



Better Barnsley New Library Barnsley

Ground Investigation Report

On behalf of Barnsley Metropolitan Borough
Council

Report 23-29-17-1-6002/GIR1
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Executive Summary

SITE INFORMATION	
Client	Barnsley Metropolitan Borough Council.
Site	Better Barnsley New Library.
Location	May Day Green, Barnsley, S70 1DD (nearest). NGR 434671, 406312.
Approximate area	0.1Ha.
Current land use	Former retail (shops).
Proposed development	Demolish existing shops and replace with new library, café and retail unit.

SITE SETTING	
Geology	Pennine Middle Coal Measures. No superficial deposits shown. Made Ground is anticipated to be present on the site.
Hydrogeology	Secondary A Aquifer. The site does not lie within a source protection zone.
Hydrology	The nearest surface water is a culvert, Slough Dyke, which runs along the northern boundary of the site.
History	The site was originally part of May Day Green, which was historically the site of fairs and markets in Barnsley. From the 18 th Century a number of small works and cottages started to encroach onto the site. The area is currently part of the commercial core of Barnsley. The current buildings were redeveloped in the mid to late 20 th Century.

INVESTIGATION	
Previous site investigations	Phase 1 Desk Study Report by Hamson Barron Smith (ref 12-17-16-16001/DSR1 dated April 2015). Report covered May Day Green and adjacent market hall.
This site Investigation	• Six windowless sample boreholes, three extended with rotary open-hole drilling. • Three dynamic probes. • Two gas/water monitoring standpipes. • Three machine excavated trial pits.
Monitoring	Six gas and groundwater level monitoring visits.
Ground conditions	Between 4.30m and 6.40m of Made Ground over bedrock of the Pennine Middle Coal Measures. No groundwater was recorded during the investigation and the standpipes were recorded as dry during subsequent monitoring. Historical monitoring recorded groundwater typically between 5m and 8m bgl.



GEOTECHNICAL	
Foundations	Based on the ground conditions encountered, conventional spread foundations are unlikely to be suitable for the proposed structure. The ground investigation has confirmed that variable Made Ground is present to depths ranging from 4.30m and 6.40m bgl. The Made Ground comprises ashy sandy gravel fill with localised reworked clays, however the strength and composition of the material varies both horizontally and vertically over the site. This stratum is therefore not suitable for conventional spread foundations and the depth is too great to extend the foundation into the underlying natural strata. Piled foundations will therefore be required.
Shrinkable soils	Soils are non-shrinkable.
Buried concrete	DS1 & AC1.
Floor slabs	Suspended floors recommended.
Gas protection	No gas protection measures required. No radon protection measures required.
Natural cavities	None expected.
Mining	The 2008 previous report concluded that it is considered that the likelihood of shallow unrecorded abandoned workings being extensive beneath the site is very low

CONTAMINATION	
Human health	No significant risks identified.
Controlled waters	No significant risks identified.
Water supply pipes	Localised elevated concentrations of hydrocarbons have been encountered, which may have the potential to attack plastics. Confirmation should be sought from the water supply company at the earliest opportunity as to their specific requirements.
Remediation	No remediation required.

1 Introduction

In April 2016 Hamson Barron Smith Ltd (HBS) was appointed by Barnsley Metropolitan Borough Council to plan, design, procure and interpret an intrusive investigation ground investigation at Better Barnsley New Library, Barnsley.

It is understood that site redevelopment includes for the demolition of the existing building. The proposal is to construct a three storey library building with rooftop terraced area, two stairwells and service risers and a lift; a central adjoining two storey cafe (ground floor café with part mezzanine seating area and roof area for public access) and a shell and core element to the South West corner of the site to give flexible retail accommodation over three floors.

A provisional ground floor layout produced by the architect, Intelligence Buildings Infrastructure, has been provided by NPS Group (reference drawing number BBTC_IBI_LR_A_G200_PL_00 revision T1 14 October 2016) and is presented in Appendix A.

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

1.1 Project Requirements and Scope of Works

The objectives of the investigation were to:

- Develop a ground model for the site.
- Quantitatively assess the potential nature and extent of contamination from those uses and the environmental risks and liabilities which may be posed to the identified receptors (human health and the environment).
- Assess any potential geotechnical risks.
- Provide geotechnical recommendations to assist in construction design.
- Establish the existing foundations on the party wall (Burlington Arcade properties).



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

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

1.2 Information Sources

During the production of this report the following sources have been reviewed:

- Rogers Geotechnical Services Ltd, Factual Report, Better Barnsley May Day Green Shops, report reference J3579/16/E Rev 1 dated 21 November 2016.
- Historic Ordnance Survey maps.
- British Geological Survey Maps.
- British Geological Survey website.
- Environment Agency landfill records.
- Environment Agency groundwater data.
- BRE 211 "Guidance on protective measures for new buildings" 2007.

1.3 Previous Investigations

A Preliminary Land Contamination and Geotechnical Risk Assessment for the site has been undertaken by HBS (formerly Robson Liddle Limited) in April 2015 (report reference 12-17-16-1-6001/DSR1). This report covers both the library site and the adjacent shopping centre.

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

2 Site Location

Address: Better Barnsley New Library, May Day Green, Barnsley.

Post Code: S70 1DD (nearest).

National Grid Reference: 434671, 406312.

The site is located in central Barnsley in the markets area off Eldon/Kendray Streets on the edge of the proposed regeneration area as shown on Figure 1. Mayday Green and Queen Street are pedestrianized areas.



Figure 1 Site Location Plan

3 Site Description

The site current comprises an existing two storey commercial building (circa 1960s reinforced concrete structure) which is due to be demolished. A concrete and asphalt ramp structure is present to the northern boundary which leads to a first floor exposed parking deck. Adjoining the ramp at the western edge of the site is a row of Victorian terraced houses on Burlington Arcade with a three storey framed building to the South.

3.1 Photographs



Photograph 1 The shop fronts on May Day Green, looking north west.





Photograph 2 The ramp to the rear of the shops leading to the roof top car park, looking south east.





Photograph 3 The roof top car park, looking south east.





Photograph 4 Burlington Arcade – properties sharing a party wall with the May Day Green shops, looking south east.



4 Summary of Previous Work

A Preliminary Land Contamination and Geotechnical Risk Assessment for the site has been undertaken by HBS (formerly Robson Liddle Limited) in April 2015 (report reference 12-17-16-1-6001/DSR1). This report covers both the library site and the adjacent shopping centre.

During the production of this report historical information, including an initial desk study and subsequent investigation and assessment reports on Barnsley Town centre redevelopment have previously been developed for the wider city centre site by Wardell Armstrong (WA) LLP, were reviewed. These reports including:

- Barnsley Markets and Adjacent CEAG Sites, Preliminary Stage 1 (Pre-demolition) Site Investigation Report. Wardell Armstrong, 2007. (Report Number SD07-00120).
- Barnsley Markets and Adjacent CEAG Sites, Stage 2 (Pre-demolition) Site Investigation Report. Wardell Armstrong, 2008. Report Number SD08-0061.
- Soil Mechanics Factual Report on Ground Investigation, May 2008, Report ref A8017.

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

- Based on BRE 211 and the Groundsure GeoInsight report it is considered that radon protection measures would not be required for residential dwellings. Radon protection requirements for non-residential buildings are not covered by BRE 211 or the site specific reports and confirmation of any protection measures should be agreed with the local authority building control.
- A series of previous site investigations have been prepared for the site and were considered in the preparation of this report. The site was originally part of May Day Green, which was historically the site of fairs and markets in Barnsley. From the 18th Century a number of small works and cottages started to encroach onto the site. The area is currently part of the commercial core of Barnsley. The current buildings were redeveloped in the mid to late 20th Century.
- Ground conditions comprise a variable depth of Made Ground (typically 3 to 4m thick; max 6m) over Glacial Till over Pennine Middle Coal Measures. The

Coal Measures comprise weak to moderately strong mudstone with interbedded siltstone and sandstone. Three coal seams were recorded from 0.3m bgl (beneath market basement) to 32m bgl.

- The 2008 previous report concluded that it is considered that the likelihood of shallow unrecorded abandoned workings being extensive beneath the site is very low and if present would likely be of a very limited nature. The subsequent risk of potential surface subsidence is low. However, given the sensitive nature of the development precautionary measures were recommended where the Winter/Abdy coal is present beneath the development area i.e. beneath the Market basement area.
- No sources of ground gas were identified on or in the vicinity of the site. Gas monitoring was undertaken as part of the 2008 investigation. It recorded a worse case gas screening value of 0.06l/h and classified the site as a CIRIA Characteristic Situation 2.
- The investigations undertaken in 2007 and 2008 confirmed that concentrations of metals, semi-metals and non-metals recorded across the site were not considered to present a significant possibility of significant harm to long term human health. It also identified visual and olfactory evidence for hydrocarbon contamination at several locations. The extent of any significant contamination was recorded as limited to relatively small and discrete areas. The key areas identified as potentially requiring further assessment and/or remediation included May Day Green (Benzo(a)pyrene) and Markets Basement (TPH).
- At the time of the 2008 investigation, the contaminated Made Ground within the May Day Green hotspot was scheduled for removal as part of the redevelopment and therefore was not considered to present a significant risk to long-term human health. If these materials are to be left insitu as part of the current development a quantitative risk assessment would be required to establish the risk to human health and environmental receptors.
- Further assessment in the form of a detailed quantitative risk assessment was recommended to establish the risk posed by identified contamination within the Markets Basement hotspot to human health and environmental receptors. This should also include generation of remedial targets if required.

5 Ground Investigation

The intrusive investigation was designed and specified by HBS. The works were undertaken by Rogers Geotechnical Services (Rogers) who were appointed by Henry Boot Construction.

The works comprised the following

- Six windowless sampler boreholes with three extended with rotary open hole drilling.
- Three dynamic probes.
- Three machine dug trial pits.

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

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

The approximate positions of the exploratory holes are shown on the Exploratory Hole Location Plan Drawing 23-29-17-1-6002 D01 in Appendix B and the exploratory hole records are included in Rogers factual report which is presented in Appendix C.

A summary of the works undertaken by Rogers is given below. Full details are outlined in the factual report which is presented in Appendix C.

5.1 Trial Pits

Three trial pits (MDG TP1 to MDG TP3) were excavated to depths varying between 1.50 and 2.10m in order to reveal the nature of the near surface soils and the extent and type of foundations to the rear of the existing building, using a tracked mini-excavator.

Detailed descriptions of the strata encountered, samples taken, groundwater observations and excavation stability notes, together with any other pertinent

information observed, are included on the trial pit records, which are included in Rogers factual report which is presented in Appendix C.

5.2 Windowless Sampler Boreholes

Six boreholes (MDG WS1 to MDG WS6) were formed to depths of between 1.80m and 5.00m using windowless sampling techniques in order to obtain samples for laboratory testing and to provide geotechnical information for foundation design. On meeting refusal, three of the boreholes (MDG WS1/RO1 to MDG WS3/RO3) were progressed to 20.0m bgl by rotary open-hole drilling techniques.

A detailed description of all strata and groundwater encountered, samples, in situ tests and other pertinent information observed are which are included in Rogers factual report which is presented in Appendix C.

5.3 Laboratory Testing

5.3.1 General

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

5.3.2 Geotechnical Testing

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

- Four Particle Size Distribution (PSD) tests
- Three natural moisture contents
- One Atterberg Limits
- Seven BRE SD1 sulphate suites

The results are included in Rogers factual report which is presented in Appendix C.

5.4 Chemical Testing

Twenty four samples of soils were retained from the exploratory holes and were scheduled for chemical laboratory testing. The soil samples were analysed for a combination of the following:



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

Thirteen soil sample was also submitted to leachate testing to assess the potential for any determinant to become mobile. Four soil samples were submitted for waste acceptance criteria (WAC) testing to assist with determining the acceptability for landfill classes of the soil.

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

6 Ground Conditions

6.1 General

The results of this investigation were consistent with the anticipated geology. Within all of the exploratory holes Made Ground was recorded to between 4.30m and 6.40m bgl overlying the Pennine Middle Coal Measures. A summary of the strata encountered is presented in Table 1 and discussed in sections 6.2 to 6.5. For full details of the strata encountered reference should be made to the exploratory hole logs in Appendix C.

Table 1 Ground Conditions

Stratum	Depth to Base (m bgl)									
	WS1/ RO1	WS2/ RO2	WS3/ RO3	WS4	WS5	WS6	TP1	TP2	TP3	TP3 Ext
Hardstanding (concrete)	0.30	0.40	0.35	0.60	0.48	0.50	0.22	0.50	0.20	0.30
Made Ground (Sandstone fill)	4.50	4.30	6.40	4.94	4.76	1.80*	2.00*	2.00*	0.70*	1.50*
Pennine Middle Coal Measures	20.00*	20.00*	20.00*	5.00*	5.00*	-	-	-	-	-
Groundwater	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry

* base of hole

6.2 Hardstanding

Hardstanding was recorded in all of the exploratory holes. The hardstanding comprises a concrete floor slab 0.22m to 0.50m thick. The trial pits confirmed that the concrete floor slab was reinforced with 6mm diameter bar, bi-directional at 200mm centres. The reinforcement was present in the concrete slab at depths varying between 0.12m and 0.38m.

6.3 Made Ground

Made Ground materials were encountered in all locations to depths ranging from 4.30m to 6.40m bgl. The materials were generally granular comprising a mixture of sandstone fill, brick, coal and ash fill, very sandy coarse gravel and slightly clayey gravelly sand.

In WS1/RO1 and WS2/RO2 a concrete slab / obstruction was recorded between 1.90m and 2.20m bgl and 1.80 and 2.10m bgl respectively.

In WS4, WS5 and TP1 the lower layer of Made Ground was recorded as comprising soft to firm slightly gravelly clay with cobbles of sandstone (noted to comprise broken flag stone pieces) – possible reworked weathered Pennine Coal Measures. This

stratum was recorded from 2.00m to 4.94m bgl in WS2, 2.10 to 4.76m bgl in WS5 and from 1.15m to the base of the hole at 2.0m bgl in TP2.

6.4 Pennine Middle Coal Measures

The Made Ground was underlain by the solid geology of the Pennine Middle Coal Measures. This material typically comprises sandstone with interbedded layers of mudstone and sandstone with siltstone bands; intact bedrock was encountered at depths of 4.50m to 6.40m bgl.

In WS2/RO2 weathered bedrock comprising a brown clay which was recorded from 4.30m to 5.20m bgl.

Thin intact coal seams were recorded in two of the rotary holes. The coal was present from 7.3m to 7.6m bgl in WS1/RO1 and from 8.80m to 9.20m bgl in WS2/RO2.

6.5 Groundwater

No groundwater was encountered during the intrusive works.

6.6 Field Observations of Contamination

No visual evidence of contamination was recorded; however olfactory evidence was identified in the two locations.

- WS1/RO1 between 2.20 and 2.60m bgl in the coal ash fill.
- WS5 slight organic odour at 1.0m bgl.

6.7 Shrinkable Soils

Cohesive soils (clay and silt) may undergo volume change when subject to changes in moisture content. This can cause ground movement of soils where seasonal changes or tree root action affect the moisture content. Where foundations are constructed in such soils these movements can lead to damage of the superstructure. These movements are greatest where trees are removed or tree root systems are severed as this allows the soils to regain their equilibrium moisture content resulting in expansion.

Shrinkable soils are generally considered as soils containing greater than 35% fine particles and having a modified plasticity index (I_p) of 10% or greater. The Modified

Plasticity Index is defined as the Plasticity Index (I_p) of the soil multiplied by the percentage of particles less than 425µm.

The plasticity index of one soil samples of the cohesive Mae Ground strata was 18%, with a percentage of the soil <425µm of 88%. The calculated modified plasticity index was 16%. On this basis of the modified plasticity index, the cohesive soils would therefore be considered to be of **low volume change potential** with respect to NHBC Chapter 4.2

The NHBC define shrinkable soils as those soils containing greater than 35% fine particles (< 63µm) and having a modified plasticity index (I_p) of 10% or greater. The results of two particle size distribution tests on samples of the granular Made Ground strata recorded < 63µm fractions ranging from 9 to 11%. On this basis the granular Made Ground tested is not considered to be shrinkable and no precautions are needed in this regard.

6.8 Soil Strength

The corrected N60 values of the Standard Penetration Tests (SPTs) ranged from 8 to 127 in the granular Made Ground and 7 to 33 in the cohesive Made Ground (see Figure 2). The SPT hammer energy ratio for the drilling rig is 69% for the rig which drilled WS/RO1 to WS/RO3 and 75% for the rig which drilled WS4 to 6, a copy of the energy ratio certificates are included with Rogers factual report in Appendix C.

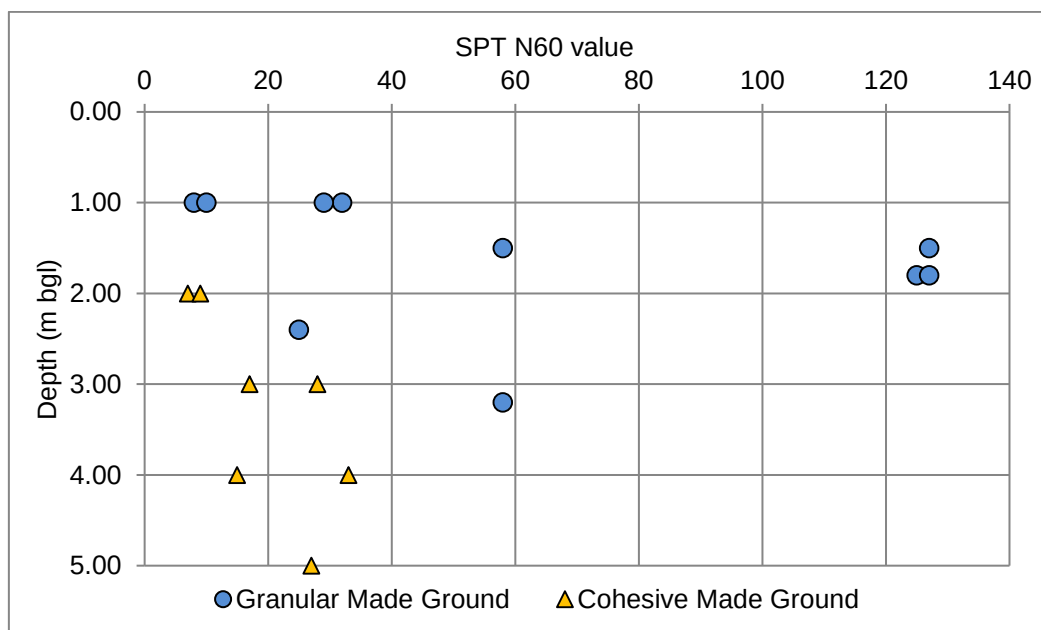


Figure 2 Corrected SPT N values

6.9 Existing Foundation Details

Three machine dug trial pits were excavated along the party wall to establish the height of the retaining wall and its existing foundations.

Trial Pit, TP1, was excavated to the north of the existing building within the unit which formerly held “Lets go Potty”. The base of the foundation for the retaining wall was recorded at 1.40m bgl.

Trial Pit, TP2, was excavated centrally along the party wall of the existing building within the unit which formerly held “Superdrug”. The base of the foundation for the retaining wall was recorded at 1.80m bgl.

Trial Pit, TP2, was excavated centrally along the party wall of the existing building within the unit which formerly held a store selling furniture. The base of the foundation for the retaining wall was recorded at 1.50m bgl.

A sketch section of the foundation and strata encountered are included in Rogers factual report which is presented in Appendix C.

7 Geotechnical Assessment

7.1 Proposed Development

It is understood that site redevelopment includes the demolition of the existing building. The proposal is to construct a three storey library building with rooftop terraced area, two stairwells and service risers and a lift. A central adjoining two storey cafe (ground floor café with part mezzanine seating area and roof area for public access); and a shell and core element to the South West corner of the site to give flexible retail accommodation over three floors. A preliminary ground floor layout plan was provided by NPS Group. A copy of this plan is included in Appendix A.

7.2 Summary of Ground Conditions

The investigation identified between 4.30m and 6.40m of Made Ground over bedrock of the Pennine Middle Coal Measures.

No groundwater was recorded during the investigation and the standpipes were recorded as dry during subsequent monitoring.

7.3 Foundation Design Principles

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

7.4 Foundation Design

Based on the ground conditions encountered, conventional spread foundations are unlikely to be suitable for the proposed structure.

The ground investigation has confirmed that variable Made Ground is present to depths ranging from 4.30m and 6.40m bgl. The Made Ground comprises ashy sandy gravel fill with localised reworked clays, however the strength and composition of the material varies both horizontally and vertically over the site. This stratum is therefore not suitable for conventional spread foundations and the depth is too great to extend the foundations into the underlying natural strata.

7.5 Piled Foundations

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

Potential issues that may need to be addressed are:

- The presence of obstructions within the Made Ground. Locations may need to be probed or pre-excavated prior to piling.
- The sandstone bedrock may present difficulties with driven pile penetration.
- Piling can result in connection of groundwater bodies and although the results of the generic quantitative land contamination risk assessment indicates that the soils present are unlikely to pose a risk to groundwater, we would recommend early agreement with the Environment Agency to ensure that they are satisfied that works will not have a detrimental impact on water bearing aquifers present at the site.

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

In order to ensure the safe operation of tracked plant (e.g. piling rigs, cranes etc), it will be necessary to design a suitable working platform. This design must be based on the specific piling rig used and therefore is outside the scope of this assessment.

7.6 Floor Slabs

Ground bearing floor slabs placed directly on the Made Ground are not recommended. For smaller piled structures suspended floor slabs would be required. It also may be possible to support suspended floors on dedicated piles. A ground bearing floor slab

may be used if ground improvement is undertaken. Specialist ground improvement contractors would be able to advise on this.

No gas protection measures are required.

Reference to BRE 211 (2007) indicates that no radon protective measures are required in the construction of new buildings.

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

7.7 Buried Structures

Notwithstanding the ground conditions revealed by the intrusive investigations, it is important to note that both foundation and ground floor slab construction could be significantly influenced by pre-existing subsurface construction, associated with the historical development of the site. This could include, for example, foundations and underground services, infilled pits and channels, which will need to be treated / managed as part of the development works. In particular, the foundations along the party wall, concrete obstructions within the Made Ground and a drain which runs in the vicinity of the party wall – identified in TP3.

7.8 Concrete Protection

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

Chemical Analysis was undertaken on seven of the Made Ground soil samples for pH and a total potential sulphate suite (water soluble sulphate, total sulphate and total sulphur).

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

The pH values were 7.4 to 10.9 with water soluble sulphate concentrations of 10mg/l to 110mg/l. Therefore, it is recommended that a Design Class of DS1 and AC1 should be assumed for buried concrete in accordance with BRE Special Digest 1 assuming natural ground and mobile groundwater conditions.



7.9 Excavations

Conventional mechanical backhoe excavators should prove suitable for excavation within the weathered bedrock. The foundations to the existing structures on the site may require heavier plant to remove where they interfere with the proposed foundations. In addition, concrete obstructions were recorded in a number of locations which are likely to require heavier plant to penetrate.

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

No groundwater was encountered during the investigation. During a subsequent monitoring visit the well were recorded as dry.

8 Contamination Risk Assessment

The primary legislative mechanism for contaminated land management in the UK is Part 2A of the Environmental Protection Act, 1990 (EPA). Part 2A was introduced into the EPA under Section 57 of the Environment Act 1995 to help deal with the substantial legacy of land contamination. It focuses on the identification and remediation of land which is in such a condition by reason of contamination that it gives rise to significant harm or the significant possibility of significant harm to certain named receptors, or gives rise to pollution of controlled waters or the likelihood of such pollution.

Local authorities are the principal regulator for inspection of land under Part 2A. In England, Part 2A is described fully in DEFRA Circular 01/2006, which also contains the statutory guidance (DEFRA, 2006). Part 2A defines contaminated land as:

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

- a. significant harm is being caused or there is a significant possibility of such harm being caused; or*
- b. Pollution of controlled waters is being, or is likely to be, caused.’*

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

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

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

Part 2A is designed to ‘enable the identification and remediation of land on which contamination is causing unacceptable risks to human health or the wider environment. It does not necessarily include all land where contamination is present, even though such contamination may be relevant in the context of other regimes’. It is not directed

to assessing risks in relation to a future use of the land that would require a specific grant of planning permission.

The control of development and land use in the future is the responsibility of the planning system. A fundamental principle of sustainable development is that the condition of land, its use and its development should be protected from potential hazards. The National Planning Policy Framework (NPPF) requires the developer to obtain adequate site information to confirm that the site is suitable for its proposed use.

NPPF States that *'to prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location.'*

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

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

8.1 Introduction to Human Health Risk Assessment

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

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

- LQM/CIEH 'Suitable 4 Use Levels' (S4ULs) where available, or

- DEFRA C4SL Health Criteria Values (March 2014),

The proposed development is a public library which is not a standard land use. The proposed development will comprise 100% hardstanding (building) and users of the building will be transient in the building therefore a '**commercial**' end use has been assumed for the assessment.

The % total organic carbon (TOC) for the soils samples ranges from <0.2% to 7.7%, average 1.51%. From this the Soil Organic Matter (SOM) can be calculated. The Environment Agency Briefing Note 7 (EA, 2005) states that %SOM = %TOC/0.58. Therefore, for the site the SOM ranges from <0.34% to 13.28%, average 2.33%. Where the assessment criteria are reliant on Soil Organic Matter (SOM); assessment criteria derived for 1.0% SOM have been used.

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

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

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

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

- The Alternative Hypothesis is that the level of contamination is lower than the critical concentration.

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

8.2 Soil Assessment

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

The chemical analysis was undertaken at Chemtest laboratories. The results are included in in Rogers' factual report which is presented in Appendix C.

8.2.1 Asbestos

All twenty four of the soils samples were screen for asbestos. No Asbestos was recorded in any of the samples.

8.2.2 Heavy Metals

The results of the chemical analysis for heavy metal concentrations within the soil samples are summarised in Table 2.

Table 2 Summary of Heavy Metals

Determinant	GAC	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
Arsenic	640	2.70	59	Yes	100%
Boron (w/s)	240,000	<0.40	0.88	Yes	100%
Cadmium	190	<0.10	0.28	Yes	100%
Chromium (total)	8,600	6.40	18	Yes	100%
Chromium (VI)	33	<0.50	<0.5	Yes	100%
Copper	68,000	6.10	120	Yes	100%
Lead	2330*	7.80	10000	No	93%
Mercury	58	<0.10	3.60	Yes	100%
Nickel	980	15.00	43	Yes	100%
Selenium	12,000	<0.20	0.55	Yes	100%
Zinc	730,000	15.00	93	Yes	100%

Results in mg/kg unless stated otherwise

GACs are LQM GAC unless stated otherwise; *DEFRA C4SL

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

Based on the full metals datasets for the near surface soils the Statistical Calculator indicates that we can be 99% to 100% confident in rejecting the Null Hypothesis for the planning scenario with the exception of lead. This result indicates that the observed metals concentrations within the near surface soils are unlikely to pose any significant risks to human health in a Planning context, with the exception of lead.

Lead concentrations are elevated with respect to the GAC for an industrial/commercial end use and therefore could pose a risk to human health. The lead results, which ranged from 7.8mg/kg to 1000mg/kg, included two concentrations (8%) in excess of the LQM S4UL.

The presence of buildings over all of the site will break the pathway between the source and the end user and therefore remove the potential risk. Therefore, with respect to human health no action will be required beneath areas of hardstanding.

8.2.3 Polyaromatic Hydrocarbons

The results of the chemical analysis for Polyaromatic Hydrocarbons (PAH US-EPA16) are summarised in Table 3.

Table 3 Summary of Polyaromatic Hydrocarbons

Determinant	GAC	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
Acenaphthene	84,000	< 0.10	26	Yes	100%
Acenaphthylene	83,000	< 0.10	8.20	Yes	100%
Anthracene	520,000	< 0.10	41	Yes	100%
Benz(a)anthracene	170	< 0.10	64	Yes	100%
Benzo(a)pyrene	35	< 0.10	49	Yes	99%
Benzo(b)fluoranthene	44	< 0.10	63	Yes	99%
Benzo(ghi)perylene	3,900	< 0.10	25	Yes	100%
Benzo(k)fluoranthene	1,200	< 0.10	30	Yes	100%
Chrysene	350	< 0.10	77	Yes	100%
Dibenz(a,h)anthracene	3.5	< 0.10	10	No	92%
Fluoranthene	23,000	< 0.10	130	Yes	100%
Fluorene	63,000	< 0.10	25	Yes	100%
Indeno(1,2,3-cd)pyrene	500	< 0.10	27	Yes	100%
Naphthalene	190	< 0.10	130	Yes	100%
Phenanthrene	22,000	< 0.10	140	Yes	100%

Determinant	GAC	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
Pyrene	54,000	< 0.10	130	Yes	100%

Results in mg/kg unless stated otherwise

GACs are LQM S4UL for SOM of 1% unless stated otherwise

*DEFRA C4SL

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

Based on the full PAH datasets the Statistical Calculator indicates that we can be 99% to 100% confident in rejecting the Null Hypothesis for the planning scenario with the exception of Dibenz(a,h)anthracene. This result indicates that the observed PAH concentrations are unlikely to pose any significant risks to human health in a Planning context exception of Dibenz(a,h)anthracene.

Dibenz(a,h)anthracene concentrations exceeding the S4UL soil guideline values have been recorded in the Made Ground in WS/RO2 at 1.5m bgl, WS4 at 1.6m bgl. TP2 at 1.7m bgl and TP3Ext at 1.5m bgl. No other PAH compounds were recorded concentrations exceeding the S4UL.

Dibenz(a,h)anthracene is not present at concentrations which would be volatile. The presence of buildings over all of the site will break the pathway between the source and the end user and therefore remove the potential risk. Therefore, with respect to human health no action will be required beneath areas of hardstanding.

8.2.4 Petroleum Hydrocarbons and BTEX

All soil samples were analysed for total petroleum hydrocarbons (TPH CGW) in an aromatic/aliphatic split and BTEX (benzene, toluene, ethylbenzene and xylene), the results of which are summarised in Table 4.

Table 4 Summary of Petroleum Hydrocarbons

Determinant	GAC	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
EC>5-6 Aliphatic	3,200	< 1.0	<1.0	Yes	100%
EC>6-8 Aliphatic	7,800	< 1.0	<1.0	Yes	100%
EC>8-10 Aliphatic	2,000	< 1.0	11	Yes	100%
EC>10-12 Aliphatic	9,700	< 1.0	43	Yes	100%
EC>12-16 Aliphatic	59,000	< 1.0	64	Yes	100%

Determinant	GAC	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
EC>16-35 Aliphatic	1,600,000	< 1.0	415	Yes	100%
EC>35-44 Aliphatic	1,600,000	< 1.0	87	Yes	100%
EC>5-7 Aromatic	26,000	< 1.0	<1.0	Yes	100%
EC>7-8 Aromatic	56,000	< 1.0	<1.0	Yes	100%
EC>8-10 Aromatic	3,500	< 1.0	280	Yes	100%
EC>10-12 Aromatic	16,000	< 1.0	2000	Yes	100%
EC>12-16 Aromatic	36,000	< 1.0	2000	Yes	100%
EC>16-21 Aromatic	28,000	< 1.0	3400	Yes	100%
EC>21-35 Aromatic	28,000	< 1.0	7700	Yes	100%
EC>35-44 Aromatic	28,000	< 1.0	120	Yes	100%

Results in mg/kg unless stated otherwise

GACs are LQM S4UL for SOM of 1% unless stated otherwise

All available TPH and BTEX soil data have been incorporated within the Statistical Calculator. The key inputs to and outputs from the Calculator tool are included in Appendix D.

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

8.2.5 Volatile Organic Compounds (VOC)

All soil samples were analysed for a suite of volatile organic compounds (VOC), the results of which are summarised in Table 5.

Table 5 Summary of Volatile Organic Compounds

Determinant	GAC (mg/kg)	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
Dichlorodifluoromethane	NA	< 0.001	< 0.001	Yes	100%
Chloromethane	1	< 0.001	< 0.001	Yes	100%
Vinyl Chloride	0.063	< 0.001	< 0.001	Yes	100%
Bromomethane	NA	< 0.020	< 0.020	Yes	100%
Chloroethane	NA	< 0.002	< 0.002	Yes	100%
Trichlorofluoromethane	NA	< 0.001	< 0.001	Yes	100%
1,1-Dichloroethene	2330	< 0.001	< 0.001	Yes	100%
Trans 1,2-Dichloroethene	22	< 0.001	< 0.001	Yes	100%
1,1-Dichloroethane	1830	< 0.001	< 0.001	Yes	100%
cis 1,2-Dichloroethene	14	< 0.001	< 0.001	Yes	100%



Determinant	GAC (mg/kg)	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
Bromochloromethane	NA	< 0.005	< 0.005		
Trichloromethane	NA	< 0.001	< 0.001		
1,1,1-Trichloroethane	700	< 0.001	< 0.001	Yes	100%
Tetrachloromethane	NA	< 0.001	< 0.001		
1,1-Dichloropropene	NA	< 0.001	< 0.001		
Benzene	27	< 0.001	0.014	Yes	100%
1,2-Dichloroethane	0.71	< 0.002	< 0.002	Yes	100%
Trichloroethene	12	< 0.001	< 0.001	Yes	100%
1,2-Dichloropropane	3.3	< 0.001	< 0.001	Yes	100%
Dibromomethane	NA	< 0.001	< 0.001		
Bromodichloromethane	2.1	< 0.005	< 0.005	Yes	100%
cis-1,3-Dichloropropene	NA	< 0.001	< 0.001		
Toluene	56000	< 0.001	0.021	Yes	100%
Trans-1,3-Dichloropropene	NA	< 0.001	< 0.001		
1,1,2-Trichloroethane	94	< 0.001	< 0.001	Yes	100%
Tetrachloroethene	NA	< 0.001	< 0.001		
1,3-Dichloropropane	NA	< 0.002	< 0.002		
Dibromochloromethane	NA	< 0.010	< 0.010		
1,2-Dibromoethane	NA	< 0.005	< 0.005		
Chlorobenzene	59	< 0.001	< 0.001	Yes	100%
1,1,1,2-Tetrachloroethane	120	< 0.002	< 0.002	Yes	100%
Ethylbenzene	5700	< 0.001	0.003	Yes	100%
m & p-Xylene	2900	0.0012	0.021	Yes	100%
o-Xylene	6600	< 0.001	0.011	Yes	100%
Styrene	3300	< 0.001	< 0.001	Yes	100%
Tribromomethane	NA	< 0.001	< 0.001		
Isopropylbenzene	1400	< 0.001	< 0.001	Yes	100%
Bromobenzene	97	< 0.001	< 0.001	Yes	100%
1,2,3-Trichloropropane	NA	< 0.05	< 0.05		
N-Propylbenzene	4100	< 0.001	< 0.001	Yes	100%
2-Chlorotoluene	NA	< 0.001	< 0.001		
1,3,5-Trimethylbenzene	NA	< 0.001	0.0048		
4-Chlorotoluene	NA	< 0.001	< 0.001		
Tert-Butylbenzene	NA	< 0.001	< 0.001		
1,2,4-Trimethylbenzene	42	< 0.001	0.009	Yes	100%
Sec-Butylbenzene	NA	< 0.001	< 0.001		
1,3-Dichlorobenzene	32	< 0.001	< 0.001	Yes	100%
4-Isopropyltoluene	NA	< 0.001	< 0.001		
1,4-Dichlorobenzene	4500	< 0.001	< 0.001	Yes	100%
N-Butylbenzene	NA	< 0.001	0.0017		
1,2-Dichlorobenzene	2100	< 0.001	< 0.001	Yes	100%
1,2-Dibromo-3-Chloropropane	NA	< 0.05	< 0.05		

Determinant	GAC (mg/kg)	Concentration Range		H ₀ Rejected?	Evidence Level
		Min	Max		
1,2,4-Trichlorobenzene	230	< 0.001	< 0.001	Yes	100%
Hexachlorobutadiene	32	< 0.001	< 0.001	Yes	100%
1,2,3-Trichlorobenzene	110	< 0.002	< 0.002	Yes	100%
Methyl Tert-Butyl Ether	7900	< 0.001	< 0.001	Yes	100%

Results in mg/kg unless stated otherwise

GACs are LQM S4UL for SOM of 1% unless stated otherwise

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

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

8.2.6 Summary

Lead concentrations are elevated with respect to the GAC for an industrial/commercial end use and therefore could pose a risk to human health. The lead results, which ranged from 7.8mg/kg to 1000mg/kg, included two concentrations (8%) in excess of the LQM S4UL.

Dibenz(a,h)anthracene concentrations exceeding the S4UL soil guideline values have been recorded in the Made Ground in WS/RO2 at 1.5m bgl, WS4 at 1.6m bgl. TP2 at 1.7m bgl and TP3Ext at 1.5m bgl. No other PAH compounds were recorded concentrations exceeding the S4UL.

Dibenz(a,h)anthracene is not present at concentrations which would be volatile. The presence of buildings over all of the site will break the pathway between the source and the end user and therefore remove the potential risk. Therefore, with respect to human health no action will be required beneath areas of hardstanding.

8.3 Controlled Waters

A typical GQRA for controlled waters comprises:

- comparison of detected concentrations in soil leachate with GAC to assess the potential risk posed to the groundwater receptor. The GAC selected for groundwater are the UK Drinking Water Quality Standards (DWS); and
- comparison of detected concentrations in soil leachate with GAC to assess the potential risk posed to the surface water receptors. The GAC selected for surface water are the Environmental Quality Standards (EQS). Robson Liddle considers that one pathway to surface water receptors is migration within groundwater. Therefore, if the contaminant is below the GAC in groundwater, it is unlikely to be above the GAC at the surface water receptor into which the groundwater may discharge, unless other factors are operating.

For groundwater, if no DWS are available, then EQS have been used as GAC. For surface water, if no EQS are available, then DWS have been used as GAC. World Health Organisation (WHO) guidelines have been used as GAC if neither DWS nor EQS are available.

8.3.1 Leachate Analysis

As part of this investigation leachate testing of eight soil samples was undertaken, for a limited suite of metals determinants.

Comparison of the leachate chemical test data with the selected generic screening criteria was undertaken. The majority of the determinants recorded in the eluate generated from the eight soils samples subjected to leachate testing were below the limit of detection and all were below the appropriate GAC.

On the basis of the above we consider that soils are unlikely to pose a risk to the groundwater.

8.4 Water Pipelines

The current guidance on selection of materials for water supply pipes to be laid in contaminated land is contained in UKWIR Report 10/WM/03/02 (re-issued 2010) which sets out in Table 3.1 of that document threshold values for a selection of organic contaminants that may have a detrimental effect on pipes and fittings. However, the

document is for guidance and is not mandatory and has not been adopted universally by all water suppliers.

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

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

8.5 Ground Gas Assessment

8.5.1 Radon

A site specific radon report obtained by Wardell Armstrong (see Section 4) indicates that Basic radon protective measures should be adopted due to the underlying geology of the site.

Reference to the BRE211 (2007) Radon Atlas indicates that the site lies outside a square that requires radon protection. This is confirmed by the Groundsure GeoInsight report, which states that the site is in an area where the estimated probability of a home being above the action level of 200Bqm^{-3} is less than 1%, which would not normally require any radon protective measures for new dwellings or extensions.

It is likely that the site specific report obtained by Wardell Armstrong included the square to the north within its 150m search buffer.

Based on BRE 211 and the Groundsure GeoInsight report it is considered that radon protection measures would not be required for residential dwellings. Radon protection requirements for non-residential buildings are not covered by BRE 211 or the site specific reports and confirmation of any protection measures should be agreed with the local authority building control.

8.5.2 Landfill Gas

The risks associated with the ground gases methane (CH_4) and carbon dioxide (CO_2) are assessed using BS 8485:2007 (Code of practice for the characterisation and

remediation from ground gas in affected developments) and guidelines from CIRIA 665 (Wilson et al 2007) and the NHBC (Boyle and Witherington 2007).

No current or historical landfills are known to exist within 250m of the site. No organic soils, evidence of buried biodegradable materials were identified on the site. Previous investigations have identified a hydrocarbon contamination beneath the adjacent Market Building, located south of the site. In addition, the site lies within an area where coal reserves may be present near surface.

Consequently, the risks to end users from explosive or asphyxiating gases is considered low.

Current UK best practice guidance suggests that the ground gas assessment and characterisation for a site is dealt with separately for different types of development. In the above guidance:

- 'Situation A' covers all forms of development (residential and industrial/commercial developments), other than low rise residential development; and
- 'Situation B' is defined as the specific development of low-rise (one to three storeys in height) housing with beam and block floors, vented sub-floor void and gardens.

Based on our understanding of the likely redevelopment of the site, Situation A would be appropriate.

One of the assumptions in using the above guidance is that the worst-case ground gas regime has been identified on the site, for either CH₄ or CO₂, at the worst-case temporal conditions that the site may be expected to encounter (such as immediately following rapid changes in atmospheric pressure or prolonged rainfall). The idealised frequency of monitoring is suggested in CIRIA 665 Tables 5.5a and 5.5b. These tables are adapted from Wilson and Haines (2005) Table 3 which gives examples of ground conditions with the various gas generation potentials, ranging from inert Made Ground (very low potential) to post 1960s domestic landfill (very high potential).

It is judged from the available evidence that the gas generation potential at the site is low (Made Ground/coal reserves) and the sensitivity of the development is low

(commercial building). Consequently, an appropriate minimum monitoring regime is 6 readings over 2 months, provided other monitoring requirements are also met, such as prevailing atmospheric pressure conditions (for example, BS 8485:2007 suggests monitoring shall include a period of falling atmospheric pressure). Gas monitoring has been undertaken by Rogers and the results are included within their factual report which is presented in Appendix C.

8.5.3 Results

The results of the gas monitoring are presented in Table 6.

Table 6 Gas Monitoring Results - Maximum recorded values

Visit No	1	2	3	4	5	6
Pressure (mb)	1006	998	1006	1023	1013	1010

Borehole Ref:		WS4	WS6
Flow	Litres/hr	0.1	0.1
LEL	%	<0.1	<0.1
Methane	%	<0.1	<0.1
Carbon Dioxide	%	0.3	0.2
Oxygen	%	20.2	20.6

For Situation A (ground bearing floor) a risk based “Gas Screening Value” (GSV) is calculated using the maximum gas concentration (%) x worst case borehole flow rate (l/h). Where zero values are recorded a conservation “less than minimum” detection value is adopted. For borehole flow rate this is < 0.1l/hr and for gas detection <0.1%.

Situation A this gives $0.003 \times <0.1 = <0.0003$ l/hr, which is less than the 0.07 l/hr threshold for “CIRIA Characteristic Situation 1 - very low risk. Therefore, no gas protection measures are considered necessary.

9 Site Conceptual Model

Following the generic quantitative risk assessment, a summary of the receptors, sources and potential pollutant linkages identified for the site is presented in the following sections. This Site Conceptual Model is summarised in Table 7.

9.1 Receptors

It is understood that the site will be redeveloped for a library and associated retail (commercial) premises. Staff and visitors are assumed therefore to occupy the site part time and are unlikely to be exposed directly to soils within the site. Construction workers would be directly exposed to soils; however this would only be short term.

- Staff and visitors of the proposed development.
- Construction workers.
- Construction materials (including services).
- Groundwater – Secondary A classification.
- Surface water – Drainage ditch 100m east – considered to be at low risk.
- Flora and fauna.

9.2 Sources

9.2.1 Contaminants

Lead concentrations are elevated with respect to the GAC for an industrial/commercial end use and therefore could pose a risk to human health. The lead results, which ranged from 7.8mg/kg to 1000mg/kg, included two concentrations (8%) in excess of the LQM S4UL.

Dibenz(a,h)anthracene concentrations exceeding the S4UL soil guideline values have been recorded in the Made Ground in WS/RO2 at 1.5m bgl, WS4 at 1.6m bgl. TP2 at 1.7m bgl and TP3Ext at 1.5m bgl. No other PAH compounds were recorded concentrations exceeding the S4UL.

Dibenz(a,h)anthracene is not present at concentrations which would be volatile. The presence of buildings over all of the site will break the pathway between the source and

the end user and therefore remove the potential risk. Therefore, with respect to human health no action will be required beneath areas of hardstanding.

9.2.2 Landfill gas

No risks from ground gas have been identified.

9.2.3 Radon

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

9.3 Pathways

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

9.3.1 Receptor – Staff and Visitors

- Indoor and outdoor inhalation of dust or vapours.

9.3.2 Receptor – Construction Workers

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

9.3.3 Receptor – Buildings and services

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

9.3.4 Receptor – Groundwater

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

9.3.5 Receptor – Surface Water

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



9.3.6 Receptor – Flora and Fauna

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

Following the generic quantitative risk assessment, a summary of the potential pollutant linkages identified for the site is presented in the Site Conceptual Model in Table 7.



Table 7 Site Conceptual Model

Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
Elevated lead and dibenzo(a)anthracene identified in the Made Ground.	Human Health – future users of the site e.g. staff and visitors.	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Unlikely – elevated lead and dibenzo(a)anthracene identified in the Made Ground. Presence of hardstanding over 100% of the site will break the pathway.	Probability: Unlikely Consequence: Medium Magnitude: Low Risk
		Indirect Contact - Vapour inhalation.	Unlikely – no volatile sources identified.	Probability: Unlikely Consequence: Medium Magnitude: Low Risk
		Hydrocarbon tainting of potable water supply pipes.	Possible – localised elevated concentrations of TPH contaminants within the Made Ground which may have the potential to attack plastics	Probability: Possible Consequence: Medium Magnitude: Medium Risk
	Human Health – Construction workers	Direct contact - Dermal contact, soil ingestion and dust inhalation.	Possible – increased risk of direct contact with soils during the construction period. Risk to be manage through PPE and risk assessment.	Probability: Possible Consequence: Medium Magnitude: Low Risk
		Indirect Contact - Vapour inhalation.	Unlikely – no volatile sources identified.	Probability: Unlikely Consequence: Medium Magnitude: Low Risk
	Controlled Waters – groundwater (Secondary A Aquifer)	Leaching and percolation.	Unlikely – no mobile sources identified.	Probability: Unlikely Consequence: Low Magnitude: Low Risk
	Controlled Waters – Culverted watercourse runs along northern boundary.	Groundwater migration & run-off to surface waters carrying entrained sediment or diffuse contamination	Unlikely – no sources identified.	Probability: Unlikely Consequence: Low Magnitude: Low Risk



Potential Source and Pollutant	Receptor	Pathway	Potential Pollutant Linkage?	Probability of exposure, consequence and magnitude of risk.
	Buried structures – Aggressive ground conditions	Direct contact and/or leaching (sulphate, pH).	Unlikely – underlying geology not expected to be aggressive.	Probability: Unlikely Consequence: Medium Magnitude: Low Risk
	Ecology - existing trees and landscaping on site.	Plant uptake.	Unlikely – no sources identified.	Probability: Unlikely Consequence: Low Magnitude: Low Risk
Ground gases.	Human Health – future users of the site e.g. staff and visitors.	Permeation through ground and intrusion into buildings and structures.	Unlikely – no sources identified.	Probability: Unlikely Consequence: High Magnitude: Low Risk
	Flora	Displacement of oxygen from root systems	Unlikely – no sources identified.	Probability: Unlikely Consequence: Low Magnitude: Low Risk
Radon.	Human Health – future users of the site e.g. staff and visitors.	Permeation through ground floor.	Unlikely – protection measures required.	Probability: Unlikely Consequence: Medium Magnitude: Low Risk

10 Remedial Requirements

Lead concentrations are elevated with respect to the GAC for an industrial/commercial end use and therefore could pose a risk to human health. The lead results, which ranged from 7.8mg/kg to 1000mg/kg, included two concentrations (8%) in excess of the LQM S4UL.

Dibenz(a,h)anthracene concentrations exceeding the S4UL soil guideline values have been recorded in the Made Ground in WS/RO2 at 1.5m bgl, WS4 at 1.6m bgl. TP2 at 1.7m bgl and TP3Ext at 1.5m bgl. No other PAH compounds were recorded concentrations exceeding the S4UL.

Dibenz(a,h)anthracene is not present at concentrations which would be volatile. The presence of buildings over all of the site will break the pathway between the source and the end user and therefore remove the potential risk. Therefore, with respect to human health no action will be required beneath areas of hardstanding.

As the proposed development comprise the construction of a library, café and retail unit over the full footprint of the site, the buildings will break any pathway and therefore therefore remedial works are considered unnecessary for the proposed scheme.

10.1 Material Reuse

Based on the GQRA carried out the soil sampled does not pose a potential risk to human receptors and would be suitable for re-use beneath the proposed buildings.

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

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

Under the CL:AIRE Voluntary Code of Practice (CoP) materials excavated on-site are not deemed contaminated if suitable for re-use at specified locations or generally within



the site. Material that may have been classified as hazardous waste under the EPR may be re-used. The CoP regime requires that a 'Qualified Person' as defined under the CoP reviews the development of the Materials Management Plan, including review of Risk Assessments and Remediation Strategy/Design Statement together with documentation relating to Planning and Regulatory issues, and signs a Declaration which is forwarded to the Environment Agency and which confirms compliance with the CoP.

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



11 Recommendations for Further Work

The following further works are recommended:

- Pre-demolition asbestos survey.
- Discussions with piling contractors regarding their method for emplacing piles.
- Discussions with service providers regarding the materials suitable for pipework etc.
- Discussions with regulatory bodies regarding the conclusions of this report.
- Detailed design of foundations.

12 Limitations and Uncertainties

12.1 General

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

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

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

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

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

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



13 General Notes

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

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

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

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

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

Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on possible presence of a feature based on either



visual, verbal, written, cartographical, photographic or published evidence, this will be for guidance only and no liability can be accepted for its accuracy.

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

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

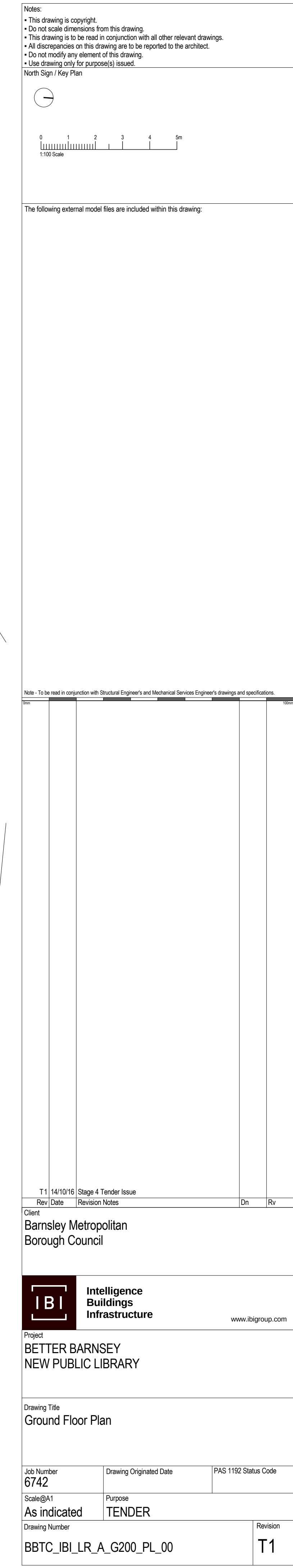
Unless specifically stated, the investigation will not take into account of possible effects of mineral extraction.

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



Appendix A

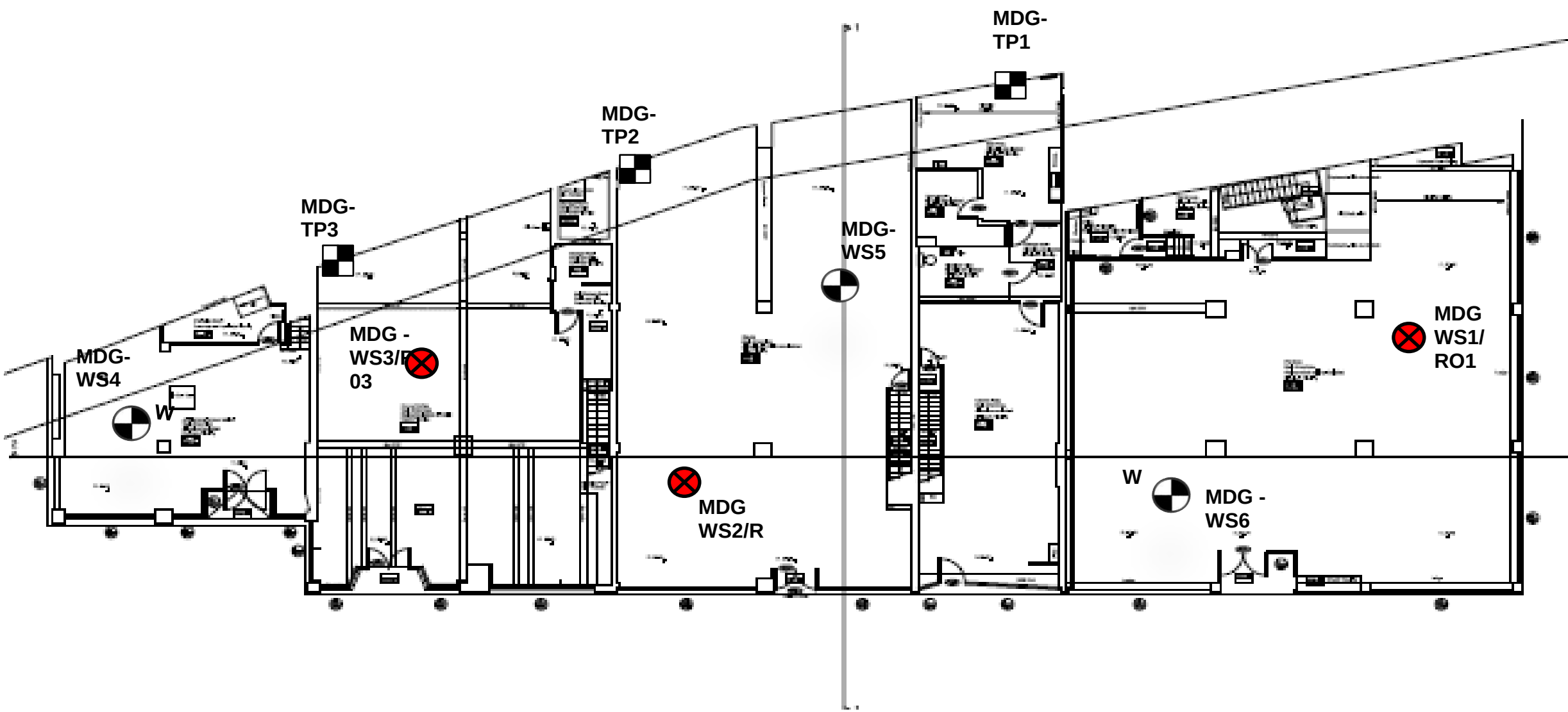
Proposed Development Plan

[illegible]



Appendix B

Exploratory Hole Plan



Project: Better Bransley Ground Investigation
Client: Henry Boot Construction Ltd
Title: Exploratory Hole Plan - Library Site
Drawing: 23-29-17-1-6002-D01
Date: 01 Nov 2016

Notes:
Hole Locations Approximate.

- Key
-  Windowless Sampler Borehole & Dynamic Probe
 -  Windowless Sampler Borehole with rotary Follow-on
 -  Machine Excavated Trial Pit
 -  W Ground / Gas Monitoring well

**Hamson
Barron
Smith**



Appendix C

Rogers Geotechnical Factual Report

**Environmental
Geotechnical
Specialists**



REPORT

job number	J3579/16/E r1	site address	Better Barnsley
date	21/11/16		Mayday Green Shops
			Mayday Green, Barnsley
written by	J. Farnsworth		S70 1SY
checked by	E. Lewis	issued by	J. Farnsworth

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GEO TECHNICAL
ENVIRONMENTAL



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Appendices

1.	Site Plan
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4.	Trialpits
5.	Laboratory Testing - Geotechnical
6.	Laboratory Testing - Chemical



Factual Report on a Ground Investigation

Location:	BETTER BARNSELEY – MAY DAY GREEN SHOPS May Day Green, Barnsley S70 1SY	
For:	Henry Boot Construction Ltd.	
Consultants:	Hamson Barron Smith Ltd.	
Report No.	J3579/16/E rev 1	Report date: November 2016

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

James Farnsworth BEng FGS
Senior Geotechnical Engineer

Emma Lewis LLB
Managing Director

1. Introduction

Henry Boot Construction propose to develop a site off May Day Green, Barnsley. It is understood that the development will comprise the demolition of the existing shops and the construction of a three storey library building, along with a café and a shop unit. Consequently, a site investigation has been undertaken in accordance with the instruction from the Client. This work was required in order to determine the nature of the underlying soils and to assess their engineering properties. This report describes the work undertaken and presents the data obtained.

2. Limitations

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



3. Fieldworks

The fieldworks were undertaken between the 22nd August and 9th September 2016 and included the following:

- Six windowless sample boreholes, three extended with rotary open-hole drilling.
- Three dynamic probes.
- Two gas/water monitoring standpipes.
- Three machine excavated trialpits.

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

3.1 Boreholes

These boreholes were sunk using a drive-in windowless sampler. The cores were undertaken in 1m lengths and reduced in diameter from 90mm for the first 1m through 80mm, 70mm and 60mm for subsequent 1m increments. Standard penetration tests (SPTs) were undertaken at 1m intervals (at the end of each sampler drive). The SPTs were conducted in accordance with the procedures given in BS1377 : 1990 : Part 9 : 3.3, and the results are summarised on the borehole records. During this work an automatic trip hammer of 63.5kg falling through 750mm was employed to drive either a cone or split barrel sampler assembly into the ground, the barrel samples were retained in air tight plastic containers. It may be appreciated that the approximate cohesion of clay soils may be obtained by multiplying the equivalent SPT value by approximately 4.5 (after Stroud, 1975).

On meeting refusal, three of the boreholes were progressed by rotary open-hole drilling techniques with 100mm diameter drag and tricone roller bits. Where necessary, 150mm diameter casing was temporarily installed in 1.5m lengths to support the bore, with a toothed lead section being utilised to assist with reaming. The drill chippings brought to surface in the flush returns were inspected by the driller on a screen which forms part of the re-circulation tanks.

The recovered cores were sealed and returned to the laboratory for logging and subsequent testing. The soils were described in general accordance with BS5930: 215, and full descriptions are given on the boreholes records which are presented in Appendix 2. Also included on these records are the sample depths, ground water levels and the percentages of *Total Core Recovery* (TCR).

3.2 Dynamic Probes

Dynamic penetration tests were proposed to be undertaken adjacent to each windowless sample position. However, due to the nature of the fill and the floor slab across the site, it was not possible to carry this work out fully, although, some probing work was possible at depth adjacent to three of the windowless sample boreholes. The probes were undertaken in accordance with the procedure given in BS1377: 1990: Part 9, using the super heavy penetrometer (DPSH). This probe consists of a 63.5kg mass falling through 750mm onto an anvil, which drives a 50mm diameter cone into the ground. The



number of blows required to drive the cone through successive 100mm increments are recorded as the N_{100} values. The results of the dynamic penetration tests are tabulated and presented as bar charts of N_{100} values versus depth in Appendix 3.

3.3 Gas/Groundwater Monitoring Standpipes

Standpipes were installed within windowless sample boreholes WS4 and WS6. It should be appreciated that whilst the installation was to the full depth of WS6, the bore of WS4 collapsed back to 1.9m below ground level before the standpipe could be installed, therefore base of installation is from this depth. The details of the installations are shown on the appropriate borehole records. In all cases, the monitoring standpipe consisted of a perforated pipe from the base of the installation to 0.8m and 0.9m below surface, with a non-perforated pipe to ground level. The response zone was filled with pea gravel, with a bentonite seal above and the installation was capped with a stop box cover in a concrete surround.

3.4 Machine Excavated Trial Pits

The trialpits were excavated in order to reveal the nature of the near surface soils and the extent and type of foundations to the rear of the existing building, using a tracked mini-excavator. In order to undertake the trialpits below the existing shop floors, a hydraulic breaker was attached to the excavator arm in order to break-out the floor. The encountered soils were logged on site in general accordance with BS5930: 2015, and full descriptions are given on the trialpit records which are presented in Appendix 4. At regular intervals throughout the excavation of the pits, samples were taken for laboratory testing. Contamination test specimens were retained in the appropriate air tight containers within cool boxes for onward transition to the chemical laboratory.

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

4. Geology

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

**Table 1: Geological Data for the Site**

Strata Type	Strata Name ¹	Previous Name ²	Description ²
Superficial Geology		None Indicated	
Solid Geology	Pennine Middle Coal Measures Formation – Kent's Rock	Middle Coal Measures	Interbedded grey mudstone, siltstone, pale grey sandstone and commonly coal seams, with a bed of mudstone containing marine fossils at the base, and several such marine fossil-bearing mudstones in the upper half of the unit.

It should be appreciated that no superficial deposits are shown to be present beneath the site. Moreover, the Kent's Rock, a named sandstone member within the Pennine Middle Coal Measures Formation, is shown to outcrop directly below the site. Regional markers suggest that the solid geology in the area dip at around 3° to the northeast.

In addition, there are four coal seams that are shown to outcrop within the vicinity of the site. These seams are summarised as follows:

Table 2: Summary of coal seams within the vicinity of the site.

Seam Name	Seam thickness ^{1*}	Outcrop distance from site ^{1*}
Low Beamshaw Coal (LBE)	0 - 1.2m	60m W
Top Beamshaw (Kilnhurst) Coal (TBE)	0 - 2.9m	30m E
Abdy (Winter) Coal (A)	0 - 1.9m	120m E
Two-Foot (Royston; Half Yard) Coal (TF)	0.1 - 2.1m	260m E
Kent's Thin Coal (KN)	0 - 1.9m	230m W
Kent's Thick (Mapplewell) Coal (KK)	0.3 - 2.6m	300m W

*All distances given are approximate. It should be noted that coal seam thicknesses vary over relatively short distances

5. Strata Conditions

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

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

² Sources: British Geological Survey (NERC) Lexicon of Named Rock Units [online resource from www.bgs.ac.uk]

**Table 3: Generalised Strata Profile**

Depth m below ground level to underside of layer	Strata Type	Positions Encountered	Groundwater Strikes m below ground level
0.2 – 0.8 2.1 – 2.2	CONCRETE	ALL	None
+1.8 – 6.4	MADE GROUND (Variable layers of sandstone gravel, brick and concrete gravel, gravelly sand and coal ash)	ALL	None
4.76 – 4.94	PROBABLE MADE GROUND (Very soft/soft, locally becoming stiff, slightly sandy silty CLAY with coal and sandstone gravel)	WS4, WS5	None
+ 4.00	PENNINE MIDDLE COAL MEASURE FORMATION (SANDSTONE with sub-ordinate mudstone and thin coal seams)	WS4, WS5, WS/RO1-3	None

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

5.1 Groundwater

No groundwater was observed during this investigation. However, it should be appreciated that the normal rate of boring does not permit the recording of an equilibrium water level for any one strike. Moreover, groundwater levels are subject to seasonal variation or changes on local drainage conditions.

6. Insitu Testing

6.1 Standard Penetration Tests

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

Table 4: Summary of Standard Penetration Tests

Strata	Depth Range (m)	SPT 'N' (Blows/300mm)			Comments
		Granular soils	Cohesive soils	Rock	
Made Ground	1 – 4	1 – +50	7 – 22	–	Variable made ground, soft to stiff where cohesive, very loose to medium dense (25) with some refusals where granular
Kent's Rock	5.0	–	–	21 for 75mm	Tests failed to achieve sufficient penetration with 21 blows for 75mm being recorded

6.2 Standpipe Monitoring



The standpipes were monitored between the 5th September and 19th October 2016. The results of the gas monitoring undertaken to date are tabulated below.

Table 5: Standpipe Monitoring								
Location	Date	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	Flow (l/hr)	Barometric Pressure (mb)	Water Level (m bgl)	Standpipe Depth (m)
WS4	05/09/16	0.0	0.2	20.2	0.1	1006	-	1.3
	12/09/16	0.0	0.3	20.5	0.0	998	-	
	28/09/16	0.0	0.2	21.0	0.0	1006	-	
	05/10/16	0.0	0.1	20.7	0.0	1023	-	
	12/10/16	0.0	0.0	20.8	0.0	1013	-	
	19/10/16	0.0	0.0	20.8	0.0	1010	-	
WS6	05/09/16	0.0	0.1	20.6	0.1	1007	-	1.7
	12/09/16	0.0	0.1	20.7	0.0	999	-	
	28/09/16	0.0	0.2	20.9	0.0	1007	-	
	05/10/16	0.0	0.2	20.6	0.0	1022	-	
	12/10/16	0.0	0.1	20.8	0.0	1013	-	
	19/10/16	0.0	0.0	20.7	0.0	1010	-	

This work was undertaken using a GA5000 ground gas analyser, serial No G503524 which was last calibrated on the 23rd August 2016.

7. Laboratory Testing - Geotechnical

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

- | | |
|--|------------------------------------|
| ▪ Moisture content determinations | BS 1377: 1990: Pt2: 3.2 |
| ▪ Index properties (4 point) | BS 1377: 1990: Pt2: 4.3, 5.3 & 5.4 |
| ▪ Particle size distribution (Wet sieve) | BS 1377: 1990: Pt2: 9.2 |
| ▪ Sedimentation by pipette | BS 1377: 1990: Pt2: 9.4 |
| ▪ Soluble sulphate content | BS 1377: 1990: Pt3: 5 |
| ▪ pH value | BS 1377: 1990: Pt3: 9 |

It should be appreciated that given the nature of the made ground, the poor sample recovery from it and the requirement for large chemical test samples, the scope of the scheduled investigation is very limited. The test results are presented in Appendix 5 and are summarised below:

**Table 6: Summary of Geotechnical Test Results**

Test type	Number of tests	Range of results		Comments
Moisture content determinations	3	12% to 19%		
Index Properties (4 Point)	1	LL	36%	Clay of intermediate plasticity.
		PL	18%	
		PI	18%	
Particle size distribution (Wet sieve)	3	Cobbles	0% to 19%	MADE GROUND (Multi-(well-) to medium graded clay/silty sandy GRAVEL locally with medium cobble content).
		Gravel	49% to 79%	
		Sand	12% to 21%	
		Clay/silt	9% to 11%	
		Cobbles	0%	MADE GROUND (Multi-(well-)graded slightly sandy gravelly CLAY).
		Gravel	35%	
		Sand	26%	
		Clay/silt	39%	
Particle size distribution (Wet sieve and sedimentation)	1	Cobbles	0%	MADE GROUND (Multi-(well-)graded slightly sandy slightly gravelly silty CLAY).
		Gravel	11%	
		Sand	23%	
		Silt	37%	
		Clay	29%	
Sulphate	7	Total SO ₄	<0.010% to 0.19%	
		Soluble SO ₄	<0.010g/l to 0.13g/l	
pH	24	pH	7.6 to 11.2	

8. Laboratory Testing - Environmental

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

Suite D

- pH, S, total/soluble SO₄²⁻.
- Mg, Cl⁻, NO₃⁻ (if triggered by pH and SO₄²⁻ results).

Suite E

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



NRA Leachate

- Dissolved Metals – Ba, Cd, Cr, Cu, Hg, Ni, Pb and Zn.
- Dissolved Semi and Non-Metals - As, B, Cl⁻, F⁻, Mo, Sb, Se, SO₄²⁻, Free CN⁻, Phenols and Organic Carbon.

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

This testing was undertaken by Chemtest Ltd and the results of all of the chemical testing are presented in Appendix 6 of this report. It should be appreciated that, to date, no water has been revealed in the standpipes installed at the site. However, should water be found in the standpipes, chemical testing will be carried out on recovered samples, the regime for that testing, along with the results, will be report under a separate cover.

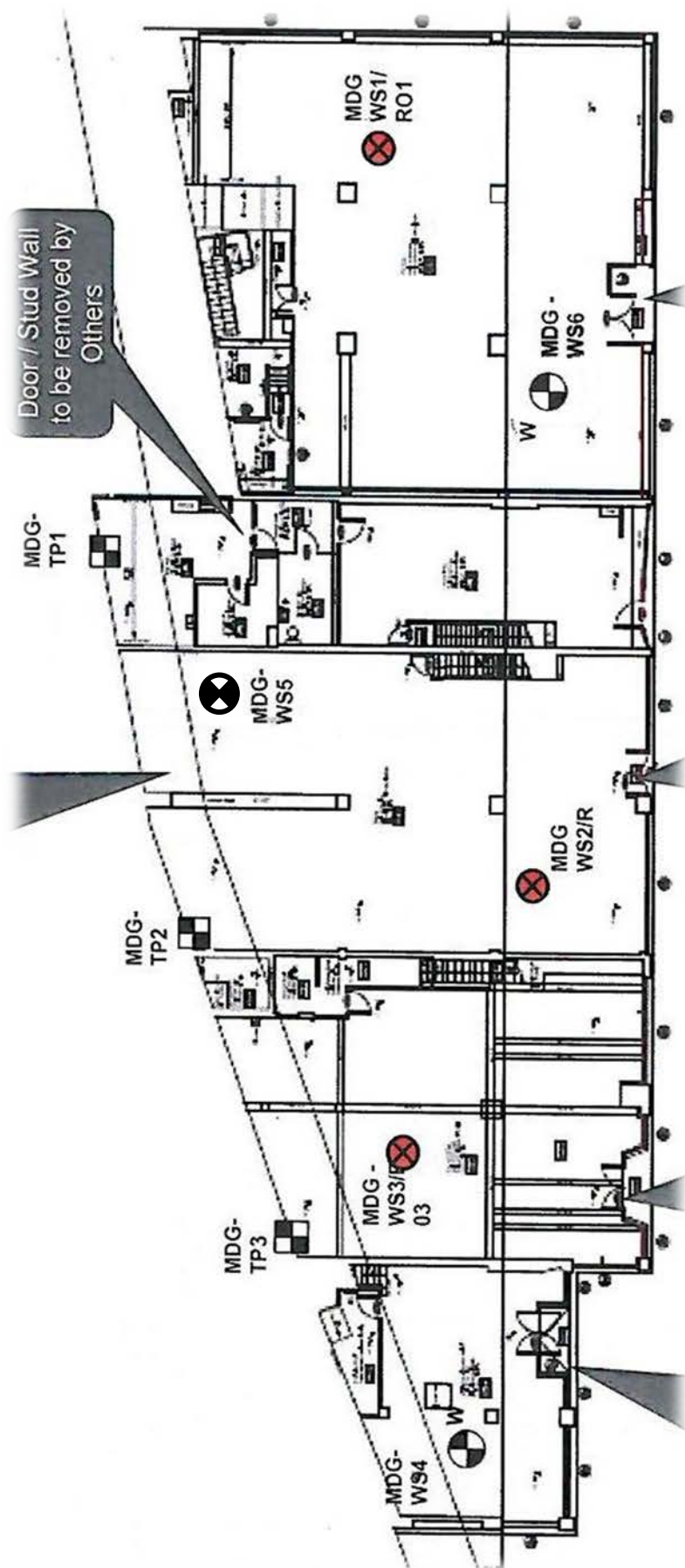
9. References

- British Standards Institution (1990) BS1377: *British standard methods of test for soils for civil engineering purposes*, B.S.I., London.
- British Standards Institution (2015) BS5930: *Code of practice for site investigations*, B.S.I., London.
- British Geological Survey (NERC) (2016), BGS, Keyworth.
 - Geology of Britain Viewer:
(http://maps.bgs.ac.uk/geologyviewer_google/googleviewer.html)
 - Lexicon of Named Rock Units:
(<http://www.bgs.ac.uk/lexicon/>)



Appendix 1

Site Plan



Plan not to scale and investigation positions approximated from site operative's notes.

Title: **Investigation Location Plan**



Rogers Geotechnical Services Ltd

Site Name:

Better Barnsley - May Day Green Shops
May Day Green, Barnsley S70 1RH

Job No:

J3579/16/E



Appendix 2

Borehole Records



Borehole Log

Borehole No.
**MDG WS1/
R01**
Sheet 1 of 2

Project Name: Better Barnsley

Project No.
J3579/16/E

Co-ords:

Hole Type
WLS+RO

Location: May Day Green & Metropolitan Centre, Barnsley

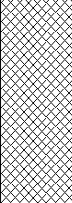
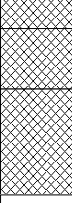
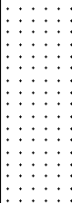
Level:

Scale
1:50

Client: Henry Boot Construction Ltd

Dates: 08/09/2016

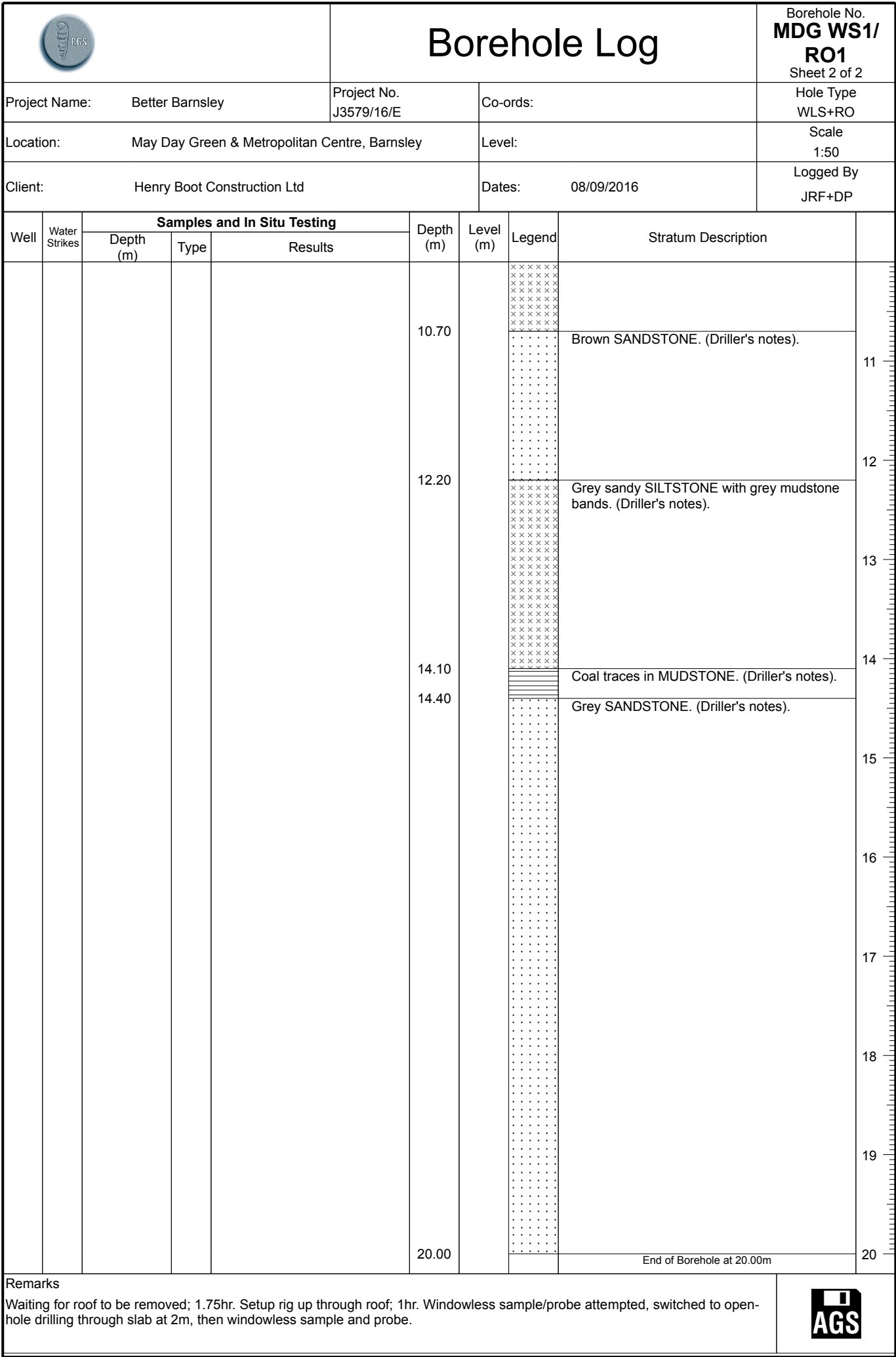
Logged By
JRF+DP

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results						
						0.30			CONCRETE. (Driller's notes).	
									MADE GROUND (Sandstone Fill). (Driller's notes).	
		1.50	SPT	100	0	N=50 (4,6/6,7,20,17)				1
				100	10					
		2.40	SPT			N=21 (4,6/6,7,2,6)	1.90		CONCRETE.	2
				100	0		2.20		MADE GROUND (Black coal ash with strong odor). (Driller's notes).	
				100	0		2.60		MADE GROUND (Yellowish brown slightly silty very sandy sub-rounded to angular fine to coarse GRAVEL of sandstone).	3
		3.20	SPT	50 (7,14/50 for 150mm)						
							3.80		Brown SANDSTONE. (possibly fill or rockhead) (Driller's notes).	4
							4.50		Strong brown SANDSTONE. (Driller's notes).	5
							7.00		Grey MUDSTONE. (Driller's notes).	7
							7.30		COAL. (Driller's notes).	
							7.60		Grey MUDSTONE. (Driller's notes).	
							7.80		Grey SANDSTONE. (Driller's notes).	8
							8.10		Grey SILTSTONE. (Driller's notes).	9
									Continued on Next Sheet	10

Remarks

Waiting for roof to be removed; 1.75hr. Setup rig up through roof; 1hr. Windowless sample/probe attempted, switched to open-hole drilling through slab at 2m, then windowless sample and probe.







Borehole Log

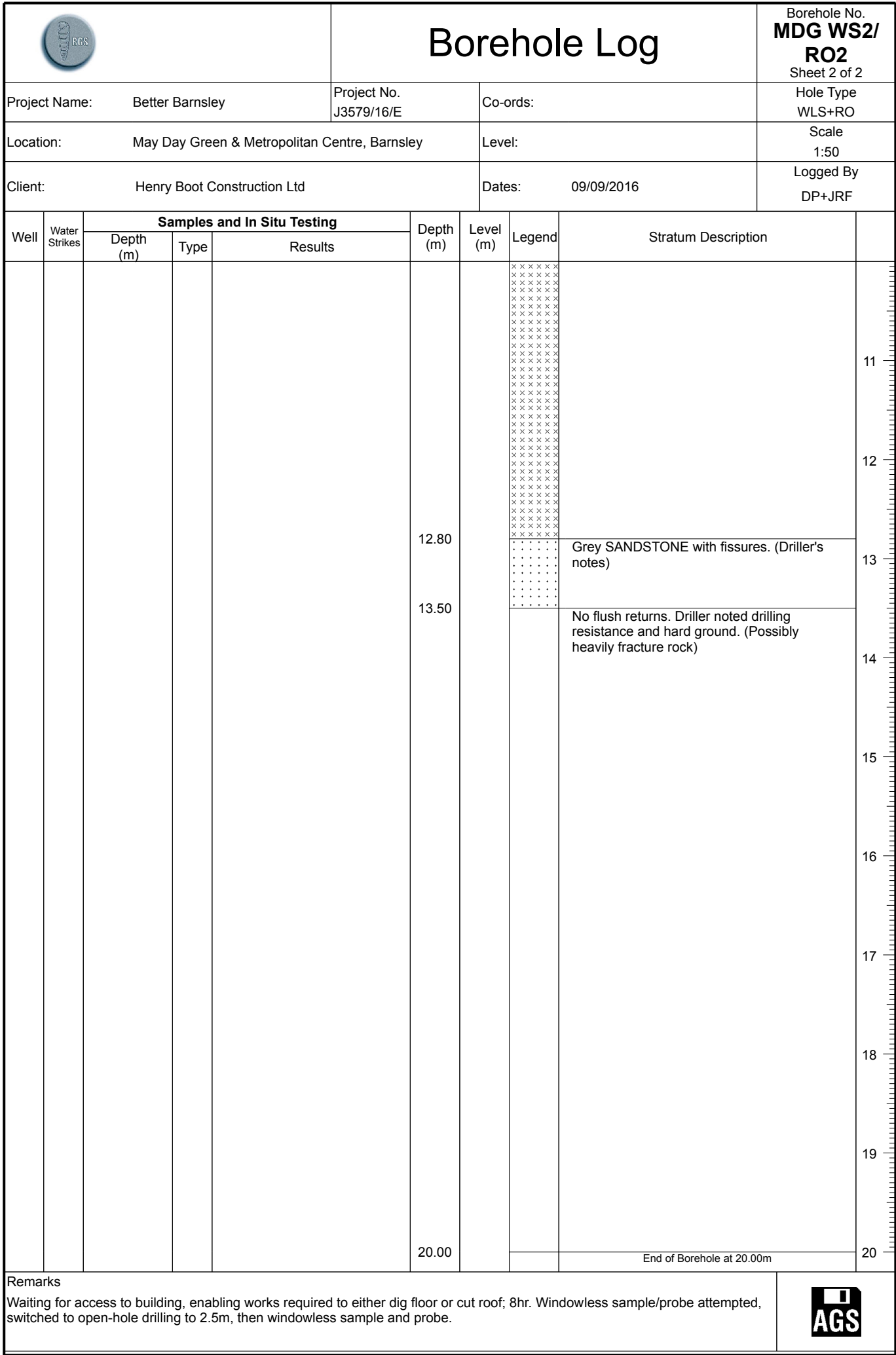
Borehole No.
**MDG WS2/
R02**
Sheet 1 of 2

Project Name:	Better Barnsley	Project No. J3579/16/E	Co-ords:	Hole Type WLS+RO
Location:	May Day Green & Metropolitan Centre, Barnsley	Level:	Scale 1:50	Logged By DP+JRF
Client:	Henry Boot Construction Ltd	Dates:	09/09/2016	

Well	Water Strikes	Samples and In Situ Testing					Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results							
							0.40 0.45 0.60			CONCRETE. (Driller's notes).	
										WOOD. (Driller's notes).	
										CONCRETE. (Driller's notes).	
										MADE GROUND (Black ash brick sandstone	
		1.50	SPT	100	15	110 (10,14/110 for 225mm)	1.20			fill). (Driller's notes).	1
				100	60		1.80			MADE GROUND (Light brown sandy sub-rounded to sub-angular GRAVEL of concrete, mortar and sandstone masonry).	
										OBSTRUCTION/CONCRETE. (Driller's	2
							2.10			notes)	
				100	10					MADE GROUND (Light brown sandy sub-rounded to sub-angular GRAVEL of concrete, mortar and sandstone masonry).	
											3
							4.30			Brown CLAY. (Driller's notes).	4
							5.20			Grey Weak SANDSTONE with mudstone bands. (Driller's notes).	5
											6
											7
							8.80			COAL with mudstone. (Driller's notes).	8
							9.20 9.30			Grey MUDSTONE. (Driller's notes).	9
										Light grey SANDSTONE with siltstone bands. (Driller's notes).	
										Continued on Next Sheet	10

Remarks
Waiting for access to building, enabling works required to either dig floor or cut roof; 8hr. Windowless sample/probe attempted, switched to open-hole drilling to 2.5m, then windowless sample and probe.







Borehole Log

Borehole No.
**MDG WS3/
R03**
Sheet 1 of 2

Project Name: Better Barnsley

Project No.
J3579/16/E

Co-ords:

Hole Type
WLS+RO

Location: May Day Green & Metropolitan Centre, Barnsley

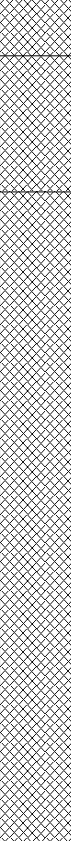
Level:

Scale
1:50

Client: Henry Boot Construction Ltd

Dates: 06/09/2016

Logged By
DP+JRF

Well	Water Strikes	Samples and In Situ Testing				Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results						
						0.35			CONCRETE. (Driller's notes).	
									MADE GROUND (Stone brick ash fill). (Driller's notes).	
		1.00 1.00 - 1.45	SPT SPTL S	90 80	0 0	N=25 (3,4/5,6,7,7)	1.20			1
		1.80	SPT	80	0	110 (10,11/110 for 225mm)			MADE GROUND (Sandstone fill). (Driller's notes).	2
		1.80 - 2.10	SPTL S							3
										4
										5
										6
										7
										8
									Brown SANDSTONE. (Driller's notes).	9
									Negligible flush returns. Driller noted drilling resistance and hard ground. (Possibly heavily fracture rock)	10
									Grey MUDSTONE. (Driller's notes).	
									Continued on Next Sheet	

Remarks

Setup on site, induction and permit to dig; 3.25hr. Windowless sample/probe attempted, switched to open-hole drilling to 2.5m, then windowless sample and probe.





Borehole Log

Borehole No.
**MDG WS3/
R03**
Sheet 2 of 2

Project Name:	Better Barnsley	Project No. J3579/16/E	Co-ords:	Hole Type WLS+RO
Location:	May Day Green & Metropolitan Centre, Barnsley	Level:	Scale 1:50	Logged By DP+JRF
Client:	Henry Boot Construction Ltd	Dates:	06/09/2016	

Well	Water Strikes	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					10.60			Grey SANDSTONE. (Driller's notes).	11
					14.20			Grey SANDSTONE with occasional SILTSTONE bands. (Driller's notes)	12
									13
									14
									15
									16
									17
									18
									19
					20.00			End of Borehole at 20.00m	20

Remarks
Setup on site, induction and permit to dig; 3.25hr. Windowless sample/probe attempted, switched to open-hole drilling to 2.5m, then windowless sample and probe.





Borehole Log

Borehole No.

MDG WS4

Sheet 1 of 1

Project Name: Better Barnsley

Project No.
J3579/16/E

Co-ords:

Hole Type
WLS

Location: May Day Green & Metropolitan Centre, Barnsley

Level:

Scale
1:50

Client: Henry Boot Construction Ltd

Dates:

Logged By
JRF

Well	Water Strikes	Samples and In Situ Testing					Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Dia. (mm)	TCR (%)	Results					
										CONCRETE. (Driller's notes)	
		1.00	SPT	87	90	N=6 (1,1/1,3,1,1)	0.60			MADE GROUND (Yellowish brown slightly silty very sandy sub-rounded to angular fine to coarse GRAVEL of sandstone). <i>0.9m: With low cobble content. Cobbles are sub-angular and angular concrete and brick. Gravel also includes concrete, brick and various lithologies (quartz).</i>	1
		2.00	SPT	77	50	N=7 (1,1/1,2,2,2)	1.88			MADE GROUND (COBBLE of grey medium strong fine-grained sandstone). (Cobble has a smooth upper surface, possible flagstone).	2
		3.00	SPT	67	80	N=22 (3,5/5,7,5,5)	2.00			PROBABLE MADE GROUND (Soft becoming stiff brown locally speckled yellowish brown, light yellow and black, slightly gravelly silty CLAY. Gravel is randomly orientated sub-rounded to sub-angular fine coal and sandstone). (Reworked Coal Measures)	3
		4.00	SPT	57	98	N=17 (3,5/4,3,5,5)				<u>2.4m: Firm.</u> <u>2.6m: Stiff and gravelly.</u> <u>2.8 - 2.84m: Partial and full radii of weak thickly laminated yellow coarse-grained sandstone. (Possible flag or cobble)</u> <u>3.83 - 3.86m: Full radii of medium strong dark yellow medium-grained sandstone. (Possible flag or cobble)</u>	4
				57	100		4.94			Extremely weak thickly laminated yellow fine-grained SANDSTONE. Laminations are smooth, undulating, 2 to 5mm aperture, clay filled with ferruginous staining.	5
							5.00			End of Borehole at 5.00m	
											6
											7
											8
											9
											10

Remarks

Bore collapsed back to 1.9m prior to installation of standpipe.





Borehole Log

Borehole No.

MDG WS5

Sheet 1 of 1

Project Name: Better Barnsley

Project No.
J3579/16/E

Co-ords:

Hole Type
WLS

Location: May Day Green & Metropolitan Centre, Barnsley

Level:

Scale
1:50

Client: Henry Boot Construction Ltd

Dates:

Logged By
JRF

Well	Water Strikes	Samples and In Situ Testing					Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Dia. (mm)	TCR (%)	Results					
										CONCRETE. (Driller's notes)	
		1.00	SPT	87	90	N=8 (1,5/5,1,1,1)	0.48				1
				77	45		1.40			MADE GROUND (Light brown becoming mottled dark grey and cream slightly clayey gravelly SAND with low cobble content. Gravel is fine to coarse. Gravel and cobbles are sub-angular and angular sandstone and concrete).	
		2.00	SPT			N=5 (2,3/3,2,0,0)	1.50			1.0m: Slight organic/hydrocarbon odour.	
							2.00			MADE GROUND (COBBLE of orangish yellow medium strong medium-grained sandstone). (Cobble has a horizontal upper surface, possible flagstone).	2
							2.10			No recovery.	
		3.00	SPT	67	10	N=13 (1,2/3,3,3,4)				MADE GROUND (Light yellow sub-angular COBBLES of fine-grained sandstone, with a little clayey sand).	3
										PROBABLE MADE GROUND (Very soft greyish brown mottled orangish brown slightly sandy gravelly silty CLAY with wood fragments in the upper levels. Gravel is randomly orientated sub-angular fine to coarse sandstone with rare coal). (Reworked Coal Measures)	
		4.00	SPT	57	60	N=12 (3,3/3,2,3,4)				2.1 - 2.13m: With decayed wood fragments (5mm to 10mm wide, 20 to 40mm long).	4
										4 - 4.5m: Wet.	
				57	40					4.5m: Grades into very clayey GRAVEL.	
		5.00	SPT			21 (4,17/21 for 75mm)	4.76			Extremely weak thickly INTERLAMINATED and thinly INTERBEDDED grey SILTSTONE with sub-ordinate orange SANDSTONE.	5
							5.00			End of Borehole at 5.00m	
											6
											7
											8
											9
											10

Remarks





Borehole Log

Borehole No.

MDG WS6

Sheet 1 of 1

Project Name: Better Barnsley

Project No.
J3579/16/E

Co-ords:

Hole Type
WLS

Location: May Day Green & Metropolitan Centre, Barnsley

Level:

Scale
1:50

Client: Henry Boot Construction Ltd

Dates:

Logged By
JRF

Well	Water Strikes	Samples and In Situ Testing					Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Dia. (mm)	TCR (%)	Results					
		1.00	SPT			N=1 (1,0/1,0,0,0)	0.50			CONCRETE. (Driller's notes)	
				87	80					MADE GROUND (Yellowish brown slightly silty very sandy sub-rounded to angular fine to coarse GRAVEL of sandstone and rare earthen ware pipe fragments, brick and ash, with low cobble content. Cobbles are sub-angular medium-grained sandstone).	1
				87	88		1.75 1.80			MADE GROUND (Dark grey gravelly SAND with low cobble content. Gravel is fine to coarse. Gravel and cobbles are sub-angular fine-grained sandstone). End of Borehole at 1.80m	2
											3
											4
											5
											6
											7
											8
											9
											10

Remarks

Refusal at 1.8m, hammer noted to be bouncing, probable concrete floor.





Appendix 3

Dynamic Probe Results



Probe Log

Probe No.
MDG DP1
Sheet 1 of 1

Project Name: Better Barnsley

Project No.
J3579/16/E

Co-ords:

Hole Type
DCP

Location: May Day Green & Metropolitan Centre, Barnsley

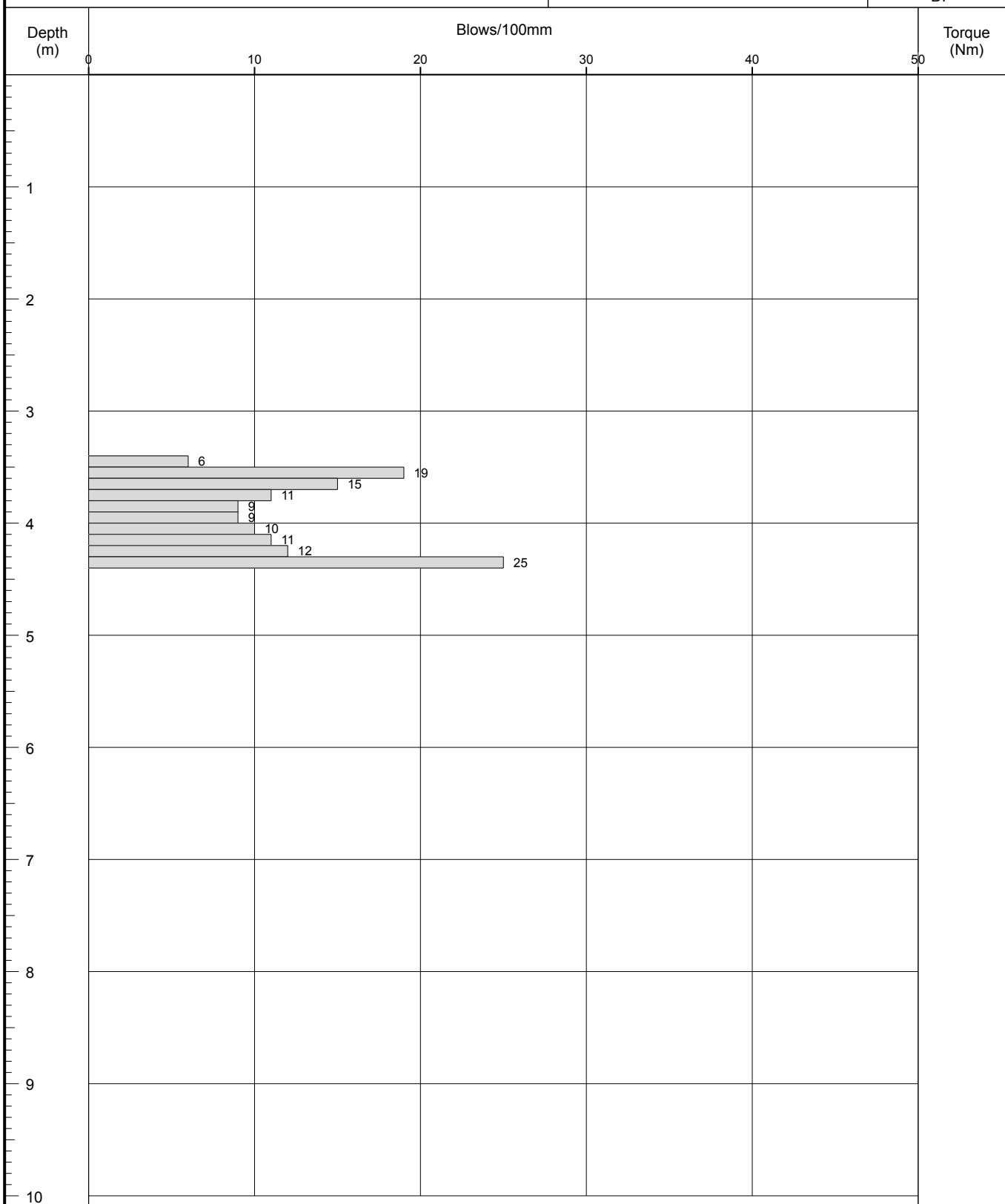
Level:

Scale
1:50

Client: Henry Boot Construction Ltd

Dates: 08/09/2016

Logged By
DP



Remarks:

Fall Height 750mm

Cone Base Diameter 50.5mm

Hammer Wt 63.5kg

Final Depth 4.4m

Probe Type DPSH-B





Probe Log

Probe No.
MDG DP2
Sheet 1 of 1

Project Name: Better Barnsley

Project No.
J3579/16/E

Co-ords:

Hole Type
DCP

Location: May Day Green & Metropolitan Centre, Barnsley

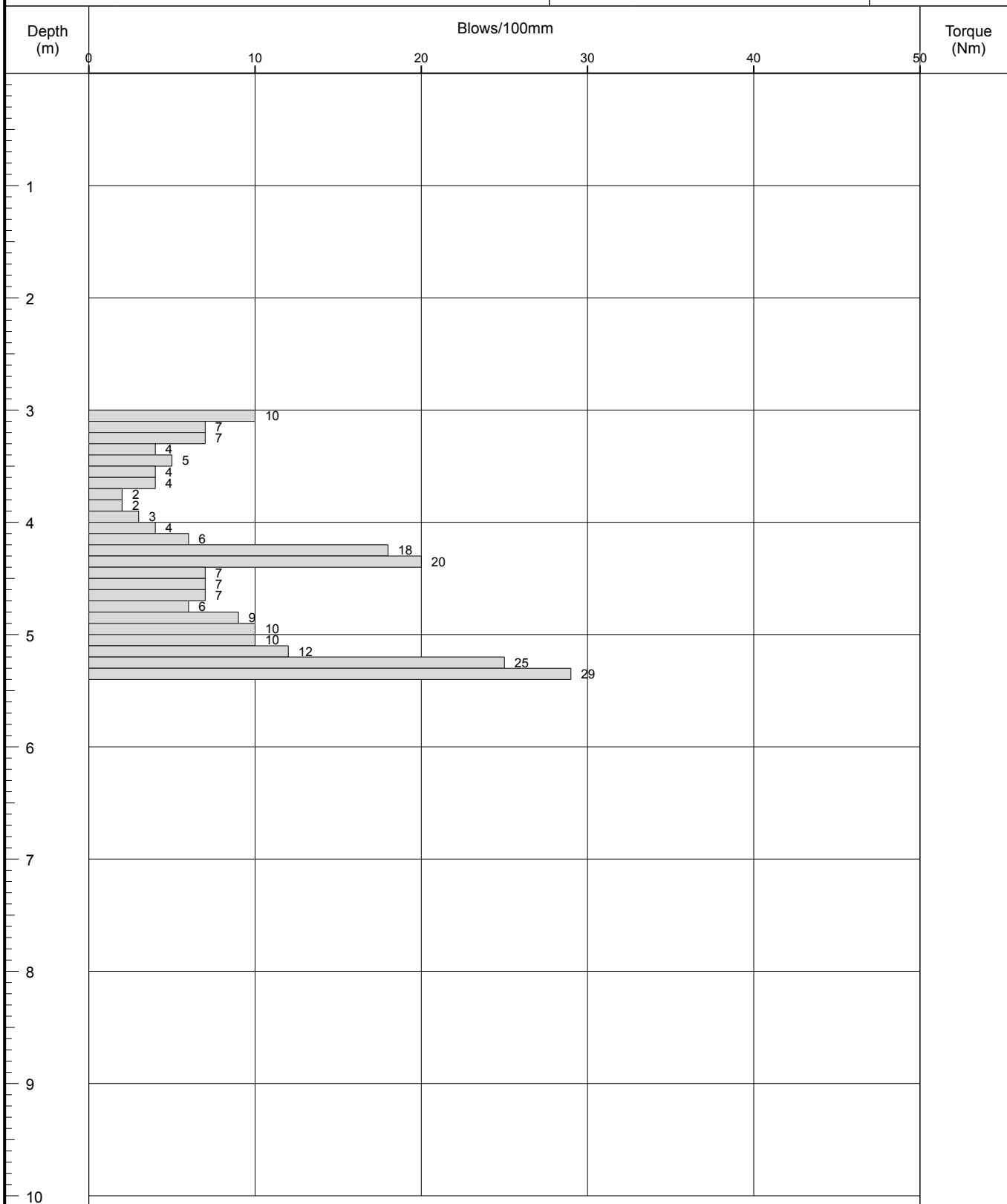
Level:

Scale
1:50

Client: Henry Boot Construction Ltd

Dates: 09/10/2016

Logged By
DP



Remarks:

Fall Height 750mm

Cone Base Diameter 50.5mm

Hammer Wt 63.5kg

Final Depth 5.3m

Probe Type DPSH-B





Probe Log

Probe No.
MDG DP3
Sheet 1 of 1

Project Name: Better Barnsley

Project No.
J3579/16/E

Co-ords:

Hole Type
DCP

Location: May Day Green & Metropolitan Centre, Barnsley

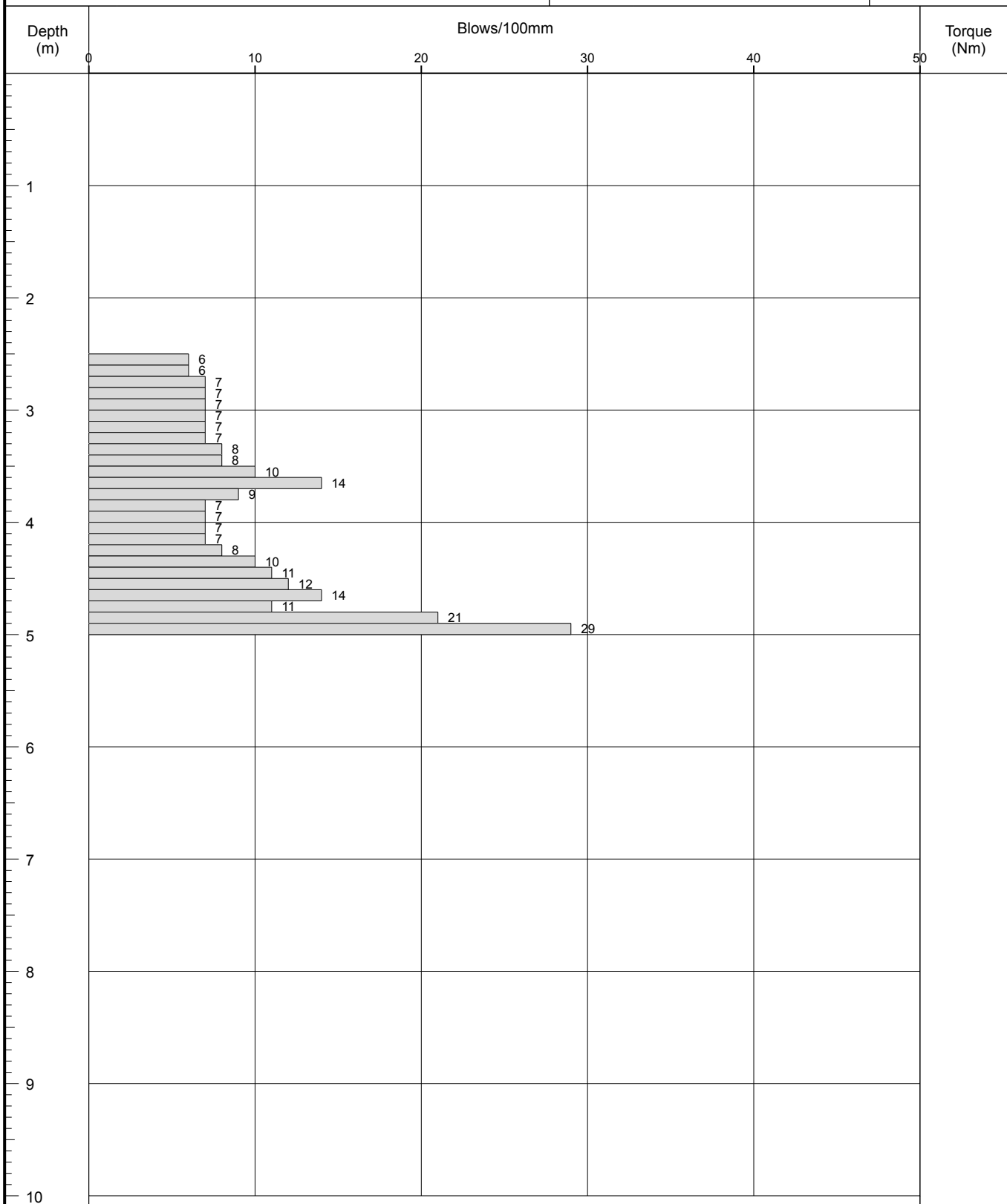
Level:

Scale
1:50

Client: Henry Boot Construction Ltd

Dates: 06/09/2016

Logged By
DP



Remarks:

Fall Height 750mm

Cone Base Diameter 50.5mm

Hammer Wt 63.5kg

Final Depth 5m

Probe Type DPSH-B





Appendix 4

Trialpits



Trial Pit Log

Trialpit No
MDG TP1
Sheet 1 of 1

Project Name: Better Barnsley	Project No. J3579/16/E	Co-ords: - Level:	Date 25/09/2016
Location: May Day Green & Metropolitan Centre, Barnsley		Dimensions (m): Depth 2.00	Scale 1:50 Logged JRF
Client: Henry Boot Construction Ltd		1.2 0.75	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
	0.02			0.02			Light grey SCREED comprising a sand sized matrix with rare fine and medium sub rounded gravel of mixed lithologies. 0-1% excess voidage. Smooth top surface, rough base.
	0.40	D		0.22			
	0.70	B					Light grey CONCRETE comprising sub-angular to sub-rounded fine and coarse aggregate of mixed lithologies. 0% excess voidage. Bi-directional (200mm centres) 6mmØ plain reinforcing bar at 0.12m. Black plastic membrane at base.
	1.10	B		1.15			
	1.50	B					MADE GROUND (Light brown silty very gravelly SAND with medium cobble content. Gravel is randomly orientated fine to coarse strong medium to coarse grained micaceous sandstone and micaceous siltstone).
	2.00	D		2.00			MADE GROUND (Very soft dark grey CLAY/SILT with low cobble content with pockets of dark brownish grey clay. Cobbles are sub rounded to angular of brick and sandstone masonry).
							1.50m: pocket of gravel next to the wall. Gravel is sub rounded to angular fine to medium of coal ash, brick and sandstone masonry. Cobbles are sub rounded to angular of sandstone masonry.
							End of pit at 2.00 m

Remarks:	
Stability: Good.	

Rogers Geotechnical Services Ltd

Offices 1&2 Barncliffe Business Park,
Near Bank, Shelley,
Huddersfield
HD8 8LU.

www.rogersgeotech.co.uk

Tel : 0843 50 666 87

Fax: 0843 51 599 30

Job No:

J3579/16/E

Sheet No:

3 of 3

Prepared By:

cm

Date:

25-26.8.16

Checked By:

JRP

Date:

30/9/16

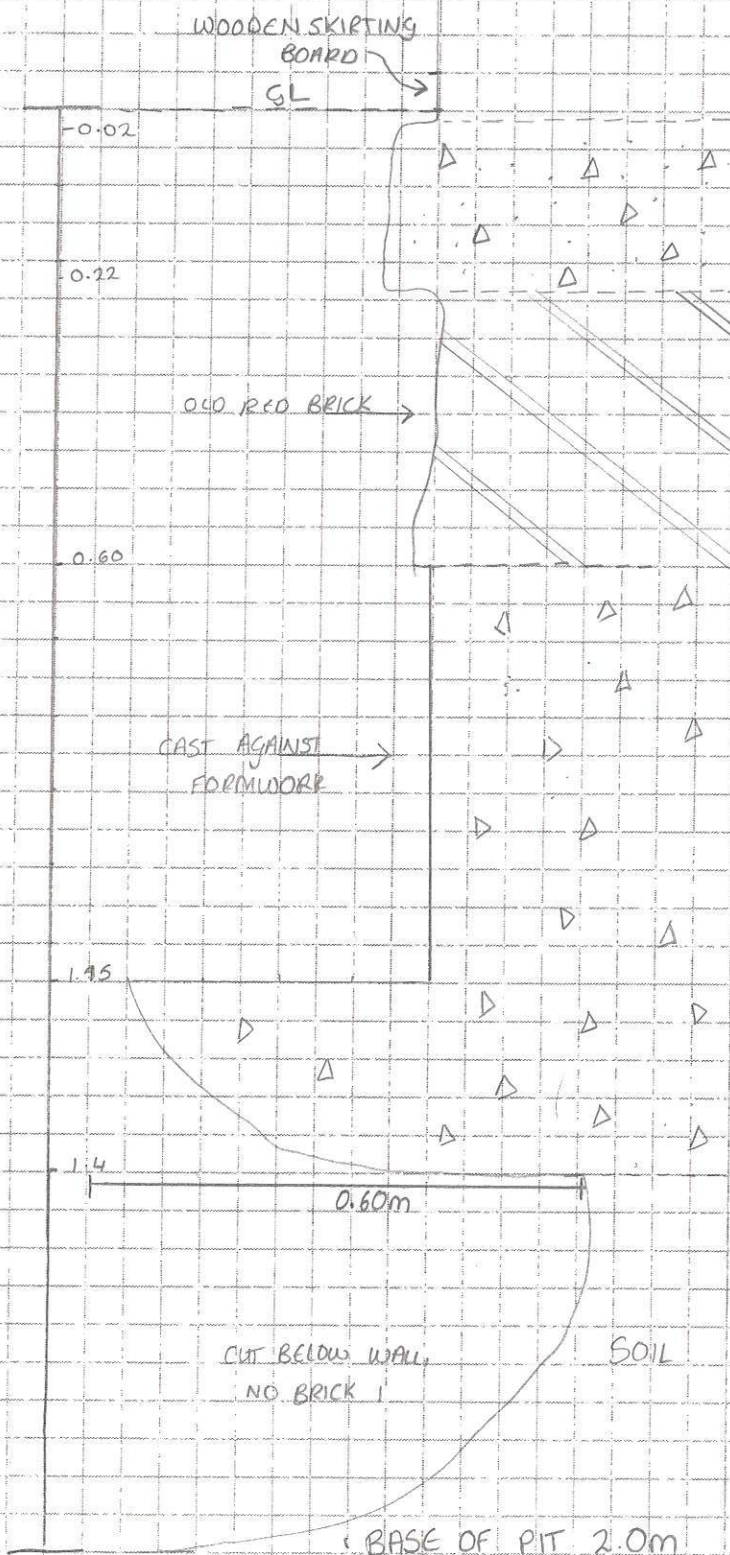
Title:

TP1

FOUNDATION PIT LOG

NOT TO SCALE

DIMENSIONS IN METRES



Concrete



Blockwork



Trial Pit Log

Trialpit No
MDG TP2
Sheet 1 of 1

Project Name: Better Barnsley	Project No. J3579/16/E	Co-ords: - Level:	Date 26/08/2016
Location: May Day Green & Metropolitan Centre, Barnsley		Dimensions (m): Depth 2.00	Scale 1:50 Logged JRF
Client: Henry Boot Construction Ltd		0.7 4	

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
	Depth	Type	Results				
				0.06			Light grey SCREED comprising a sand sized matrix with rare fine and medium sub rounded gravel of mixed lithologies. 0-1% excess voidage. Smooth top surface, rough base.
	0.70	D		0.50			Light grey CONCRETE comprising sub-angular to sub-rounded fine and coarse aggregate of mixed lithologies. 0% excess voidage. Bi-directional (100mm and 200mm centres) 6mmØ plain reinforcing bar at 0.3m. 10mmØ edge projection reinforcing bar at 0.38m. Black plastic membrane at base.
	1.30	D		1.50			MADE GROUND (Light brown silty very gravelly SAND with medium cobble content. Gravel is randomly orientated fine to coarse of strong medium to coarse grained micaceous sandstone and micaceous siltstone).
	1.70	B		2.00			MADE GROUND (Dark grey locally gravelly SAND and reddish brown and purple gravelly SAND (ash) becoming predominantly clayey with depth, with pockets of very soft dark grey gravelly clay/silt and low cobble content. Gravel is sub rounded to angular fine to coarse brick, ash, sandstone masonry. Cobbles are brick masonry).
	1.70	D					End of pit at 2.00 m
	2.00	B					
	2.00	D					

Remarks:	
Stability: Good	

Rogers Geotechnical Services Ltd

Offices 1&2 Barncliffe Business Park,
Near Bank, Shelley,
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HD8 8LU.

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Tel : 0843 50 666 87

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Job No:

J3579/16/E

Sheet No:

2 of 3

Prepared By:

CM

Date:

26.8.16

Checked By:

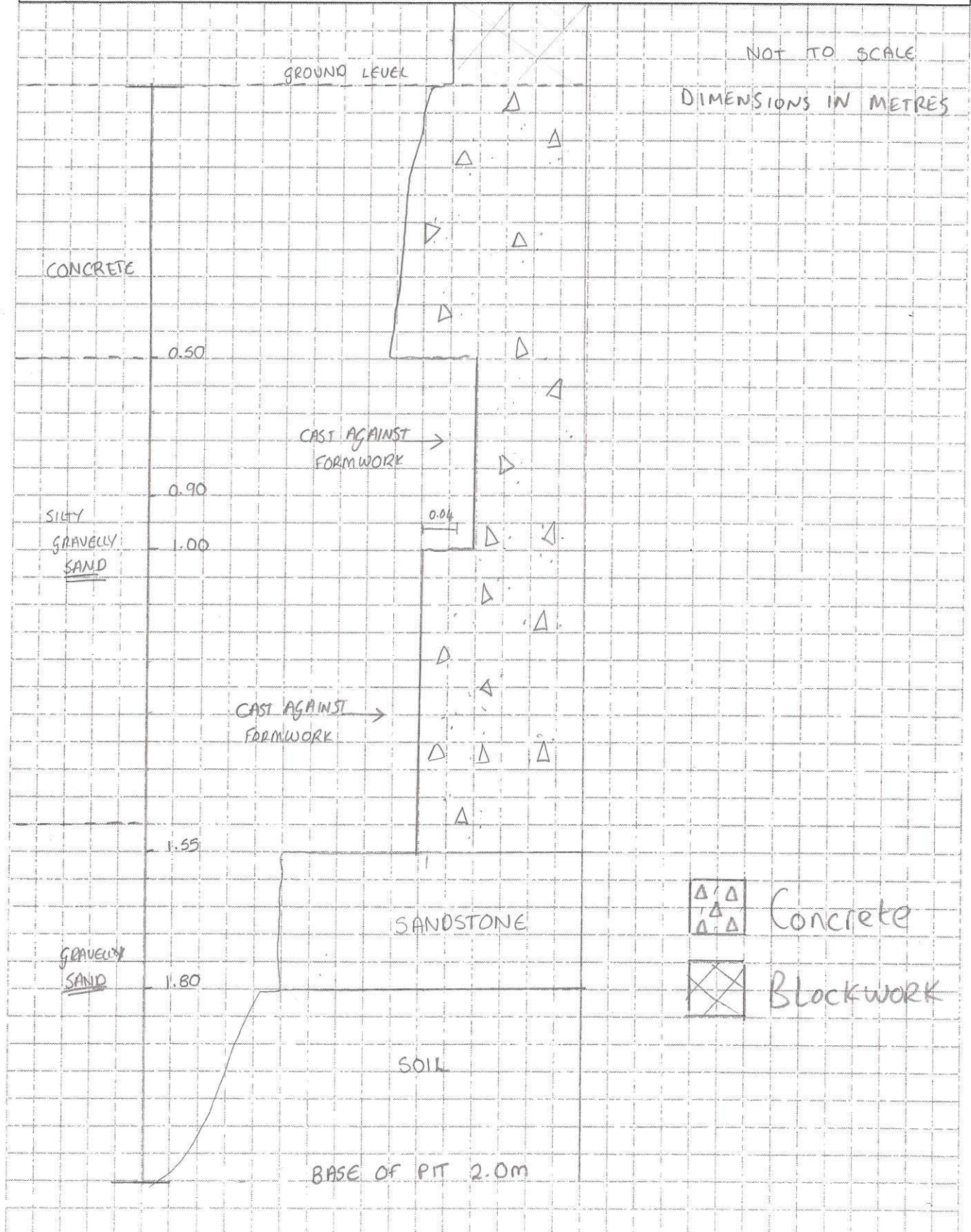
JRF

Date:

30/9/16

Title:

TP2 FOUNDATION PIT LOG





Trial Pit Log

Trialpit No
MDG TP3
Sheet 1 of 1

Project Name: Better Barnsley	Project No. J3579/16/E	Co-ords: - Level:	Date 26/10/2016
Location: May Day Green & Metropolitan Centre, Barnsley		Dimensions (m): 1.6	Scale 1:50
Client: Henry Boot Construction Ltd		Depth 0.70	Logged JRF

Water Strike	Samples and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
	Depth	Type	Results					
	0.40	D		0.05 0.20			Light grey SCREED comprising a sand sized matrix with rare fine and medium sub rounded gravel of mixed lithologies. 0-1% excess voidage. Smooth top surface, rough base.	
	0.65	D		0.65 0.70			Light grey CONCRETE comprising sub-angular to sub-rounded fine and coarse aggregate of mixed lithologies. 0% excess voidage. Bi-directional 6mmØ plain reinforcing bar at 0.15m. Blue plastic membrane at base).	1
							MADE GROUND (Light brown slightly clayey very gravelly SAND with medium cobble content. Gravel is fine to coarse sub angular to angular of brick (fragments and whole), concrete and sandstone masonry).	2
							CONCRETE	
							End of pit at 0.70 m	
								3
								4
								5
								6
								7
								8
								9
								10

Remarks: Drain encountered below a capping of concrete. Position abandoned after discussion with client. Trial pit extended to the site in order to avoid drains (See TP3 EXT).

Stability: good



Rogers Geotechnical Services Ltd

Offices 1&2 Barncliffe Business Park,
Near Bank, Shelley,
Huddersfield
HD8 8LU.

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Fax: 0843 51 599 30

Job No:

J3579/16/E

Sheet No:

3 of 3

Prepared By:

cm

Date:

26.8.16

Checked By:

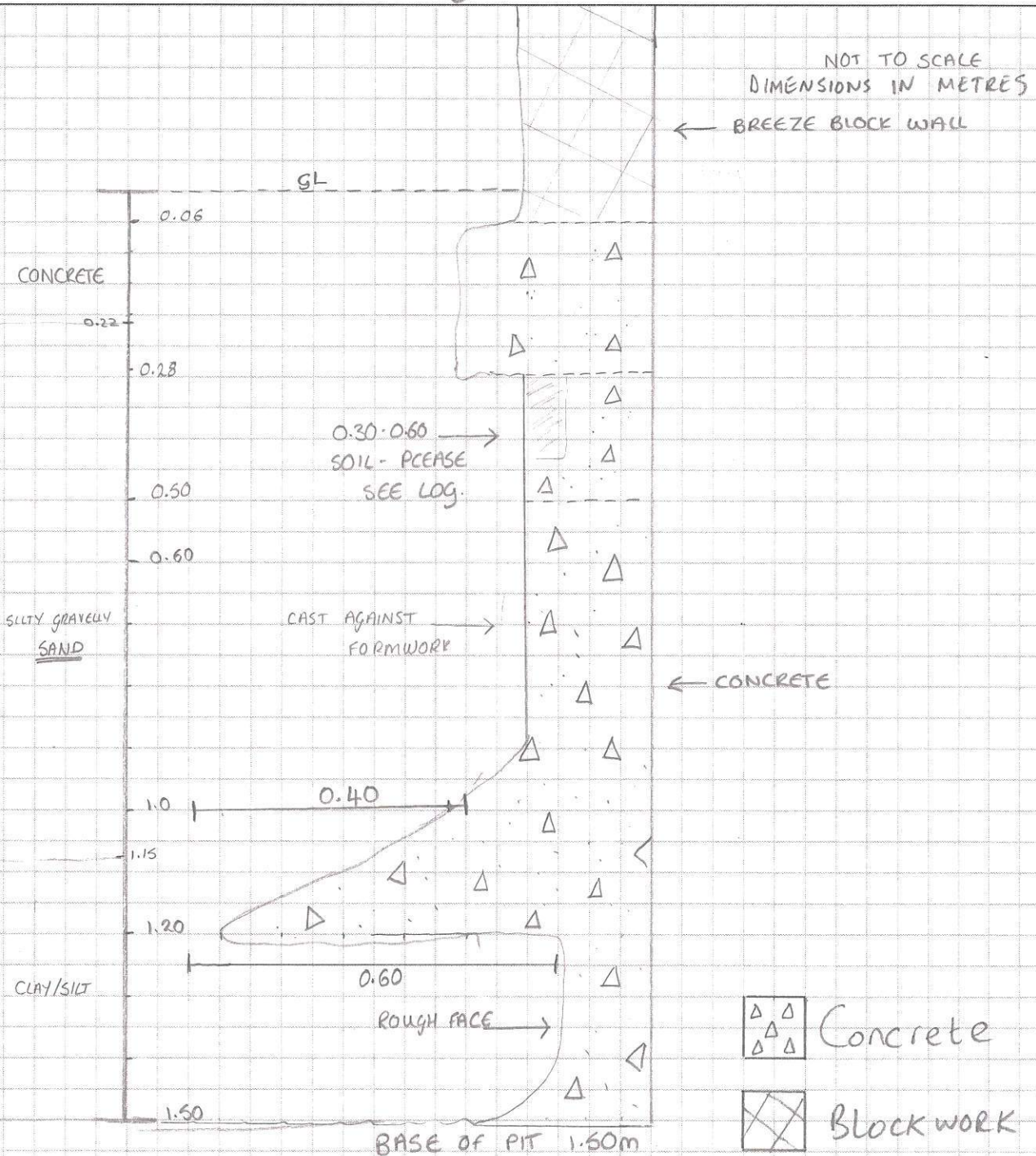
JRF

Date:

30/9/16

Title:

TF3EXT FOUNDATION PIT LOG





Appendix 5

Laboratory Testing - Geotechnical



LABORATORY REPORT



4043

Contract Number: PSL16/4627

Report Date: 13 October 2016
Client's Reference: J3579/16/E
Client Name: Rogers Geotechnical Services Ltd
Offices 1 & 2
Barncliffe Business Park
Near Bank, Shelley
Huddersfield
HD8 8LU

For the attention of: James Farnsworth

Contract Title: Better Barnsley - MDG
Date Received: 6/10/2016
Date Commenced: 6/10/2016
Date Completed: 12/10/2016

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

R Gunson
(Director)

A Watkins
(Director)

R Berriman
(Quality Manager)

D Lambe
(Senior Technician)

S Royle
(Senior Technician)

W Allen
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
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e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

PSL
Professional Soils Laboratory

Checked / Approved		Date	12/10/16	Contract No:
Better Barnsley - MDG				PSL16/4627
				Client Ref:
				J3579/16/E

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

*** : Liquid Limit and Plastic Limit Wet Sieved.**



PSL
Professional Soils Laboratory

Checked / Approved

Date _____

12/10/16

Contract No:

PSL16/4627

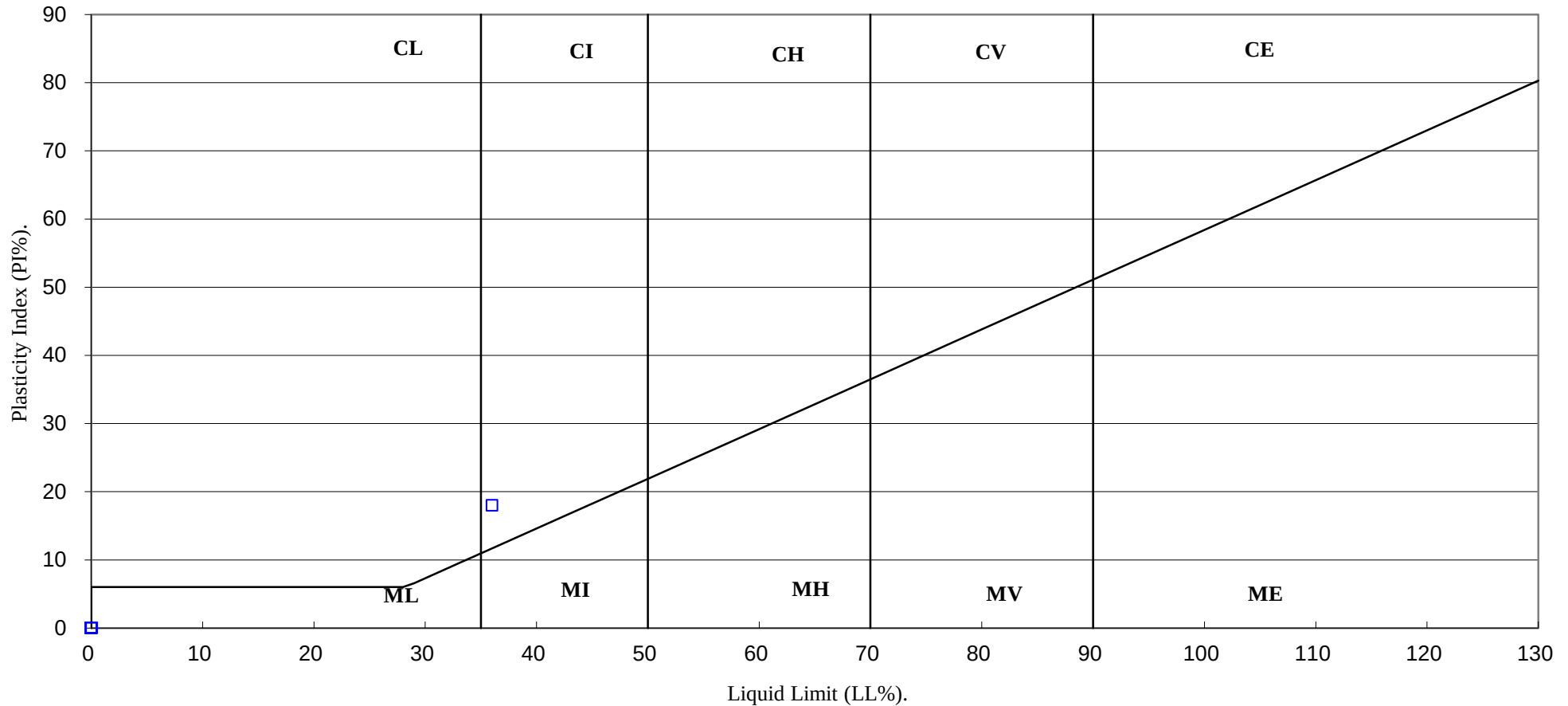
Client Ref:

J3579/16/E

Better Barnsley - MDG

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



PSL
Professional Soils Laboratory

Checked /Approved

Date

12/10/16

Contract No:

PSL16/4627

Client Ref:

J3579/16/E

Better Barnsley - MDG

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

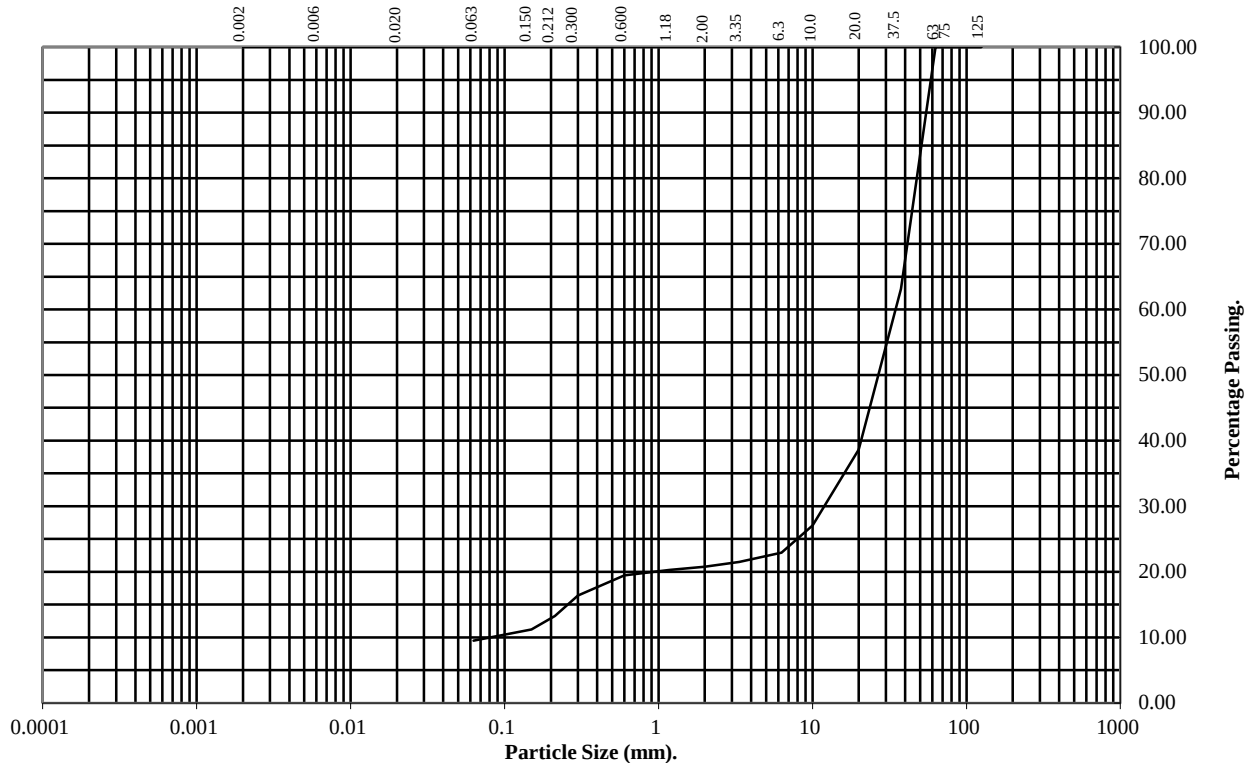
Hole Number: TP1

Top Depth (m): 1.10

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	63
20	39
10	27
6.3	23
3.35	21
2	21
1.18	20
0.6	19
0.3	16
0.212	13
0.15	11
0.063	9

Soil Fraction	Total Percentage
Cobbles	0
Gravel	79
Sand	12
Silt/Clay	9

Remarks:

See summary of soil descriptions.



Checked / Approved		Date	12/10/16	Contract No:
Better Barnsley - MDG				PSL16/4627
				Client Ref:
				J3579/16/E

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

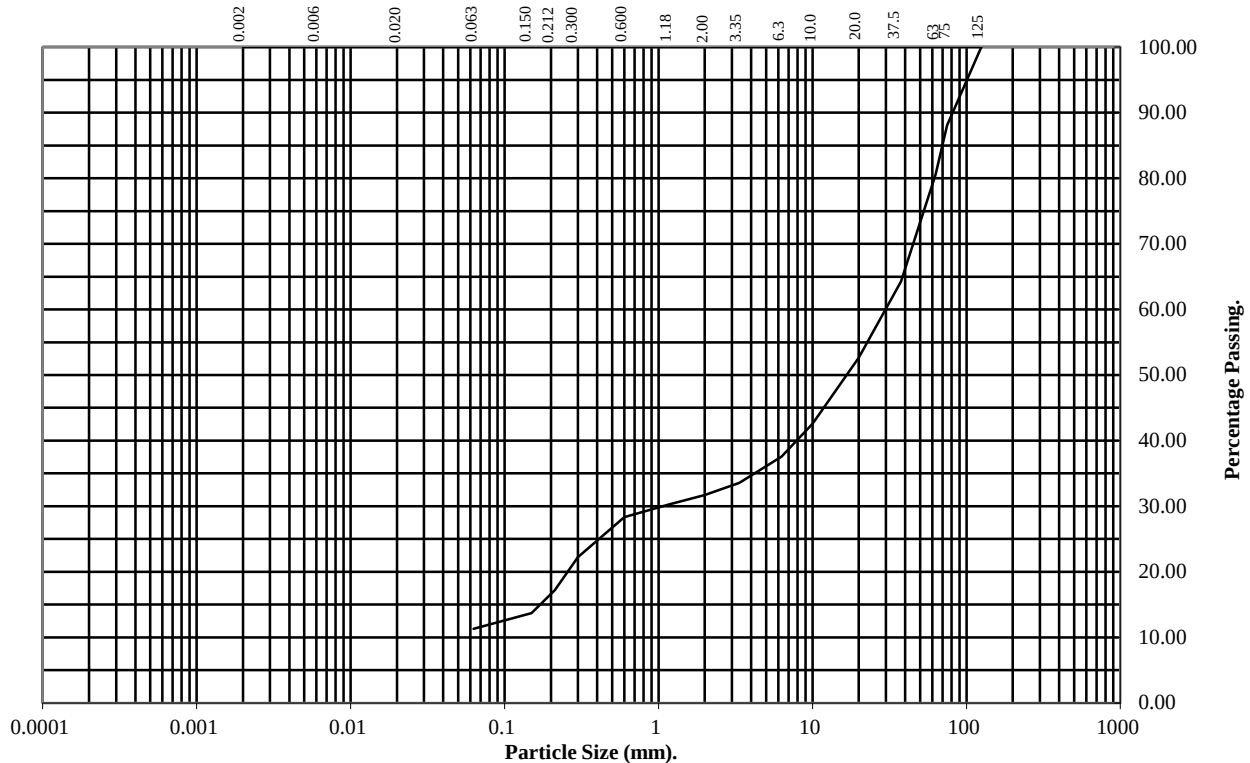
Hole Number: TP3

Top Depth (m): 0.65

Sample Number:

Base Depth(m):

Sample Type: B



BS Test Sieve	Percentage Passing
125	100
75	88
63	81
37.5	64
20	53
10	43
6.3	38
3.35	34
2	32
1.18	30
0.6	28
0.3	22
0.212	17
0.15	14
0.063	11

Soil Fraction	Total Percentage
Cobbles	19
Gravel	49
Sand	21
Silt/Clay	11

Remarks:

See summary of soil descriptions.



Checked / Approved		Date	12/10/16	Contract No:
Better Barnsley - MDG				PSL16/4627
				Client Ref:
				J3579/16/E

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:

WS4

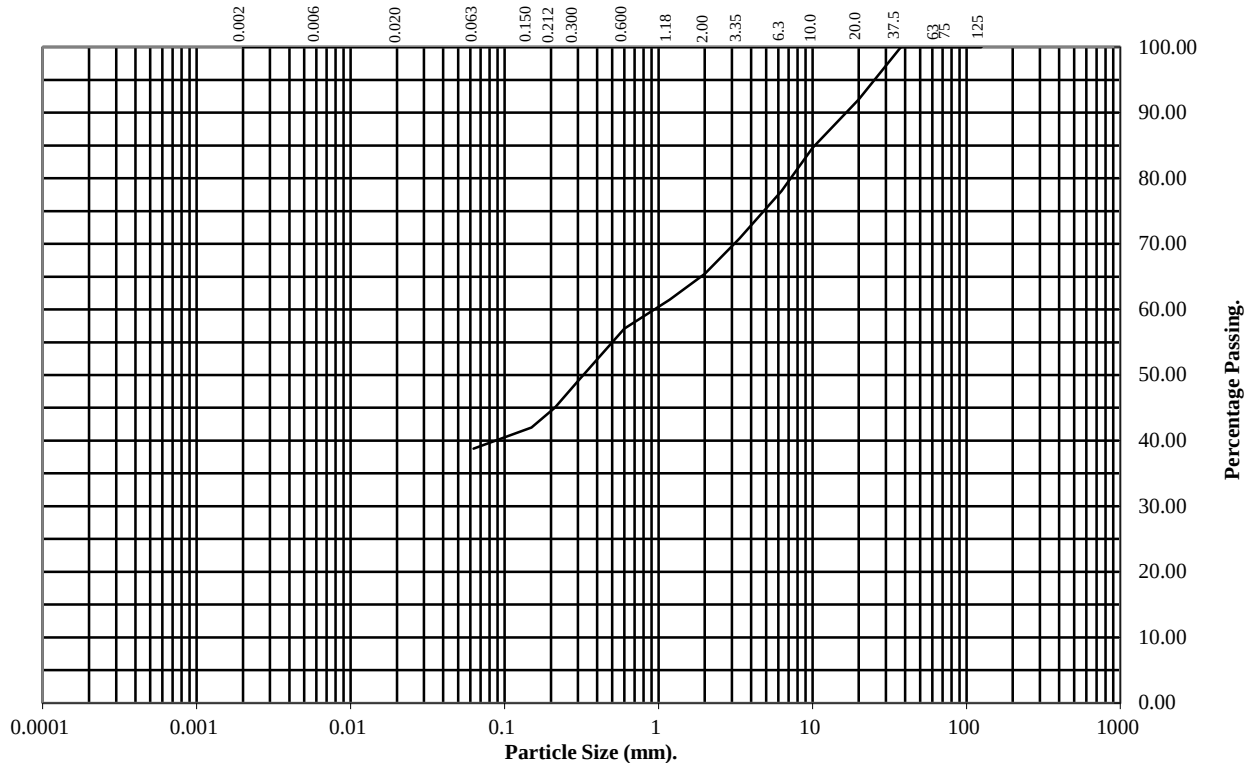
Top Depth (m):

3.20

Sample Number:

Base Depth(m):

Sample Type:



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	92
10	85
6.3	78
3.35	71
2	65
1.18	61
0.6	57
0.3	49
0.212	45
0.15	42
0.063	39

Soil Fraction	Total Percentage
Cobbles	0
Gravel	35
Sand	26
Silt/Clay	39

Remarks:

See summary of soil descriptions.



Checked / Approved		Date	12/10/16	Contract No:
Better Barnsley - MDG				PSL16/4627
				Client Ref:
				J3579/16/E

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:

WS5

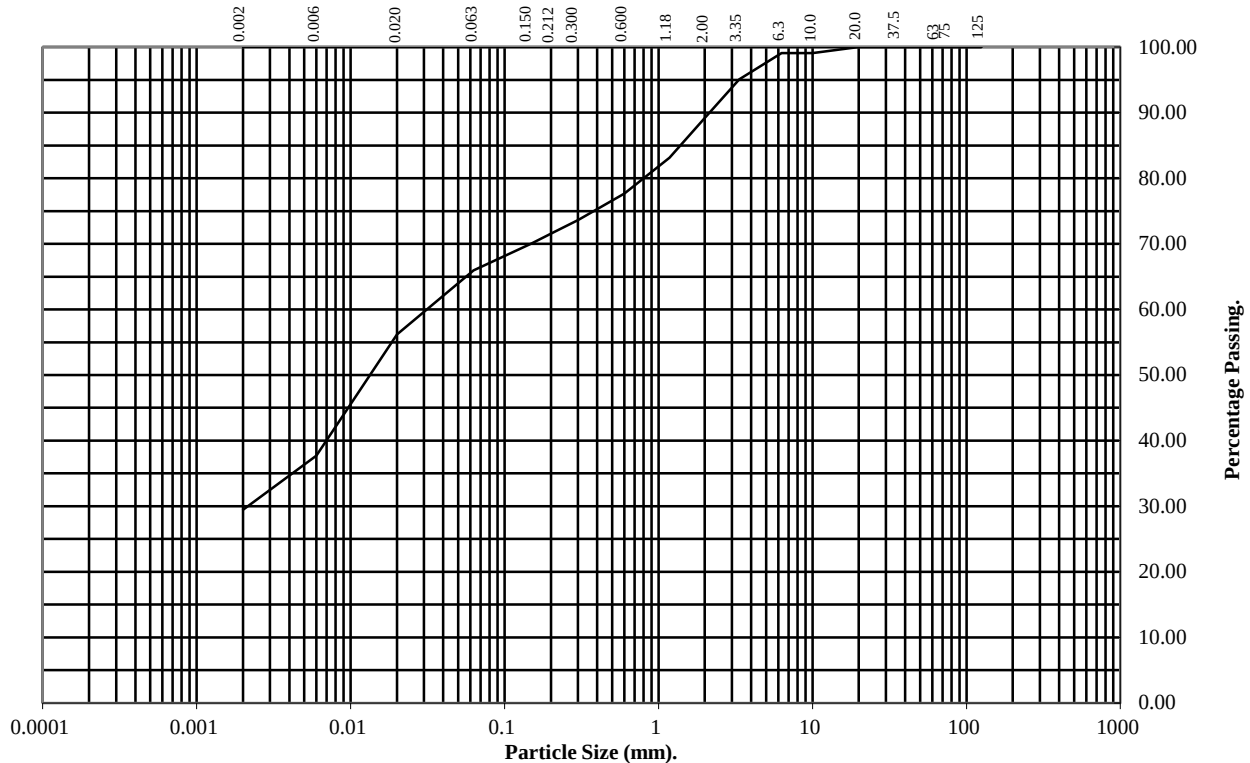
Top Depth (m):

4.95

Sample Number:

Base Depth(m):

Sample Type:



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	99
3.35	95
2	89
1.18	83
0.6	78
0.3	74
0.212	72
0.15	70
0.063	66

Particle Diameter	Percentage Passing
0.02	56
0.006	38
0.002	29

Soil Fraction	Total Percentage
Cobbles	0
Gravel	11
Sand	23
Silt	37
Clay	29

Remarks:

See summary of soil descriptions.



PSL
Professional Soils Laboratory

Checked / Approved

[Signature]

Date

12/10/16

Contract No:

PSL16/4627

Client Ref:

J3579/16/E

Better Barnsley - MDG



Appendix 6

Laboratory Testing - Chemical



Final Report

Report No.: 16-22822-1

Initial Date of Issue: 28-Sep-2016

Client Rogers Geotechnical Services Ltd

Client Address: Unit 4, Barncliffe Business Park
Near Bank
Shelley
Huddersfield
West Yorkshire
HD8 8LU

Contact(s): James Farnsworth

Project J3579/16/E Better Barnsley (May Day
Green Shops)

Quotation No.: **Date Received:** 22-Sep-2016

Order No.: 0916-30 **Date Instructed:** 22-Sep-2016

No. of Samples: 24

Turnaround (Wkdays): 5 **Results Due:** 28-Sep-2016

Date Approved: 28-Sep-2016

Approved By:

Details: Martin Dyer, Laboratory Manager

Results - Leachate

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:	354634	354636	354639	354641	354645	354648	354651	354653
Order No.: 0916-30	Client Sample Ref.:	WS4	WS4	WS5	WS6	TP1	TP2	TP3	TP3 EXT
	Client Sample ID.:	C3	C5	C4	C2	5D	3D	2B/D	2BD/D
	Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):	2.5	4.1	4	1.4	1.5	1.7	0.65	1.5
	Bottom Depth (m):	3	4.8	4.5	1.8				
	Date Sampled:	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
Determinand	Accred.	SOP	Units	LOD					
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030
Sulphate	U	1220	mg/l	1.0	10	14	29	14	360
Total Dissolved Solids	N	1040	mg/l	1.0	25	75	140	53	410
Chloride	U	1220	mg/l	1.0	8.8	12	4.0	1.7	1.5
Fluoride	U	1220	mg/l	0.050	0.26	0.54	0.53	0.32	0.10
Arsenic (Dissolved)	U	1450	µg/l	1.0	< 1.0	1.2	< 1.0	< 1.0	< 1.0
Barium (Dissolved)	U	1450	µg/l	5.0	24	5.8	21	6.2	41
Cadmium (Dissolved)	U	1450	µg/l	0.080	< 0.080	< 0.080	< 0.080	< 0.080	0.080
Chromium (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper (Dissolved)	U	1450	µg/l	1.0	2.3	< 1.0	1.3	< 1.0	< 1.0
Mercury (Dissolved)	U	1450	µg/l	0.50	0.55	0.80	0.79	0.74	0.91
Molybdenum (Dissolved)	U	1450	µg/l	1.0	< 1.0	24	5.2	< 1.0	< 1.0
Nickel (Dissolved)	U	1450	µg/l	1.0	4.1	< 1.0	1.3	< 1.0	14
Lead (Dissolved)	U	1450	µg/l	1.0	6.6	< 1.0	< 1.0	< 1.0	7.3
Antimony (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.2
Selenium (Dissolved)	U	1450	µg/l	1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.3
Zinc (Dissolved)	U	1450	µg/l	1.0	4.7	< 1.0	< 1.0	< 1.0	82
Dissolved Organic Carbon	U	1610	mg/l	2.0	7.9	7.2	6.3	6.5	6.8

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:				354630	354631	354632	354633	354634	354635	354636	354637
Order No.: 0916-30	Client Sample Ref.:				WS/RO2	WS/RO2	WS4	WS4	WS4	WS4	WS4	WS5
	Client Sample ID.:				C2	C3	C1	C2	C3	C4	C5	C1
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.5	2.6	0.6	1.6	2.5	3.5	4.1	0.5
	Bottom Depth (m):						1	1.8	3	4	4.8	1
	Date Sampled:				19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Cadmium	M	2450	mg/kg	0.10	0.28	0.26	< 0.10	< 0.10	0.13	0.12	0.15	0.10
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Copper	M	2450	mg/kg	0.50	15	16	8.4	19	24	27	19	8.4
Mercury	M	2450	mg/kg	0.10	0.18	< 0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	17	15	20	23	39	42	39	19
Lead	M	2450	mg/kg	0.50	47	75	12	380	33	22	27	13
Zinc	M	2450	mg/kg	0.50	39	42	24	78	81	84	71	24
Arsenic	M	2450	mg/kg	1.0	9.6	9.0	5.2	9.5	9.7	10	8.8	4.8
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Total Phenols	M	2920	mg/kg	0.30	1.8	< 0.30	< 0.30	0.83	< 0.30	< 0.30	< 0.30	< 0.30
Naphthalene	M	2700	mg/kg	0.10	52	55	< 0.10	95	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	M	2700	mg/kg	0.10	3.6	2.3	< 0.10	6.2	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2700	mg/kg	0.10	26	0.37	< 0.10	7.0	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2700	mg/kg	0.10	25	5.4	< 0.10	11	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2700	mg/kg	0.10	110	28	0.60	54	0.49	< 0.10	0.41	< 0.10
Anthracene	M	2700	mg/kg	0.10	38	7.1	0.14	12	0.17	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2700	mg/kg	0.10	90	34	0.67	64	0.79	0.29	0.71	0.24
Pyrene	M	2700	mg/kg	0.10	87	34	0.63	64	0.68	< 0.10	0.57	0.17
Benzo[a]anthracene	M	2700	mg/kg	0.10	42	16	0.35	30	0.75	< 0.10	0.34	< 0.10
Chrysene	M	2700	mg/kg	0.10	53	24	0.48	47	1.0	< 0.10	0.42	< 0.10
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	39	17	< 0.10	34	1.0	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	16	5.9	< 0.10	12	0.37	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2700	mg/kg	0.10	31	12	< 0.10	23	0.63	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	17	6.4	< 0.10	12	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	6.0	2.1	< 0.10	4.6	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	14	6.8	< 0.10	13	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	M	2700	mg/kg	2.0	650	260	2.9	490	5.9	< 2.0	2.5	< 2.0
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	4.9	< 1.0	< 1.0	< 1.0	9.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	10	< 1.0	< 1.0	9.8	< 1.0	< 1.0	< 1.0	11
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	50	11	< 1.0	8.2	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	130	46	< 1.0	82	< 1.0	< 1.0	< 1.0	150
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	6.4	< 1.0	< 1.0	6.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	M	2680	mg/kg	5.0	200	58	< 5.0	110	< 5.0	< 5.0	< 5.0	170

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Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:				354630	354631	354632	354633	354634	354635	354636	354637
Order No.: 0916-30	Client Sample Ref.:				WS/RO2	WS/RO2	WS4	WS4	WS4	WS4	WS4	WS5
	Client Sample ID.:				C2	C3	C1	C2	C3	C4	C5	C1
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.5	2.6	0.6	1.6	2.5	3.5	4.1	0.5
	Bottom Depth (m):						1	1.8	3	4	4.8	1
	Date Sampled:				19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	5.4	4.9	< 1.0	12	< 1.0	< 1.0	< 1.0	4.1
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	17	3.1	< 1.0	48	< 1.0	< 1.0	< 1.0	2.3
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	66	7.5	< 1.0	65	< 1.0	< 1.0	< 1.0	5.5
Aromatic TPH >C16-C21	M	2680	mg/kg	1.0	170	31	< 1.0	140	< 1.0	< 1.0	< 1.0	3.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	390	130	< 1.0	410	< 1.0	< 1.0	< 1.0	36
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	8.3	< 1.0	< 1.0	5.6	< 1.0	< 1.0	< 1.0	< 1.0
Total Aromatic Hydrocarbons	M	2680	mg/kg	5.0	660	180	< 5.0	680	< 5.0	< 5.0	< 5.0	51
Total Petroleum Hydrocarbons	M	2680	mg/kg	10	850	240	< 10	800	< 10	< 10	< 10	220
pH	M	2010		N/A	10.5	11.2	8.9	7.9	7.6	11.2	8.8	10.5
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010				0.11		0.018		
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	4.8	3.6	7.5	11	11	11	10	11
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones, Brick	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Sand	Sand	Clay	Sand	Loam
pH (2.5:1)	N	2010		N/A				7.4		10.9		
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.41	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
Total Sulphur	M	2175	%	0.010				0.049		0.040		
Sulphate (Acid Soluble)	M	2430	%	0.010				0.19		0.011		
Chromium	M	2450	mg/kg	1.0	11	11	8.3	12	16	18	14	8.1
Total Organic Carbon	M	2625	%	0.20	1.4	0.30	< 0.20	0.58	2.1	1.6	1.3	< 0.20
Total Of 9 PAH's	U	2700	mg/kg	1.0	470	200	2.2	370	4.8	< 1.0	1.9	< 1.0
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:				354630	354631	354632	354633	354634	354635	354636	354637
Order No.: 0916-30	Client Sample Ref.:				WS/RO2	WS/RO2	WS4	WS4	WS4	WS4	WS4	WS5
	Client Sample ID.:				C2	C3	C1	C2	C3	C4	C5	C1
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.5	2.6	0.6	1.6	2.5	3.5	4.1	0.5
	Bottom Depth (m):						1	1.8	3	4	4.8	1
	Date Sampled:				19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	1.3	1.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	2.5	1.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	2.4	1.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	3.4	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	2.9	1.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:	354630	354631	354632	354633	354634	354635	354636	354637
Order No.: 0916-30	Client Sample Ref.:	WS/RO2	WS/RO2	WS4	WS4	WS4	WS4	WS4	WS5
	Client Sample ID.:	C2	C3	C1	C2	C3	C4	C5	C1
	Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):	1.5	2.6	0.6	1.6	2.5	3.5	4.1	0.5
	Bottom Depth (m):			1	1.8	3	4	4.8	1
	Date Sampled:	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD					
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:				354638	354639	354640	354641	354642	354643	354644	354645
Order No.: 0916-30	Client Sample Ref.:				WS5	WS5	WS6	WS6	TP1	TP1	TP1	TP1
	Client Sample ID.:				C2	C4	C1	C2	1D	2B/D	4B/D	5D
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.5	4	0.5	1.4	0.4	0.7	1.1	1.5
	Bottom Depth (m):				2	4.5	0.9	1.8				
	Date Sampled:				19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Cadmium	M	2450	mg/kg	0.10	0.10	0.19	< 0.10	< 0.10	0.11	0.12	0.11	< 0.10
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Copper	M	2450	mg/kg	0.50	19	25	6.1	11	6.1	8.7	9.1	120
Mercury	M	2450	mg/kg	0.10	2.6	0.23	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.6
Nickel	M	2450	mg/kg	0.50	16	43	15	21	15	19	21	43
Lead	M	2450	mg/kg	0.50	45	29	9.3	9.0	7.8	11	11	4800
Zinc	M	2450	mg/kg	0.50	38	93	18	22	15	24	27	65
Arsenic	M	2450	mg/kg	1.0	11	10	2.7	3.2	5.4	5.1	4.4	59
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.55
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Naphthalene	M	2700	mg/kg	0.10	2.2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.91
Acenaphthylene	M	2700	mg/kg	0.10	0.21	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.47
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.64
Fluorene	M	2700	mg/kg	0.10	0.61	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.87
Phenanthrene	M	2700	mg/kg	0.10	4.6	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.3
Anthracene	M	2700	mg/kg	0.10	0.86	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.49
Fluoranthene	M	2700	mg/kg	0.10	5.5	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.0
Pyrene	M	2700	mg/kg	0.10	5.2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.7
Benzo[a]anthracene	M	2700	mg/kg	0.10	2.7	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	2.8
Chrysene	M	2700	mg/kg	0.10	3.6	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.7
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	3.0	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.4
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	1.2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.8
Benzo[a]pyrene	M	2700	mg/kg	0.10	2.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.0
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	1.3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.7
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	0.56	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.9
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	1.2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.4
Total Of 16 PAH's	M	2700	mg/kg	2.0	35	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	34
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	14	< 1.0	8.2	19	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	30	< 1.0	16	28	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	1.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.7
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	89	< 1.0	49	61	< 1.0	< 1.0	< 1.0	38
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.5
Total Aliphatic Hydrocarbons	M	2680	mg/kg	5.0	130	< 5.0	73	110	< 5.0	< 5.0	< 5.0	49

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:				354638	354639	354640	354641	354642	354643	354644	354645
Order No.: 0916-30	Client Sample Ref.:				WS5	WS5	WS6	WS6	TP1	TP1	TP1	TP1
	Client Sample ID.:				C2	C4	C1	C2	1D	2B/D	4B/D	5D
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.5	4	0.5	1.4	0.4	0.7	1.1	1.5
	Bottom Depth (m):				2	4.5	0.9	1.8				
	Date Sampled:				19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	2.5	< 1.0	1.8	2.2	< 1.0	< 1.0	< 1.0	4.5
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	4.7	< 1.0	2.1	8.7	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	14	< 1.0	5.2	18	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C16-C21	M	2680	mg/kg	1.0	21	3.0	< 1.0	1.2	< 1.0	< 1.0	1.1	28
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	91	24	40	120	< 1.0	< 1.0	7.7	250
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	49	< 1.0	< 1.0	< 1.0	< 1.0	5.9
Total Aromatic Hydrocarbons	M	2680	mg/kg	5.0	130	28	99	150	< 5.0	< 5.0	8.8	290
Total Petroleum Hydrocarbons	M	2680	mg/kg	10	270	28	170	260	< 10	< 10	< 10	340
pH	M	2010		N/A	9.8	8.4	8.5	8.6	10.1	9.1	9.5	6.0
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010		0.075	< 0.010	0.047	0.033			
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	15	19	9.3	8.6	6.2	7.4	7.0	19
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Loam	Sand	Sand	Sand	Sand	Sand	Sand	Sand
pH (2.5:1)	N	2010		N/A		8.3	8.5	8.6	10.3			
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	0.52
Total Sulphur	M	2175	%	0.010		0.047	< 0.010	0.076	0.015			
Sulphate (Acid Soluble)	M	2430	%	0.010		0.036	< 0.010	0.018	0.016			
Chromium	M	2450	mg/kg	1.0	9.1	14	6.4	7.6	8.2	8.7	9.5	14
Total Organic Carbon	M	2625	%	0.20	1.4	0.70	0.23	0.61	< 0.20	0.50	0.30	7.7
Total Of 9 PAH's	U	2700	mg/kg	1.0	26	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	21
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:				354638	354639	354640	354641	354642	354643	354644	354645
Order No.: 0916-30	Client Sample Ref.:				WS5	WS5	WS6	WS6	TP1	TP1	TP1	TP1
	Client Sample ID.:				C2	C4	C1	C2	1D	2B/D	4B/D	5D
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.5	4	0.5	1.4	0.4	0.7	1.1	1.5
	Bottom Depth (m):				2	4.5	0.9	1.8				
	Date Sampled:				19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:	354638	354639	354640	354641	354642	354643	354644	354645
Order No.: 0916-30	Client Sample Ref.:	WS5	WS5	WS6	WS6	TP1	TP1	TP1	TP1
	Client Sample ID.:	C2	C4	C1	C2	1D	2B/D	4B/D	5D
	Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):	1.5	4	0.5	1.4	0.4	0.7	1.1	1.5
	Bottom Depth (m):	2	4.5	0.9	1.8				
	Date Sampled:	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD					
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:				354646	354647	354648	354649	354650	354651	354652	354653
Order No.: 0916-30	Client Sample Ref.:				TP2	TP2	TP2	TP2	TP3	TP3	TP3 EXT	TP3 EXT
	Client Sample ID.:				1D	2B/D	3D	5D	1D	2B/D	1D	2BD/D
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.7	1.3	1.7	2	0.4	0.65	1.2	1.5
	Bottom Depth (m):											
	Date Sampled:				19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Cadmium	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.16	0.13	0.10
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Copper	M	2450	mg/kg	0.50	13	8.5	54	43	12	12	29	31
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	2.5	0.31	< 0.10	< 0.10	3.6	0.97
Nickel	M	2450	mg/kg	0.50	18	15	17	23	19	17	28	24
Lead	M	2450	mg/kg	0.50	150	23	10000	630	53	44	110	150
Zinc	M	2450	mg/kg	0.50	28	30	78	80	28	27	57	59
Arsenic	M	2450	mg/kg	1.0	6.2	4.7	18	20	7.6	9.1	16	17
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	0.33	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Naphthalene	M	2700	mg/kg	0.10	< 0.10	4.3	130	< 0.10	1.1	1.6	14	98
Acenaphthylene	M	2700	mg/kg	0.10	< 0.10	0.93	8.2	< 0.10	0.23	0.35	1.0	7.3
Acenaphthene	M	2700	mg/kg	0.10	< 0.10	1.1	10	< 0.10	0.52	0.62	1.6	18
Fluorene	M	2700	mg/kg	0.10	< 0.10	1.3	17	< 0.10	0.61	0.72	2.2	25
Phenanthrene	M	2700	mg/kg	0.10	< 0.10	4.9	70	< 0.10	2.5	3.2	10	140
Anthracene	M	2700	mg/kg	0.10	< 0.10	0.96	17	< 0.10	0.58	0.71	2.2	41
Fluoranthene	M	2700	mg/kg	0.10	< 0.10	5.9	77	1.0	3.3	4.0	13	130
Pyrene	M	2700	mg/kg	0.10	< 0.10	5.7	76	1.1	3.4	4.5	13	130
Benzo[a]anthracene	M	2700	mg/kg	0.10	< 0.10	2.9	35	< 0.10	2.0	2.3	6.0	64
Chrysene	M	2700	mg/kg	0.10	< 0.10	4.5	40	< 0.10	3.7	4.1	5.7	77
Benzo[b]fluoranthene	M	2700	mg/kg	0.10	< 0.10	2.8	38	< 0.10	1.9	2.7	6.5	63
Benzo[k]fluoranthene	M	2700	mg/kg	0.10	< 0.10	5.2	18	< 0.10	3.6	3.6	6.2	30
Benzo[a]pyrene	M	2700	mg/kg	0.10	< 0.10	2.0	27	< 0.10	1.3	1.9	4.4	49
Indeno(1,2,3-c,d)Pyrene	M	2700	mg/kg	0.10	< 0.10	0.95	15	< 0.10	0.75	1.2	2.4	27
Dibenz(a,h)Anthracene	M	2700	mg/kg	0.10	< 0.10	1.6	6.7	< 0.10	1.7	1.8	2.3	10
Benzo[g,h,i]perylene	M	2700	mg/kg	0.10	< 0.10	0.97	15	< 0.10	0.67	1.1	2.5	25
Total Of 16 PAH's	M	2700	mg/kg	2.0	< 2.0	46	600	2.1	28	34	93	940
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	11	< 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	< 1.0	4.2	< 1.0	< 1.0	< 1.0	43	3.9
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	< 1.0	8.2	< 1.0	< 1.0	< 1.0	64	7.4
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	6.1	10	< 1.0	< 1.0	2.8	55	11
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	35	45	28	27	61	360	42
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	12	< 1.0	< 1.0	< 1.0	87	10
Total Aliphatic Hydrocarbons	M	2680	mg/kg	5.0	< 5.0	41	81	28	27	64	620	75

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:				354646	354647	354648	354649	354650	354651	354652	354653
Order No.: 0916-30	Client Sample Ref.:				TP2	TP2	TP2	TP2	TP3	TP3	TP3 EXT	TP3 EXT
	Client Sample ID.:				1D	2B/D	3D	5D	1D	2B/D	1D	2BD/D
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.7	1.3	1.7	2	0.4	0.65	1.2	1.5
	Bottom Depth (m):											
	Date Sampled:				19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	2.7	8.2	< 1.0	1.8	2.3	280	14
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	< 1.0	7.8	37	< 1.0	< 1.0	< 1.0	2000	86
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	< 1.0	12	89	< 1.0	< 1.0	< 1.0	2000	110
Aromatic TPH >C16-C21	M	2680	mg/kg	1.0	< 1.0	31	300	1.7	11	17	3400	270
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	< 1.0	130	770	44	68	100	7700	750
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	< 1.0	21	< 1.0	< 1.0	< 1.0	120	19
Total Aromatic Hydrocarbons	M	2680	mg/kg	5.0	< 5.0	190	1200	46	82	120	16000	1200
Total Petroleum Hydrocarbons	M	2680	mg/kg	10	< 10	230	1300	74	110	190	16000	1300
pH	M	2010		N/A	7.9	9.2	8.5	8.5	10.8	11.0	9.1	10.6
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010								0.081
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Moisture	N	2030	%	0.020	6.8	7.7	18	21	8.2	7.9	16	13
Soil Colour	N	2040		N/A	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones, Brick	Stones	Stones	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand	Clay	Sand	Sand	Sand	Sand
pH (2.5:1)	N	2010		N/A								10.5
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40	0.55	0.59	< 0.40	< 0.40	0.88	< 0.40
Total Sulphur	M	2175	%	0.010								0.12
Sulphate (Acid Soluble)	M	2430	%	0.010								0.13
Chromium	M	2450	mg/kg	1.0	8.3	7.9	10	13	8.9	10	18	11
Total Organic Carbon	M	2625	%	0.20	0.40	0.37	3.9	3.6	0.35	1.4	0.97	2.1
Total Of 9 PAH's	U	2700	mg/kg	1.0	< 1.0	29	440	1.0	17	22	64	690
Dichlorodifluoromethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	M	2760	µg/kg	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Chloroethane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:				16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:				354646	354647	354648	354649	354650	354651	354652	354653
Order No.: 0916-30	Client Sample Ref.:				TP2	TP2	TP2	TP2	TP3	TP3	TP3 EXT	TP3 EXT
	Client Sample ID.:				1D	2B/D	3D	5D	1D	2B/D	1D	2BD/D
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.7	1.3	1.7	2	0.4	0.65	1.2	1.5
	Bottom Depth (m):											
	Date Sampled:				19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:				COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD								
Bromochloromethane	U	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Trichloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	2.9	< 1.0	< 1.0	< 1.0	14	1.2
1,2-Dichloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
cis-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	4.0	< 1.0	< 1.0	< 1.0	21	< 1.0
Trans-1,3-Dichloropropene	N	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	M	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	2760	µg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	M	2760	µg/kg	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	M	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.0	< 1.0
m & p-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	4.6	< 1.0	1.4	< 1.0	21	1.2
o-Xylene	M	2760	µg/kg	1.0	< 1.0	< 1.0	3.2	< 1.0	< 1.0	< 1.0	11	< 1.0
Styrene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	N	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50
N-Propylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	1.5	< 1.0	< 1.0	< 1.0	4.8	< 1.0
4-Chlorotoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	2.6	< 1.0	< 1.0	< 1.0	9.0	< 1.0
Sec-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Results - Soil

Project: J3579/16/E Better Barnsley (May Day Green Shops)

Client: Rogers Geotechnical Services Ltd	Chemtest Job No.:	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822	16-22822
Quotation No.:	Chemtest Sample ID.:	354646	354647	354648	354649	354650	354651	354652	354653
Order No.: 0916-30	Client Sample Ref.:	TP2	TP2	TP2	TP2	TP3	TP3	TP3 EXT	TP3 EXT
	Client Sample ID.:	1D	2B/D	3D	5D	1D	2B/D	1D	2BD/D
	Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):	0.7	1.3	1.7	2	0.4	0.65	1.2	1.5
	Bottom Depth (m):								
	Date Sampled:	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016	19-Sep-2016
	Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	Accred.	SOP	Units	LOD					
1,3-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50	< 50	< 50	< 50	< 50	< 50
1,2,4-Trichlorobenzene	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at our Coventry laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.co.uk



2183

Amended Report

Report No.:	16-22825-2		
Initial Date of Issue:	30-Sep-2016	Date of Re-Issue:	02-Nov-2016
Client	Rogers Geotechnical Services Ltd		
Client Address:	Unit 4, Barncliffe Business Park Near Bank Shelley Huddersfield West Yorkshire HD8 8LU		
Contact(s):	James Farnsworth		
Project	J3579/16/E Better Barnsey (May Day Green Shops)		
Quotation No.:	Q16-06617	Date Received:	22-Sep-2016
Order No.:	0916-30	Date Instructed:	22-Sep-2016
No. of Samples:	4		
Turnaround (Wkdays):	7	Results Due:	30-Sep-2016
Date Approved:	30-Sep-2016		
Approved By:			
Details:	Glynn Harvey, Laboratory Manager		

Results - 2 Stage WAC

Project: J3579/16/E Better Barnsey (May Day Green Shops)

Chemtest Job No: 16-22825 Chemtest Sample ID: 354659 Sample Ref: WS4 Sample ID: C1 Top Depth(m): 0.6 Bottom Depth(m): 1 Sampling Date: 19-Sep-2016							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units						
Total Organic Carbon	2625	U	%				0.36	3	5
Loss On Ignition	2610	U	%				1.9	--	10
Total BTEX	2760	U	mg/kg				< 0.010	6	--
Total PCBs (7 Congeners)	2815	U	mg/kg				< 0.10	1	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg				< 10	500	--
Total (Of 17) PAH's	2700	N	mg/kg				9.5	100	--
pH	2010	U					8.0	--	>6
Acid Neutralisation Capacity	2015	N	mol/kg				0.017	--	To evaluate
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
Arsenic	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.018	0.0081	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.0021	0.0015	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0016	0.0014	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0027	0.0011	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	0.0012	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	0.0014	< 0.010	0.012	0.1	0.5	7
Zinc	1450	U	0.0043	0.0015	< 0.50	< 0.50	4	50	200
Chloride	1220	U	13	2.4	26	36	800	15000	25000
Fluoride	1220	U	0.57	0.25	1.1	2.9	10	150	500
Sulphate	1220	U	51	8.3	100	130	1000	20000	50000
Total Dissolved Solids	1020	N	190	64	380	790	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	27	11	54	130	500	800	1000

Soild Information

Dry mass of test portion/kg	0.175
Moisture (%)	7.5

Leachate Test Information

Leachant volume 1st extract/l	0.336
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.204

Results - 2 Stage WAC

Project: J3579/16/E Better Barnsey (May Day Green Shops)

Chemtest Job No: 16-22825 Chemtest Sample ID: 354660 Sample Ref: WS6 Sample ID: C1 Top Depth(m): 0.5 Bottom Depth(m): 0.9 Sampling Date: 19-Sep-2016							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units						
Total Organic Carbon	2625	U	%				3	5	6
Loss On Ignition	2610	U	%				--	--	10
Total BTEX	2760	U	mg/kg				6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg				1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg				500	--	--
Total (Of 17) PAH's	2700	N	mg/kg				100	--	--
pH	2010	U					--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg				--	To evaluate	To evaluate
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
Arsenic	1450	U	0.0018	0.0023	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.0085	0.0042	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.0011	0.0015	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0011	0.0011	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0022	< 0.0010	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	0.0010	< 0.010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0015	< 0.0010	< 0.50	< 0.50	4	50	200
Chloride	1220	U	6.1	1.4	12	19	800	15000	25000
Fluoride	1220	U	0.82	0.25	1.6	3.1	10	150	500
Sulphate	1220	U	34	5.3	68	85	1000	20000	50000
Total Dissolved Solids	1020	N	120	53	240	600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	25	15	< 50	160	500	800	1000

Soild Information

Dry mass of test portion/kg	0.175
Moisture (%)	8.0

Leachate Test Information

Leachant volume 1st extract/l	0.335
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.195

Results - 2 Stage WAC

Project: J3579/16/E Better Barnsey (May Day Green Shops)

Chemtest Job No: 16-22825 Chemtest Sample ID: 354661 Sample Ref: TP1 Sample ID: 2B/D Top Depth(m): 0.7 Bottom Depth(m): Sampling Date: 19-Sep-2016							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units						
Total Organic Carbon	2625	U	%				0.21	3	5
Loss On Ignition	2610	U	%				1.8	--	10
Total BTEX	2760	U	mg/kg				< 0.010	6	--
Total PCBs (7 Congeners)	2815	U	mg/kg				< 0.10	1	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg				< 10	500	--
Total (Of 17) PAH's	2700	N	mg/kg				< 2.0	100	--
pH	2010	U					8.7	--	>6
Acid Neutralisation Capacity	2015	N	mol/kg				0.012	--	To evaluate
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
Arsenic	1450	U	0.0027	0.0027	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.0066	0.0023	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.017	0.0024	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0017	< 0.0010	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0045	< 0.0010	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	0.0012	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0028	0.0012	< 0.010	0.014	0.1	0.5	7
Zinc	1450	U	0.0010	< 0.0010	< 0.50	< 0.50	4	50	200
Chloride	1220	U	5.7	1.5	11	21	800	15000	25000
Fluoride	1220	U	1.1	0.32	2.2	4.3	10	150	500
Sulphate	1220	U	55	9.1	110	150	1000	20000	50000
Total Dissolved Solids	1020	N	160	78	320	890	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	13	13	< 50	130	500	800	1000

Soild Information

Dry mass of test portion/kg	0.175
Moisture (%)	7.5

Leachate Test Information

Leachant volume 1st extract/l	0.336
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.238

Results - 2 Stage WAC

Project: J3579/16/E Better Barnsey (May Day Green Shops)

Chemtest Job No: 16-22825 Chemtest Sample ID: 354662 Sample Ref: TP2 Sample ID: 5D Top Depth(m): 2 Bottom Depth(m): Sampling Date: 19-Sep-2016							Landfill Waste Acceptance Criteria Limits		
							Inert Waste Landfill	Stable, Non-reactive hazardous waste in non-hazardous Landfill	Hazardous Waste Landfill
Determinand	SOP	Accred.	Units						
Total Organic Carbon	2625	U	%				2.4	3	6
Loss On Ignition	2610	U	%				5.9	--	10
Total BTEX	2760	U	mg/kg				< 0.010	6	--
Total PCBs (7 Congeners)	2815	U	mg/kg				< 0.10	1	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg				< 10	500	--
Total (Of 17) PAH's	2700	N	mg/kg				14	100	--
pH	2010	U					8.6	--	>6
Acid Neutralisation Capacity	2015	N	mol/kg				0.015	--	To evaluate
Eluate Analysis			2:1 mg/l	8:1 mg/l	2:1 mg/kg	Cumulative mg/kg 10:1	Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
Arsenic	1450	U	0.0035	0.0040	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.015	0.0074	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.0025	0.0012	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0027	0.0016	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0080	0.0036	< 0.050	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	0.0013	< 0.0010	< 0.010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0036	0.0018	< 0.010	0.020	0.1	0.5	7
Zinc	1450	U	0.0024	< 0.0010	< 0.50	< 0.50	4	50	200
Chloride	1220	U	8.3	2.1	16	28	800	15000	25000
Fluoride	1220	U	0.31	0.25	< 1.0	2.6	10	150	500
Sulphate	1220	U	78	19	150	260	1000	20000	50000
Total Dissolved Solids	1020	N	270	140	530	1600	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	16	14	< 50	140	500	800	1000

Soild Information

Dry mass of test portion/kg	0.175
Moisture (%)	18

Leachate Test Information

Leachant volume 1st extract/l	0.311
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.210

Test Methods

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

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customerservices@chemtest.co.uk



Appendix D

Statistical Analysis - Inputs and Outputs

Client/client ref	Barnsley Metropolitan Borough Council
Project ref	Better Barnsley Library
Site ref	23-29-17-1-6002
Data description	Ground Investigation
Contaminant(s)	Metals and Phenol
Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)? ▼
Date	20 November 2016
User details	C Riley

Statistics Calculator (Version 2)



Input data

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

ESI Ltd (ESI) do not promise that the spreadsheet will provide any particular facilities or functions. The user must ensure that the spreadsheet meets their needs and they remain solely responsible for the competent use of the spreadsheet. Users are entirely responsible for the consequences of any use of the spreadsheet, ESI do not provide any warranty about the fitness for purpose or performance of any part of the spreadsheet. We do not promise that the media will always be free from defects, computer viruses, software locks or other similar code or that the operation of the spreadsheet will be uninterrupted or error free. The user should carry out all necessary virus checks prior to installing on their computing system.

Go to summary							Project details		Select all filters		Deselect all filters		Paste Values												
Easting	Northing	Depth (m)	User-defined 1	User-defined 2	User-defined 3	Sample ID	Arsenic	Boron (Hot Water Soluble)	Cadmium	Chromium	Chromium (Hexavalent)	Copper	Lead	Mercury	Nickel	Selenium	Zinc								
							☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter
		1.5	MG-G			WS/RO2	9.6	0.41	0.28	11	< 0.50	15	47	0.18	17	< 0.20	39								
		2.6	MG-G			WS/RO2	9	< 0.40	0.26	11	< 0.50	16	75	< 0.10	15	< 0.20	42								
		0.6	MG-G			WS4	5.2	< 0.40	< 0.10	8.3	< 0.50	8.4	12	< 0.10	20	< 0.20	24								
		1.6	MG-G			WS4	9.5	< 0.40	< 0.10	12	< 0.50	19	380	0.16	23	< 0.20	78								
		2.5	MG-C			WS4	9.7	< 0.40	0.13	16	< 0.50	24	33	< 0.10	39	< 0.20	81								
		3.5	MG-C			WS4	10	< 0.40	0.12	18	< 0.50	27	22	< 0.10	42	< 0.20	84								
		4.1	MG-C			WS4	8.8	< 0.40	0.15	14	< 0.50	19	27	< 0.10	39	< 0.20	71								
		0.5	MG-S			WS5	4.8	< 0.40	0.1	8.1	< 0.50	8.4	13	< 0.10	19	< 0.20	24								
		1.5	MG-S			WS5	11	< 0.40	0.1	9.1	< 0.50	19	45	2.6	16	< 0.20	38								
		4	MG-C			WS5	10	< 0.40	0.19	14	< 0.50	25	29	0.23	43	< 0.20	93								
		0.5	MG-G			WS6	2.7	< 0.40	< 0.10	6.4	< 0.50	6.1	9.3	< 0.10	15	< 0.20	18								
		1.4	MG-G			WS6	3.2	< 0.40	< 0.10	7.6	< 0.50	11	9	< 0.10	21	< 0.20	22								
		0.4	MG-S			TP1	5.4	< 0.40	0.11	8.2	< 0.50	6.1	7.8	< 0.10	15	< 0.20	15								
		0.7	MG-S			TP1	5.1	< 0.40	0.12	8.7	< 0.50	8.7	11	< 0.10	19	< 0.20	24								
		1.1	MG-S			TP1	4.4	< 0.40	0.11	9.5	< 0.50	9.1	11	< 0.10	21	< 0.20	27								
		1.5	MG-C			TP1	59	0.52	< 0.10	14	< 0.50	120	4800	1.6	43	0.55	65								
		0.7	MG-S			TP2	6.2	< 0.40	< 0.10	8.3	< 0.50	13	150	< 0.10	18	< 0.20	28								
		1.3	MG-S			TP2	4.7	< 0.40	< 0.10	7.9	< 0.50	8.5	23	< 0.10	15	< 0.20	30								
		1.7	MG-S			TP2	18	0.55	< 0.10	10	< 0.50	54	10000	2.5	17	< 0.20	78								
		2	MG-S			TP2	20	0.59	< 0.10	13	< 0.50	43	630	0.31	23	< 0.20	80								
		0.4	MG-S			TP3	7.6	< 0.40	< 0.10	8.9	< 0.50	12	53	< 0.10	19	< 0.20	28								
		0.65	MG-S			TP3	9.1	< 0.40	0.16	10	< 0.50	12	44	< 0.10	17	< 0.20	27								
		1.2	MG-S			TP3 EXT	16	0.88	0.13	18	< 0.50	29	110	3.6	28	< 0.20	57								
		1.5	MG-S			TP3 EXT	17	< 0.40	0.1	11	< 0.50	31	150	0.97	24	< 0.20	59								

Client/site ref: Bursley Metropolitan Borough Council
Project ref: Better Bursley Library
Site ref: 23-29-171-6002
Data description: Ground Investigation
Contaminant(s): Metals and Pesticides
Test scenario: Planning
Date: 20 November 2018

Critical concentration, C _c	640	240000	190	8600	33	6800	2330	58	980	12000	7300								
Notes	LQM GAC	LQM GAC	LQM GAC	LQM GAC	LQM GAC	LQM GAC	Delta CASL	LQM GAC	LQM GAC	LQM GAC	LQM GAC								
Full dataset size	24	24	24	24	24	24	24	24	24	24	24	0	0	0	0	0	0	0	0
Outliers present?	Yes	Yes	No	No	No	Yes	Yes	Yes	No	Yes	No								
Number of outliers temporarily excluded	0																		
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	24	24	24	24	24	24	24	24	24	24	24	0	0	0	0	0	0	0	0
Sample mean, $\bar{x}$	11.083333	0.28125	0.1066667	10.958333	0.25	22.679167	695.4625	0.5375	23.666667	0.11875	47.166667	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Standard deviation, s	11.230806	0.1775513	0.0655854	3.2682819	0	23.902901	2207.196	0.9952419	9.7609099	0.0918559	25.412538								
Number of non-detects	0	19	10	0	24	0	0	15	0	23	0	0	0	0	0	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Single value	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal								
Statistical approach	Auto-Cretychev	Auto-Cretychev	Auto-Cretychev	Auto-Cretychev	Auto-Cretychev	Auto-Cretychev	Auto-Cretychev	Auto-Cretychev	Auto-Cretychev	Auto-Cretychev	Auto-Cretychev	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto

Test scenario:	Planning: is true mean lower than critical concentration ($\mu < C_c$)?											Evidence level required: 95%		Use Normal distribution to test for outliers										
t statistic, t ₀ (or k ₀)	-274.3391447	-6622051.433	-14184.30091	-12874.51329	N/A	-1389.034565	-3.62793595	-282.853442	-479.981623	-639993.6667	-1398.187042													
Upper confidence limit (on true mean concentration, μ)	21.076017	0.4392274	0.1650217	13.866308	0.25	43.946929	2659.3295	1.423023	32.3515	0.2004794	69.777638													
Evidence level	100%	100%	100%	100%	100%	100%	93%	100%	100%	100%	100%													
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level													
Result	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu \geq C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$													
Select dataset	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

Back to data

Go to outlier test

Go to normality test

Show individual summary

Client/client ref	Barnsley Metropolitan Borough Council
Project ref	Better Barnsley Library
Site ref	23-29-17-1-6002
Data description	Ground Investigation
Contaminant(s)	Metals and Phenol
Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)? ▼
Date	20 November 2016
User details	C Riley

Statistics Calculator (Version 2)



Input data

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Go to summary						Project details			Select all filters		Deselect all filters			Paste Values													
Easting	Northing	Depth (m)	User-defined 1	User-defined 2	User-defined 3	Sample ID	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-c,d]Pyrene	Naphthalene	Phenanthrene	Pyrene					
							☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter	☐ filter
		1.5	MG-G			WSR02	26	3.6	38	42	31	39	14	16	53	6	90	25	17	52	110	87					
		2.6	MG-G			WSR02	0.37	2.3	7.1	16	12	17	6.8	5.9	24	2.1	34	5.4	6.4	55	28	34					
		0.6	MG-G			WS4	<0.10	<0.10	0.14	0.35	<0.10	<0.10	<0.10	0.48	<0.10	0.67	<0.10	<0.10	<0.10	0.6	0.63						
		1.6	MG-G			WS4	12	6.2	12	30	23	34	13	12	47	4.6	64	11	12	95	54	64					
		2.5	MG-C			WS4	<0.10	<0.10	0.17	0.75	0.63	1	<0.10	0.37	1	<0.10	0.79	<0.10	<0.10	<0.10	0.49	0.68					
		3.5	MG-C			WS4	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.29	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10					
		4.1	MG-C			WS4	<0.10	<0.10	<0.10	<0.10	0.34	<0.10	<0.10	<0.10	0.42		0.71	<0.10	<0.10	<0.10	0.41	0.57					
		0.5	MG-S			WSS	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.24	<0.10	<0.10	<0.10	<0.10	0.17					
		1.5	MG-S			WSS	<0.10		0.21	0.86	2.7	2.1	3	1.2	1.2	3.6	0.56	5.5	0.61	1.3	2.2	4.6	5.2				
		4	MG-C			WSS	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10					
		0.5	MG-G			WS6	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10					
		1.4	MG-G			WS6	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10					
		0.4	MG-S			TP1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10					
		0.7	MG-S			TP1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10					
		1.1	MG-S			TP1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10					
		1.5	MG-C			TP1	0.64	0.47	0.49	2.8	3	3.4	1.4	3.8	3.7	1.9	3	0.87	1.7	0.91	2.3	3.7					
		0.7	MG-S			TP2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10					
		1.3	MG-S			TP2	1.1	0.93	0.96	2.9	2	2.8	0.97	5.2	4.5	1.6	5.9	1.3	0.95	4.3	4.9	5.7					
		1.7	MG-S			TP2	10	8.2	17	35	27	38	15	18	40	6.7	77	17	15	130	70	76					
		2	MG-S			TP2	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	1	<0.10	<0.10	<0.10	<0.10	1.1					
		0.4	MG-S			TP3	0.52	0.23	0.58	2	1.3	1.9	0.67	3.6	3.7	1.7	3.3	0.61	0.75	1.1	2.5	3.4					
		0.65	MG-S			TP3	0.62	0.35	0.71	2.3	1.9	2.7	1.1	3.6	4.1	1.8	4	0.72	1.2	1.6	3.2	4.5					
		1.2	MG-S			TP3 EXT	1.6	1	2.2	6	4.4	6.5	2.5	6.2	5.7	2.3	13	2.2	2.4	14	10	13					
		1.5	MG-S			TP3 EXT	18	7.3	41	64	49	63	25	30	77	10	130	25	27	98	140	130					

Client/client ref: Barnsley Metropolitan Borough Council
Project ref: Better Barnsley Library
Site ref: 23-29-17-1-6002
Data description: Ground Investigation
Contaminant(s): Metals and Phenol
Test scenario: Planning
Date: 20 November 2016
User: J. J. J. J. J.

	Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz[a,h]Anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-c,d]Pyrene	Naphthalene
Critical concentration, C _c	84000	83000	520000	170	35	44	3900	1200	350	3.5	23000	63000	500	190
Notes	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM	LQM GAC 1%SOM
Full dataset size	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Outliers present?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of outliers temporarily excluded	0													
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Sample mean, $\bar{X}$	2.77291667	1.31	5.07333333	8.65166667	6.58041667	8.87083333	3.42875	4.43625	11.1958333	1.66291667	18.0729167	3.765	3.59791667	18.9483333
Standard deviation, s	6.49236574	2.45278369	11.4176422	16.8293526	12.7981855	16.9050797	6.56529235	7.50051987	21.0857477	2.62122686	35.2719612	7.68266428	7.01103911	37.8009757
Number of non-detects	14	13	11	10	12	12	13	12	10	13	7	13	13	13
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev	Auto: Chebychev

Test scenario:	Planning: is true mean lower than critical concentration ($\mu < C_c$)?				Evidence level required:		95%	Use Normal distribution to test for outliers						
t statistic, t ₀ (or k ₀)	-63382.24139	-165774.4551	-223114.758	-46.96806776	-10.87864805	-10.18019847	-2907.596739	-780.8848432	-78.7164243	-3.433443209	-3191.996857	-40170.6038	-346.8620821	-22.16817399
Upper confidence limit (on true mean concentration, μ)	8.54954142	3.49238028	15.2322549	23.6256929	17.9676857	23.9122383	9.27026168	11.1098865	29.9570148	3.99517036	49.4563742	10.6007006	9.83603443	52.5819979
Evidence level	100%	100%	100%	100%	99%	99%	100%	100%	100%	92%	100%	100%	100%	100%
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu \approx \geq C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$	$\mu < C_c$
Select dataset	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Back to data

Go to outlier test

Go to normality test

Show individual summary

Client/client ref: Barnsley Metropolitan Borough Council
 Project ref: Better Barnsley Library
 Site ref: 23-29-17-1-6002
 Data description: Ground Investigation
 Contaminant(s): Metals and Phenol
 Test scenario: Planning
 Date: 20 November 2016
 User: [redacted]

	Phenanthrene	Pyrene				
Critical concentration, C_c	22000	54000				
Notes	LQM GAC 1%SOM	LQM GAC 1%SOM				
Full dataset size	24	24	0	0	0	0
Outliers present?	Yes	Yes				
Number of outliers temporarily excluded						
Number removed by filter	0	0	0	0	0	0
Sample size, n	24	24	0	0	0	0
Sample mean, $\bar{X}$	17.9791667	17.91875	No Data	No Data	No Data	No Data
Standard deviation, s	37.7115671	34.9331751				
Number of non-detects	10	8	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit ▼
Distribution	Non-normal	Non-normal				
Statistical approach	Auto: Chebychev	Auto: Chebychev	Auto	Auto	Auto	Auto ▼

Test scenario:					
t statistic, t_0 (or k_0)	-2855.608433	-7570.371364			
Upper confidence limit (on true mean concentration, μ)	51.5332794	49.0007704			
Evidence level	100%	100%			
Base decision on:	evidence level	evidence level			▼
Result	$\mu < C_c$	$\mu < C_c$			
Select dataset	○	○	○	○	○

Back to data

Client/client ref	Barnsley Metropolitan Borough Council
Project ref	Better Barnsley Library
Site ref	23-29-17-1-6002
Data description	Ground Investigation
Contaminant(s)	TPH
Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)? ▼
Date	20 November 2016
User details	C Riley

Statistics Calculator (Version 2)



Input data

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[illegible]

[illegible]

Client/client ref	Barnsley Metropolitan Borough Council
Project ref	Better Barnsley Library
Site ref	23-29-17-1-6002
Data description	Ground Investigation
Contaminant(s)	VOC (Sheet 1)
Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)? ▼
Date	28 November 2016
User details	C Riley

Statistics Calculator (Version 2)



Input data

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Go to summary						Project details		Select all filters		Deselect all filters		Paste Values														
Easting	Northing	Depth (m)	User-defined 1	User-defined 2	User-defined 3	Sample ID	Chloromethane	Vinyl Chloride	1,1-Dichloroethane	Trans 1,2-Dichloroethane	1,1-Dichloroethane	cis 1,2-Dichloroethane	1,1,1-Trichloroethane	Benzene	1,2-Dichloroethane	Trichloroethene	1,2-Dichloropropane	Bromodichloromethane	Toluene	1,1,2-Trichloroethane	Chlorobenzene	1,1,1,2-Tetrachloroethane	Ethylbenzene	m & p-Xylene	o-Xylene	Styrene
							☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter	☐ Filter
		1.5	MG: G			WS/RO2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	0.0013	<0.01	<0.001	<0.002	<0.001	0.0025	0.0024	<0.001
		2.6	MG: G			WS/RO2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	1.1	<0.01	<0.001	<0.002	<0.001	0.0017	0.0013	<0.001
		0.6	MG: G			WS4	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		1.6	MG: G			WS4	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		2.5	MG: C			WS4	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		3.5	MG: C			WS4	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		4.1	MG: C			WS4	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		0.5	MG: S			WS5	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		1.5	MG: S			WS5	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		4	MG: C			WS5	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		0.5	MG: G			WS6	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		1.4	MG: G			WS6	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		0.4	MG: S			TP1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		0.7	MG: S			TP1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		1.1	MG: S			TP1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		1.5	MG: C			TP1	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		0.7	MG: S			TP2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		1.3	MG: S			TP2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		1.7	MG: S			TP2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0029	<0.002	<0.001	<0.001	<0.005	0.004	<0.01	<0.001	<0.002	<0.001	0.0046	0.0032
		2	MG: S			TP2	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		0.4	MG: S			TP3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		0.85	MG: S			TP3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	<0.001	<0.001	<0.001
		1.2	MG: S			TP3 EXT	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.002	<0.001	<0.001	<0.005	0.021	<0.01	<0.001	<0.002	0.003	0.021	0.011	<0.001
		1.5	MG: S			TP3 EXT	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0012	<0.002	<0.001	<0.001	<0.005	<0.001	<0.01	<0.001	<0.002	<0.001	0.0012	<0.001

Client/client ref: Barnsley Metropolitan Borough Council
Project ref: Better Barnsley Library
Site ref: 23-29-17-1-6002
Data description: Ground Investigation
Contaminant(s): VOC (Sheet 1)
Test scenario: Planning
Date: 28 November 2016

Client ref: Bamsley Metropolitan Borough Council Project ref: Better Bamsley Library Site ref: 23-29-17-1-6002 Data description: Ground Investigation Contaminant(s): VOC (Sheet 1) Test scenario: Planning Date: 20 November 2024		Chloromethan e	Vinyl Chloride	1,1-Dichloroethan e	Trans 1,2-Dichloroethen e	1,1-Dichloroethan e	cis 1,2-Dichloroethen e	1,1,1-Trichloroethan e	Benzene	1,2-Dichloroethan e	Trichloroethen e	1,2-Dichloropropan e	Bromodichlor omethane	Toluene	1,1,2-Trichloroethan e	Chlorobenzene	1,1,1,2-Tetrachloroethan e	Ethylbenzene	m & p-Xylene	o-Xylene	Styrene
Critical concentration, C _c		1	0.063	2330	22	1830	14	700	27	0.71	12	3.3	2.1	56000	94	59	120	5700	2900	6600	3300
Notes		CLARE LQM		CLARE	CLARE	CLARE	CLARE	LQM	CLARE	LQM	LQM	CLARE	CLARE	CLARE	CLARE	LQM	LQM	CLARE	CLARE	CLARE	CLARE
Full dataset size		24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Outliers present?		No	No	No	No	No	No	No	Yes	No	No	No	No	Yes	No	No	No	Yes	Yes	Yes	No
Number of outliers temporarily excluded		0																			
Number removed by filter		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n		24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Sample mean, $\bar{x}$		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0006667	0.001	0.0005	0.0005	0.0025	0.0473458	0.005	0.0005	0.0006042	0.0016875	0.0011625	0.0005	
Standard deviation, s		3.323E-19	3.323E-19	3.323E-19	3.323E-19	3.323E-19	3.323E-19	3.323E-19	0.0005272	6.645E-19	3.323E-19	3.323E-19	8.86E-19	0.2242538	1.772E-18	3.323E-19	6.645E-19	0.0005103	0.0042177	0.0021994	3.323E-19
Number of non-detects		24	24	24	24	24	24	24	21	24	24	24	24	20	24	24	23	19	20	24	
Set non-detect values to:		Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution		Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal
Statistical approach		Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev	Auto Creqshev
Test scenario:		Planning: is true mean lower than critical concentration (μ < C _c)?  Evidence level required: 95% Use Normal distribution to test for outliers: 																			
t statistic, t _i (or k _i)		-1.4732E+19	-9.21538E+17	-3.43549E+22	-3.24373E+20	-2.69826E+22	-2.06417E+20	-1.03212E+22	-250875.8781	-5.22695E+18	-1.76928E+20	-4.86497E+19	-1.15975E+19	-1223357.737	-2.59859E+20	-8.69923E+20	-8.84667E+20	-54719994.2	-3368433.645	-14701145.95	-4.86571E+22
Upper confidence limit (on true mean concentration, μ)		0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0011358	0.001	0.0005	0.0005	0.0025	0.2468771	0.005	0.0005	0.001	0.0010582	0.0054402	0.0031194	0.0005
Evidence level		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Base decision on:		evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level
Result		μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c	μ < C _c
Select dataset																					
Back to data		Go to outlier test			Go to normality test			Show individual summary													

Client/client ref	Barnsley Metropolitan Borough Council
Project ref	Better Barnsley Library
Site ref	23-29-17-1-6002
Data description	Ground Investigation
Contaminant(s)	VOC (Sheet 1)
Test scenario	Planning: is true mean lower than critical concentration ($\mu < C_c$)? ▼
Date	28 November 2016
User details	C Riley

Statistics Calculator (Version 2)



Input data

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

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[illegible]

Client/unit ref: Barnsey Metropolitan Borough Council Project ref: Better Barnsley Library Site ref: 23-29-07-4-6002 Data description: Ground investigation Contaminant(s): VOC (Sheet 1) Test scenario: Planning Date: 28 November 2015	Isopropylbenzene	Bromobenzene	N-Propylbenzene	1,2,4-Trimethylbenzene	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,2-Dichlorobenzene	1,2,4-Trichlorobenzene	Hexachlorobutadiene	1,2,3-Trichlorobenzene	Methyl Tert-Butyl Ether									
Critical concentration, C _c	1400	97	4100	42	LQM	LQM	2100	230	32	110	7900									
Notes	CLARE	CLARE	CLARE	CLARE	LQM	LQM	LQM	LQM	LQM	LQM	CLARE									
Full dataset size	24	24	24	24	24	24	24	24	24	24	24	0	0	0	0	0	0	0	0	0
Outliers present?	No	No	No	Yes	No	No	No	No	No	No	No									
Number of outliers temporarily excluded	0																			
Number removed by filter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sample size, n	24	24	24	24	24	24	24	24	24	24	24									
Sample mean, $\bar{x}$	0.0005	0.0005	0.0005	0.0010833	0.0005	0.0005	0.001	0.0005	0.0005	0.001	0.0005	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Standard deviation, s	3.323E-19	3.323E-19	3.323E-19	0.0018088	3.323E-19	3.323E-19	6.645E-19	3.323E-19	3.323E-19	6.645E-19	3.323E-19									
Number of non-detects	24	24	24	24	24	24	24	24	24	24	24	0	0	0	0	0	0	0	0	0
Set non-detect values to:	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit	Half detection limit
Distribution	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal	Non-normal									
Statistical approach	Auto Creschew	Auto Creschew	Auto Creschew	Auto Creschew	Auto Creschew	Auto Creschew	Auto Creschew	Auto Creschew	Auto Creschew	Auto Creschew	Auto Creschew									
Test scenario: (t statistic, t ₀ (or k _a))	-2.06424E+22	-1.43022E+21	-6.04528E+22	-1.13748.2585	-4.71819E+20	-6.63506E+22	-1.54818E+22	-3.39125E+21	-4.71819E+20	-8.10944E+20	-1.16482E+23									
Upper confidence limit (on true mean concentration, μ)	0.0005	0.0005	0.0005	0.0026928	0.0005	0.0005	0.001	0.0005	0.0005	0.001	0.0005									
Evidence level	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%									
Base decision on:	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level	evidence level									
Result	μ < Cc	μ < Cc	μ < Cc	μ < Cc	μ < Cc	μ < Cc	μ < Cc	μ < Cc	μ < Cc	μ < Cc	μ < Cc									
Select dataset	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Back to data	Go to outlier test				Go to normality test				Show individual summary											