



Barnsley Youth Zone Barnsley S71 1BP

Ground Investigation Report

Barnsley Youth Zone

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EXECUTIVE SUMMARY

This executive summary contains an overview of the key findings and conclusions. No reliance should be placed on any part of the executive summary until the whole of the report has been read. Other sections of the report may contain information that puts into context the findings that are summarised in the executive summary.

BRIEF

Geotechnical and Environmental Associates (GEA) has been commissioned by HL Structural Engineers, on behalf of Barnsley Youth Zone, to carry out a ground investigation for this site off Schwabisch Gmund Way, Barnsley, S71 1BP. GEA has previously undertaken a desk study of the site and the purpose of the work has been to determine whether old coal workings are present beneath the proposed buildings. In addition, contamination testing has been commissioned to address the recommendations in the desk study. The proposed development comprises the construction of a new youth centre, consisting of a two-storey main facility, a sports hall and a kick pitch.

DESK STUDY

The site history has been researched by reference to historical Ordnance Survey (OS) maps obtained from the Envirocheck database. The earliest map studied, dated 1852, shows the northern half of the site as well as the eastern edge to have been occupied by woodland / orchards with the south and east of the site being occupied by what appears to have been gardens and parkland behind Harborough Hill House. The railway station to the west of site is shown as having been present. The maps dated 1892 and 1893 show a number of small buildings along the eastern edge of the site. The 1931 map notes the site as allotment gardens and Harborough Hill House had become a club. Off site, a row of terraced houses had been built along the northern boundary of the site consistent with the current houses along Mottram Street. Boro Colliery, a drift mine, is noted approximately 160 m to the east of site, and a lamp works approximately 170 m south. Little or no change is noted on subsequent maps up to 1958 but the 1961 map shows a number of structures in the northwest of the site. The 1972 map shows that an Electricity Board Depot had been built in the northern half of the site. The club in the southeastern corner of the site also appears to have been expanded with a new building just to the west of the previous Harborough Hill House. The 1991 map shows that a number of structures had been constructed in the southwestern corner of the site as well as an electrical substation on the southern boundary. There is little or no further change of significance to the site on the maps dated up to 2006, but by 2020 the Electricity Board Depot and the club buildings had been demolished. The South Yorkshire Mining Advisory Service reports conclude that the site is stable from deep mining subsidence but recommended boreholes to investigate the potential for shallow mine workings to be present.

GROUND CONDITIONS

A limited thickness of made ground was found to be directly underlain by sandstone and mudstone of the Pennine Middle Coal Measures. A coal seam was identified in eight of the boreholes but no evidence of voids or broken ground was encountered. The coal was intact at all locations and serves as reasonable evidence that there are no workings within 20 m depth from the surface.

RECOMMENDATIONS

Moderate width strip or pad foundations bearing on the mudstone or sandstone of the Middle Coal Measures placed at a minimum depth of 0.75 m may be designed to apply a net allowable bearing pressure of 350 kN/m². This value incorporates an adequate factor of safety against bearing capacity failure and should ensure that settlement remains within normal tolerable limits. The recommended bearing pressure is subject to inspection or further targeted investigation as the area for part of the proposed building has not yet been accessible.

Remedial measures are not expected to be required in respect of contamination as the reprofiling of the site to the proposed final level will mean that made ground and near surface natural soils and rock will be removed from site.

Part 1: INVESTIGATION REPORT

This section of the report details the objectives of the investigation, the work that has been carried out to meet these objectives and the results of the investigation. Interpretation of the findings is presented in Part 2.

1.0 INTRODUCTION

Geotechnical and Environmental Associates (GEA) has been commissioned by HL Structural Engineers on behalf of Barnsley Youth Zone to carry out a ground investigation for this site off Schwabisch Gmund Way, Barnsley, S71 1BP.

GEA has previously carried out a desk study for the site (ref J21015, dated February 2021) and the findings should be read in conjunction with this report.

1.1 Proposed Development

The proposed redevelopment of the site comprises the construction of a new youth centre, consisting of a two-storey main facility, a sports hall and a kick pitch. Some soft landscaping will be included in the redevelopment to soften site level changes.

This report is specific to the proposed development and the advice herein should be reviewed if the development proposals are amended.

1.2 Purpose of Work

The principal technical objectives of the work carried out were as follows:

- ❑ to determine the ground conditions and their engineering properties;
- ❑ to investigate whether former coal workings are present within a depth that could affect the proposed development;
- ❑ to provide an indication of the degree of soil contamination present;
- ❑ to assess the risk that any such contamination may pose to the proposed development, its users or the wider environment.

1.3 Scope of Work

In order to meet the above objectives, a ground investigation was carried out and, comprised, in summary, the following activities:

- ❑ ten boreholes advanced to a maximum depth of 20.0 m under licence from the Coal Authority using water flush rotary drilling methods;
- ❑ installation of three standpipes to monitor soil gas and groundwater;
- ❑ laboratory testing of selected soil samples for the presence of contamination; and
- ❑ provision of a report presenting and interpreting the above data, together with our

advice and recommendations with respect to the proposed development.

This report includes a contaminated land assessment which has been undertaken by a suitably qualified and competent professional in accordance with the methodology presented by the Environment Agency in their Land contamination risk assessment (LCRM)¹ published 8 October 2020. This involves identifying, making decisions on, and taking appropriate action to deal with, land contamination in a way that is consistent with government policies and legislation within the United Kingdom. Risk management is divided into three stages; Risk Assessment, Options Appraisal and Remediation, and each stage comprises three tiers. The Risk Assessment stage includes preliminary risk assessment (PRA), generic quantitative risk assessment (GQRA) and detailed quantitative risk assessment (DQRA) and this report includes the GQRA.

The exploratory methods adopted in this investigation have been selected on the basis of the constraints of the site including but not limited to access and space limitations, together with any budgetary or timing constraints. Where it has not been possible to reasonably use an EC7 compliant investigation technique a practical alternative has been adopted to obtain indicative soil parameters and any interpretation is based upon engineering experience, local precedent where applicable and relevant published information.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made on the basis of the investigation. The results of the work should be viewed in the context of the range of data sources consulted, the number of locations where the ground was sampled and the number of soil, gas or groundwater samples tested; no liability can be accepted for information in other data sources or conditions not revealed by the sampling or testing. Any comments made on the basis of information obtained from the client or other third parties are given in good faith on the assumption that the information is accurate; no independent validation of such information has been made by GEA.

2.0 THE SITE

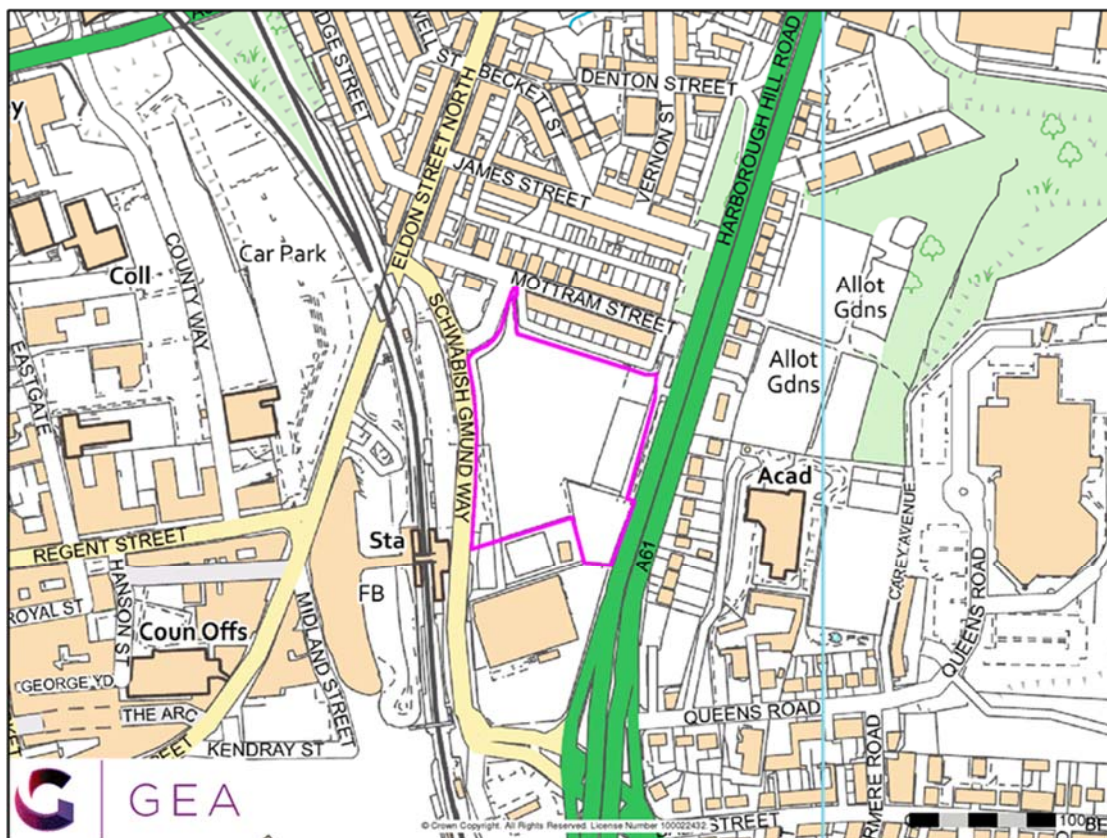
2.1 Site Description

The site is located off Schwabisch Gmund Way, approximately 25 m east of Barnsley Interchange railway station. It is bounded by Schwabisch Gmund Way to the west, Mottram Way and terraced houses to the north and the A61 Harborough Hill Road to the east. To the south the site is bounded by an electrical distribution station and a bingo hall with its associated car park.

The site is irregular in shape with maximum dimensions of approximately 170 m north to south and 130 m west to east and its centre may be located by National Grid Reference 434815 406629.

The surrounding topography slopes gently down to the north but there is a steep slope down to Schwabisch Gmund Way along the western boundary. The site is shown on the plan overleaf, and the proposed development is to be located in the western half of the site.

¹ <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>



2.2 Desk Study Findings

The site history was researched by reference to historical Ordnance Survey (OS) maps obtained from the Envirocheck database. The earliest map studied, dated 1852, shows the northern half of the site as well as the eastern edge to have been occupied by woodland / orchards with the south and east of the site being occupied by what appears to have been gardens and parkland behind Harbrough Hill House. The railway station to the west of site is shown as having been present. The maps dated 1892 and 1893 show a number of small buildings along the eastern edge of the site. The 1931 map notes the site as allotment gardens and Harbrough Hill House had become a club. Off site, a row of terraced houses had been built along the northern boundary of the site consistent with the current houses along Mottram Street. Boro Colliery, a drift mine, is noted approximately 160 m to the east of site, and a lamp works approximately 170 m south.

Little or no change is noted on subsequent maps up to 1958 but the 1961 map shows a number of structures in the northwest of the site. The 1972 map shows that an Electricity Board Depot had been built in the northern half of the site. The club in the southeastern corner of the site also appears to have been expanded with a new building just to the west of the previous Harbrough Hill House. The 1991 map shows that a number of structures had been constructed in the southwestern corner of the site as well as an electrical substation on the southern boundary. There is little or no further change of significance to the site on the maps dated up to 2006, but by 2020 the Electricity Board Depot and the club buildings had been demolished.

Four previous site investigations were reviewed as part of the desk study. These reports included reference to two earlier reports and covered the wider site as well as the area of this investigation. The previous ground investigations encountered a sensibly consistent ground profile in that beneath a limited to significant thickness of made ground, the Pennine Middle Coal Measures were encountered and proved to the maximum depth investigated.

The made ground comprised typically gravelly clay with gravel and cobbles of brick, limestone and sandstone and occasional glass, coal, polythene, ash and slag. The made ground was encountered to depths as shallow as 0.15 m and as deep as 3.2 m with a particularly deep area in the northeastern quarter of the site where shallow coal mining is considered likely to have taken place. Elevated concentrations of contaminants including PAH, TPH and metallic contaminants have been measured within the previous investigations and a 'hot-spot' appears to have been progressively defined by the investigations to an area in the northern part of the site. Beneath the made ground firm, stiff and very stiff thinly laminated clay was encountered and is interpreted as being weathered mudstone. This was encountered at depths of between 0.3 m and 3.2 m and was generally found to grade into very weak to weak thinly laminated mudstones and siltstones with coal seams and sandstone layers.

2.2.1 Past Coal Mining

The geological map of the area and previous investigations indicate that the site is underlain by a limited to significant thickness of made ground which is underlain by the Pennine Middle Coal Measures Formation. The South Yorkshire Mining Advisory Service (SYMAS) reports conclude that the site is stable from deep mining subsidence. Three coal seams are shown to outcrop through the site and despite there being no records of shallow mining having taken place, the reports cannot rule out that shallow unrecorded mining may have taken place. Borehole investigations were recommended for future development to confirm that shallow unrecorded workings are not present. Such boreholes are likely to extend to a depth of 20 m and would be located within the footprint of the proposed buildings. Provided that these boreholes did not reveal any past shallow extraction it was not envisaged that mine grouting will be necessary for the project.

2.3 Preliminary Contamination Risk Assessment

The desk study concluded that there is a MODERATE / LOW risk of there being a significant contaminant linkage at this site that could result in any requirement for any remediation work. The risk assessment is based on the proposed construction of a new youth centre end use of the site and being surrounded predominantly by hardstanding but with some areas of soft landscaping. Contamination is likely to be present due to the developed history of the site and the basis of the contaminants previously measured.

The new location of the proposed buildings suggests that any made ground will need to be removed as part of the lowering of the site to grade at Schwabisch Gmund Way. Any contamination contained within the made ground will therefore represent a source removal and remediation would not be required.

3.0 EXPLORATORY WORK

In order to meet the objectives described in Section 1.2, and in the context of the previous site investigations the scope of the investigation was determined on the basis of proving the presence of rock and determining whether or not former coal mine workings are present beneath the site.

The scope of investigation was agreed with the Coal Authority and the work was carried out under their requirement for a permit to enter their interests. It comprised ten boreholes advanced by rotary open-hole techniques to a maximum depth of 20 m. The boreholes were advanced using water recirculation as the flushing medium as required by the permit and also with a mine

gas monitor fixed to the front of the rig. The boreholes were grouted on completion with cement / bentonite grout.

Combined gas and groundwater monitoring standpipes were installed into three of the boreholes and six monitoring visits have been undertaken.

3.1 Sampling Strategy

The boreholes were located to provide specific information within the footprint of the proposed buildings. However a change in the proposed location and orientation of the buildings from wholly within the northern part of the site to the western edge of the site led to a change in borehole locations. In addition, the revised location had been changed such that the access to the proposed centre would be at ground level with Schwabisch Gmund Way, some 3 m to 5 m below the previously anticipated level. To have achieved full coverage of the site would have required access into a fenced off compound between the higher former depot area and the Schwabisch Gmund Way level. This access was not available at the time of the investigation so all of the boreholes were advanced from the higher level and were adjusted for the presence of buried services.

A total of ten soil samples were subjected to analysis for a range of common industrial contaminants and contamination indicative parameters. For this investigation the analytical suite for the soil included a range of metals, speciation of total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide, monohydric phenols and asbestos screening. The soil samples were selected on the basis of observations made on site, to provide a general view of the chemical conditions of the soils that are likely to be involved in a human exposure and to provide advice in respect of re-use or for waste disposal classification.

The contamination analyses were carried out at an MCERTs accredited laboratory with the majority of the testing suite accredited to MCERTS standards. Details of the MCERTs accreditation and test methods are included in the Appendix together with the analytical results.

4.0 GROUND CONDITIONS

The investigation has encountered the expected ground conditions in that a limited thickness of made ground was found to be directly underlain by sandstone and mudstone of the Pennine Middle Coal Measures, with a coal seam identified in eight of the boreholes. No evidence of voids or broken ground was encountered.

4.1 Made Ground

All locations, except Borehole No 8, were surfaced with concrete of between 0.3 m and 0.4 m in thickness. In Borehole Nos 3 to 10, the concrete had been cast directly onto the underlying rock, whilst in Borehole Nos 1 to 3, the concrete surfacing was underlain by black and dark grey ashy clay with bricks and brick fragments that extended to a maximum depth of 0.5 m.

Borehole No 8 was surfaced with a 0.2 m thickness of bricks and brick fragments beneath which was a 1.1 m thickness of reinforced concrete.

There was no visual or olfactory evidence of gross soil contamination.

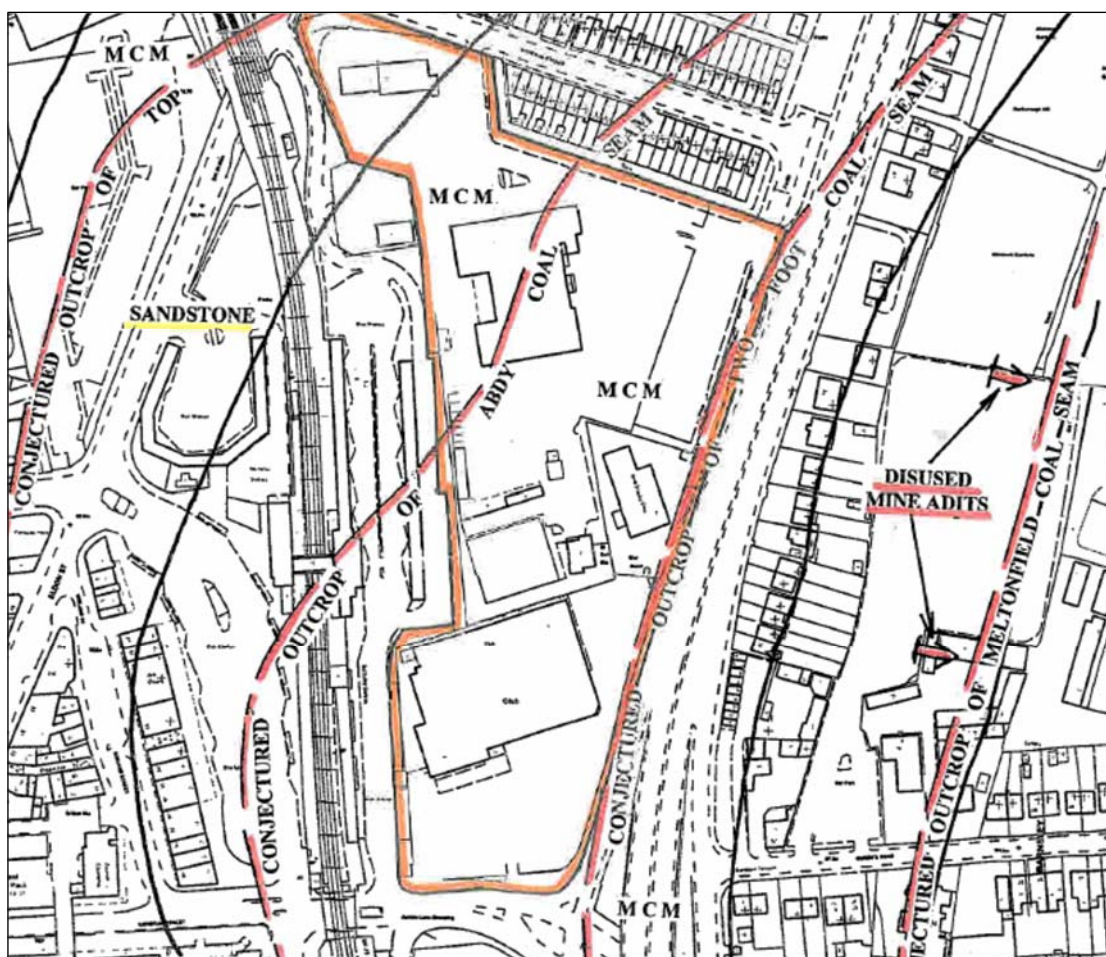
4.2 Pennine Middle Coal Measures

Beneath the made ground in all locations, pale grey and pale brown sandstone together with pale grey and dark grey mudstone were encountered and proved to the maximum depth investigated of 20.0 m.

Neither strength testing nor SPT testing was undertaken on account of the aim of the investigation being to determine whether coal mine workings were present. Full flush return was observed throughout and no evidence of voids or broken ground was encountered.

A thin seam of coal was encountered within Borehole Nos 3 to 10. It was found to be progressively shallower as the boreholes progressed to the north. It was deepest in Borehole No 4 where it extended from 11.2 m to 11.7 m and shallowest in Borehole No 10 where it was present as a split seam with coal present from 1.4 m to 1.9 m and 2.3 m to 2.6 m. This represents a dip to the south and is reasonably consistent with the expected outcrop of the Adby Coal as shown on the plan below which was taken from the 2003 SYMAS report on the site.

No evidence of soil contamination was observed within this material.



4.3 Groundwater

Groundwater was not encountered in any of the boreholes, but any inflows will have been masked by the drilling flush. Subsequent monitoring of the three standpipes has only measured groundwater in Borehole No 6, at depths of 2.2 m, 2.6 m and 2.7 m on successive fortnightly

visits. This appears to suggest that the water represents flush water from the borehole drilling that is gradually seeping away into the rock. Three further monitoring visits are scheduled.

4.4 Soil Contamination

The table below sets out the values measured within the ten samples of made ground analysed; all concentrations are in mg/kg unless otherwise stated.

Determinant	Maximum concentration recorded (mg/kg)	Minimum concentration recorded (mg/kg)	Number of samples below detection limit
pH	11.3	8.8	-
Arsenic	100	3.0	None
Cadmium	3.7	<0.1	4
Chromium	100	4.2	None
Hexavalent Chromium	2.9	<1.0	9
Copper	510	9.0	None
Mercury	0.29	<0.05	7
Nickel	42	9.8	None
Lead	600	4.5	None
Selenium	<0.5	<0.5	All
Zinc	2600	21	None
Total Cyanide	<0.1	<0.1	All
Total Phenols	0.3	<0.3	9
Sulphide	80	12	None
Total EPH	480	<10	9
Naphthalene	0.49	<0.03	5
Benzo(a)pyrene	0.16	<0.03	4
PAH (USEPA 16 Total)	4.9	<0.1	1
Total organic carbon %	0.9	<0.1	2

In addition to the above chemical testing, microscopic analysis of the ten samples was undertaken; asbestos was not found in any of the samples tested.

4.4.1 Generic Quantitative Risk Assessment

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site-specific risk assessments. Contaminants of concern are those that have values in excess of generic human health risk-based guideline values, which are either the CLEA² Soil Guideline Values where available, the Sutable 4 Use Values³ (S4UL) produced by LQM/CIEH calculated using the CLEA UK Version 1.071⁴

² Updated Technical Background to the CLEA Model (Science Report SC050021/SR3) Jan 2009 and Soil Guideline Value reports for specific contaminants; all DEFRA and Environment Agency.

³ The LQM/CIEH S4ULs for Human Health Risk Assessment S4UL3065 November 2014

⁴ Contaminated Land Exposure Assessment (CL|EA) Software Version 1.071 Environment Agency 2015

software, or the DEFRA Category 4 Screening values⁵. Due to the artificial playing surfaces and the youth zone buildings being largely surrounded by hardstanding, the commercial end use is considered to best reflect the end usage. The key generic assumptions for this end use are as follows:

- ❑ that groundwater will not be a critical risk receptor;
- ❑ that the critical receptor for human health will be a working female aged 16 to 65 years old;
- ❑ that the building equates to a three-storey office;
- ❑ that the exposure duration will be 49 years; and
- ❑ that the critical exposure pathways will be direct soil and indoor dust ingestion, skin contact with soils and dust, and inhalation of dust and vapours.

It is considered that these assumptions are acceptably conservative for this generic assessment of this site. The tables of generic screening values derived by GEA and an explanation of how each value has been derived are included in the Appendix.

Where contaminant concentrations are measured at concentrations below the generic screening value it is considered that they pose an acceptable level of risk and thus further consideration of these contaminant concentrations is not required. However, where concentrations are measured in excess of these generic screening values there is considered to be a potential that they could pose an unacceptable risk and thus further action will be required which could include;

- ❑ additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;
- ❑ site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- ❑ soil remediation or risk management to mitigate the risk posed by the contaminant to a degree that it poses an acceptable risk.

On the basis of the above, there are no measured concentrations that are elevated above the respective GGV, indicating no need to consider remedial measures or further assessment.

The significance of the results is discussed in Part 2 of this report.

4.5 Soil Gas

Six rounds of monitoring have been carried out to date and full results are given in the appendix. The monitoring has indicated no significant concentrations of soil gas and no positive pressures or flow within the standpipes.

In determining the significance of soil gas concentrations, both the gas concentrations and borehole flow rates are used to define a characteristic situation for a site based on the limiting

⁵ CL:AIRE (2013) *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination* Final Project Report SP1010 and DEFRA (2014) *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination* Policy Companion Document SP1010

borehole gas volume flow, renamed as the Gas Screening Value (GSV) for methane and carbon dioxide. In this case the following GSVs have been determined, in accordance with guidance provided by CIRIA.

Gas	Max concentration % vol.	Ave flow rate l/hr	GSV
Methane	< 0.001	< 0.1	< 0.0001
Carbon dioxide	2.5	< 0.1	0.0025

On the basis of the single monitoring visit to date, the gas screening value of less than 0.07 l/hr indicates Characteristic Situation 1 (CS1); very low risk. In accordance with BS 8485:2015⁶ the proposed development is likely to be classified as a Type C building. This is categorised as a single occupancy of ground floor and basement areas, small to large size rooms with active ventilation or good passive ventilation of all rooms and other internal spaces throughout ground floor and basement areas., and with full building management controls on alterations to the building and its uses.

Based on the six rounds of monitoring to date, Table 4 of BS 8485:2015 indicates the minimum gas protection score (points) for each type of building (A-D) using the CS level (1-6) previously determined. A Type C building with CS1 requires zero points in reference to gas protection measures and on the NHBC “traffic light” system⁷ the site may be considered to be Green.

6 British Standards Institution (2015), BS 8484:2015 *Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*. 2nd Ed. BSI Standards Ltd
7 Boyle, R and Witherington, P (2006) *Guidance on evaluation on development proposals on sites where methane and carbon dioxide are present, incorporating ‘traffic lights’*. Report Ref 10627-R01-(02) for National House-Building Council

Part 2: DESIGN BASIS REPORT

This section of the report provides an interpretation of the findings detailed in Part 1, in the form of a ground model, and then provides advice and recommendations with respect to foundation options and contamination issues.

5.0 INTRODUCTION

Consideration is being given to the proposed redevelopment of the site through the construction of a new youth centre. The redevelopment consists of a two-storey main facility, a sports hall and a kick pitch. Some soft landscaping will be included in the redevelopment to soften site level change from the existing site level of around 96 m OD down to 93 m OD at Schwabisch Gmund Way. It is understood that steel framed cladded buildings are proposed and that the foundation loads are likely to be moderate.



6.0 GROUND MODEL

The desk study indicated that the site does not have a significantly contaminative history. On the basis of the intrusive investigation, the ground conditions at this site can be characterised as follows:

- ❑ the site is underlain by a very limited thickness of made ground, beneath which sandstone and mudstone of the Pennine Middle Coal Measures are present;
- ❑ made ground generally extends to depths of up to 0.5 m and largely comprises just the concrete slab although this is underlain by a very thin layer of ashy clay with brick fragments in three locations and by concrete in one further location;
- ❑ the Coal Measures were encountered as layers of sandstone and mudstone that extended to the maximum depth investigated of 20.0 m;
- ❑ an intact seam of coal has been encountered within eight of the ten boreholes with its base at depths of between 11.7 m and 1.9 m; the dip being roughly to the south;
- ❑ no evidence of former coal mine workings has been encountered;

- ❑ groundwater was not encountered at any location within this investigation; and
- ❑ no visual or olfactory evidence of significant soil contamination was observed. Whilst the test results indicated elevated concentrations of arsenic, copper and lead, none are above the generic guideline values.

7.0 ADVICE AND RECOMMENDATIONS

The proposed redevelopment includes the construction of two steel frame sports buildings.

7.1 Old Coal Mine Workings

The main purpose of the investigation was to investigate the presence of former coal mine workings. The previous reports by the South Yorkshire Mining Advisory Service (SYMAS) indicate that workings were not expected but proof drilling would be needed to effectively rule out their presence. During the drilling of these ten boreholes, no significant loss of flush was recorded by the driller, and no evidence of voids or broken ground was encountered. In addition no mine gases were measured at the drill head.

A thin seam of coal was encountered within Borehole Nos 3 to 10. It was found to be progressively shallower as the boreholes progressed to the north. It was deepest in Borehole No 4 where it extended from 11.2 m to 11.7 m and shallowest in Borehole No 10 where it was present as a split seam with coal present from 1.4 m to 1.9 m and 2.3 m to 2.6 m. This represents a dip to the south and is reasonably consistent with the expected outcrop of the Adbby Coal. The coal was intact at all locations and serves as reasonable evidence that there are no workings within 20 m depth from the surface.

A relatively narrow strip of the site adjacent to Schwabisch Gmund Way is to be developed but has not yet been investigated. The area that has been investigated will need to be lowered to achieve the final levels and this will involve cutting into the existing slope. It is considered that the evidence above for the area investigated would be sufficient to rule out the presence of coal workings that might affect the development but the excavation to formation levels will expose at least part of the coal seam itself. In that respect it would be prudent to plot the depths to the coal seam as encountered in this investigation onto a topographic survey of the site and the proposed foundation levels to confirm where exactly the foundations will bear.

As the excavation of the existing slope will extend through known coal deposits the works will need to be under a Coal Authority permit and details of how any coal arising will be disposed of will need to be agreed.

7.2 Spread Foundations

Whilst the level detail of the final proposals is not known, it is assumed that the excavation for the new structures will cut into the existing slope and reveal the underlying rock. For long term stability it is recommended that slopes within the Coal Measures are cut no steeper than 1 in 2; a gradient of 26.5°.

Moderate width strip or pad foundations bearing on the mudstone or sandstone of the Middle Coal Measures should be placed at a minimum depth of 0.75 m and may be designed to apply a net allowable bearing pressure of 350 kN/m². This value incorporates an adequate factor of safety against bearing capacity failure and should ensure that settlement remains within normal

tolerable limits. The recommended bearing pressure is based on our experience of these materials and the previous investigation reports but is subject to inspection or further targeted investigation because the area for part of the proposed building has not yet been accessible.

7.3 Ground Floor Slabs

Lightly loaded ground floor slabs may be designed to bear upon the Coal Measures subject to proof rolling of the formation and removal of any soft spots with compacted granular material.

The soil gas monitoring has measured no significant concentrations of carbon dioxide and oxygen concentrations have been relatively consistent representing relatively oxygen rich conditions.

Gas protection measures are not required in accordance with a characteristic situation CS1.

7.4 Site Specific Contamination Risk Assessment

The desk study has indicated that the site has a moderate to low potential for contamination based on its historical usage with the 'moderate' reflecting the previous locations proposed for the buildings and 'low' probably closer reflects the current proposal.

The contamination testing has not found any elevated concentrations of contaminants with respect to a commercial end use.

The proposed construction will result in a net export of material from the site as the new buildings are placed adjacent to Schwabisch Gmund Way. Remedial measures are not expected to be required in respect of contamination as the reprofiling of the site to the proposed final level will mean that made ground and near surface natural soils and rock will be removed from site.

The proposed site layout has small areas of soft landscaping but the lack of a suitable growing medium means that importation of sub-soil and topsoil will be required regardless of whether contamination is present or not. It is considered therefore that the importing of clean sub-soil and topsoil with a minimum thickness of 300 mm for grassed areas will be sufficient to address any risk to end users. It is also noted that with no evidence of volatile contamination the risk to end users is restricted to direct contact and inhalation of dust.

On this basis, significant remedial measures are not considered to be required.

7.4.1 Site Workers

Site workers should be made aware of the historical setting of the site and the potential for contamination to be present and a programme of working should be identified to protect workers handling any soil. The method of site working should be in accordance with guidelines set out by HSE⁸ and CIRIA⁹ and the requirements of the Local Authority Environmental Health Officer.

As with any site, a watching brief should be maintained during the groundwork, and if suspicious soils are encountered then a suitably qualified engineer should inspect the soils and further testing carried out if required.

8 HSE (1992) HS(G)66 *Protection of workers and the general public during the development of contaminated land*
HMSO

9 CIRIA (1996) *A guide for safe working on contaminated sites* Report 132, Construction Industry Research and Information Association

7.5 Waste Disposal

Under the European Waste Directive, waste is classified as being either Hazardous or Non-Hazardous and landfills receiving waste are classified as accepting hazardous or non-hazardous wastes or the non-hazardous sub-category of inert waste in accordance with the Waste Directive. Waste classification is a staged process and this investigation represents the preliminary sampling exercise of that process. Once the extent and location of the waste that is to be removed has been defined, further sampling and testing may be necessary. The results from this ground investigation should be used to help define the sampling plan for such further testing, which could include WAC leaching tests where the totals analysis indicates the soil to be a hazardous waste or inert waste from a contaminated site. It should however be noted that the Environment Agency guidance WM3¹⁰ states that landfill WAC analysis, specifically leaching test results, must not be used for waste classification purposes.

Any spoil arising from excavations or landscaping works, which is not to be re-used in accordance with the CL:AIRE¹¹ guidance, will need to be disposed of to a licensed tip. Waste going to landfill is subject to landfill tax at either the standard rate of £96.70 per tonne (about £180 per m³) or at the lower rate of £3.10 per tonne (roughly £6 per m³). However, the classifications for tax purposes and disposal purposes differ and currently all made ground and topsoil is taxable at the 'standard' rate and only naturally occurring soil and stones, which are accurately described as such in terms of the 2011 Order, would qualify for the 'lower rate' of landfill tax.

Based upon on the technical guidance provided by the Environment Agency it is considered likely that the soils encountered during this ground investigation, as represented by the chemical analyses carried out, would be generally classified as follows;

Soil Type	Waste Classification (Waste Code)	WAC Testing Required Prior to Landfill Disposal?	Current applicable rate of Landfill Tax
Made ground (individual results)	Non-hazardous (17 05 04)	No	£96.70/tonne (Standard rate)
Natural Soils and Rocks	Inert (17 05 04)	Should not be required	£3.10/tonne (lower rate)

Under the requirements of the European Waste Directive all waste needs to be pre-treated prior to disposal. The pre-treatment process must be physical, thermal, chemical or biological, including sorting. It must change the characteristics of the waste in order to reduce its volume, hazardous nature, facilitate handling or enhance recovery. The waste producer can carry out the treatment, but they will need to provide documentation to prove that this has been carried out. Alternatively, the treatment can be carried out by an approved contractor. The Environment Agency has issued a position paper¹² which states that in certain circumstances, segregation at source may be considered as pre-treatment and thus excavated material may not have to be treated prior to landfilling if the soils can be segregated onsite prior to excavation by sufficiently characterising the soils in-situ prior to excavation.

The above opinion with regard to the classification of the excavated soils is provided for guidance only and should be confirmed by the receiving landfill once the soils to be discarded have been identified.

10 Environment Agency 2015. *Guidance on the classification and assessment of waste*. Technical Guidance WM3 First Edition

11 CL:AIRE March 2011. *The Definition of Waste: Development Industry Code of Practice* Version 2

12 Environment Agency 23 Oct 2007 *Regulatory Position Statement Treating non-hazardous waste for landfill - Enforcing the new requirement*

The local waste regulation department of the Environment Agency (EA) should be contacted to obtain details of tips that are licensed to accept the soil represented by the test results. The tips will be able to provide costs for disposing of this material but may require further testing.

8.0 OUTSTANDING RISKS AND ISSUES

This section of the report aims to highlight areas where further work is required as a result of limitations on the scope of this investigation, or where issues have been identified by this investigation that warrant further consideration. The scope of risks and issues discussed in this section is by no means exhaustive but covers the main areas where additional work may be required.

The ground is a heterogeneous natural material and variations will inevitably arise between the locations at which it is investigated. This report provides an assessment of the ground conditions based on the discrete points at which the ground was sampled, but the ground conditions should be subject to review as the work proceeds to ensure that any variations from the Ground Model are properly assessed by a suitably qualified person.

Due to limitations in access, part of the site has not been investigated and it would be prudent to undertake additional investigation once that access is made available. As with any site, if during groundworks any visual or olfactory evidence of contamination is identified it is recommended that further investigation be carried out by an appropriately qualified specialist.

APPENDIX

Site Plan

Coal Authority Permit

Borehole Records

Contamination test results

Gas Monitoring Results

Generic Guideline Values

Completion Report for the Coal Authority



GEA

Geotechnical & Environmental Associates
www.gea-ltd.co.uk

Site Plan (Final)

Site Barnsley Youth Zone, Land Off Schwäbisch Gmünd Way, Barnsley, S71 1BP

Client Barnsley Youth Zone

Engineer HL Structural Engineers

Job Number
J21015A

Sheet
1 / 1





The Coal
Authority

Permit to Enter or Disturb Coal Authority Interests

Permit 22519

Name and Address of Permit Holder:

*Geotechnical and Environmental Associates
Peter House
Oxford Street
Manchester
M1 5AN*

Site Location:

*Land off
Schwabisch Gmund Way
Barnsley
S71 1BP*

This certificate hereby grants the above named Permit Holder a Permit to carry out:-

Ground investigation by 10 boreholes to determine presence of shallow mine workings

within the Authority's interests at the identified site location above as shown on the Grant Permit Boundary (overleaf) for the period of 12 months from the granted date shown below. *The granting of this Permit does not constitute advice given by the Authority in relation to the proposed operations. It is the Permit Holder's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.*

Conditions:

- *Manned entry (i.e.) into mine entries/workings) is strictly prohibited.*
- *Water flush*
- *Gas Monitoring CO, CH₄, CO₂, O₂, H₂S at borehole and rig*
- *Operators undertaking the work must be in possession of this certificate and the Permit boundary plan at the time of works*
- *Appropriate borehole sealing without delay and to withstand site level changes*

Signed: Stuart Brown Granted Date: 09/08/2021

For and on behalf of The Coal Authority

Nominated Representative: Stuart Brown, Permitting Manager;

The Coal Authority, Permitting Office, 200 Lichfield Lane, Mansfield, Notts, NG18 4RG

Tel: 01623 637450; E-Mail: permissions@coal.gov.uk

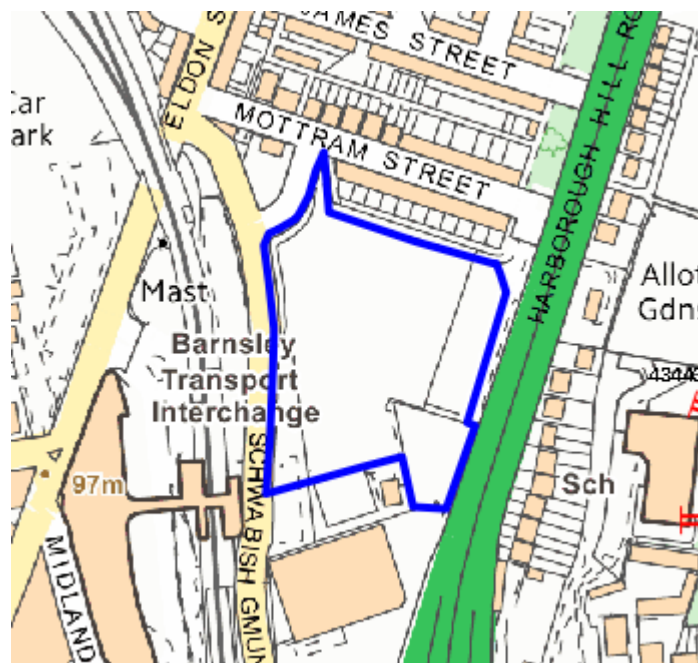


The Coal
Authority

Granted Permit Boundary

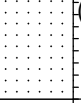
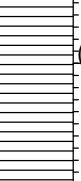
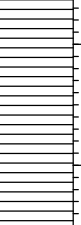
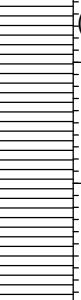
Permit Ref: 22519

Permit Boundary:



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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH1
Job No J21015A	Date 16-08-21	Ground Level (m OD)	Co-Ordinates ()	
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 1 of 2

RUN DETAILS			Water	STRATA				Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
						0.30	MADE GROUND (concrete)	
						0.50	MADE GROUND (brick, ash and clay fill)	
						(1.40)	Brown SANDSTONE	
						1.90		
						(2.10)	Light grey MUDSTONE with traces of coal	
						4.00		
						(0.60)	Light brown SANDSTONE	
						4.60	Light grey MUDSTONE	
						(6.20)	7.30 - 8.20 ...traces of coal	
							8.20 - 9.40 ...siltstone bands	
							9.40 - 10.30 ...traces of coal	

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH1	
Job No J21015A	Date 16-08-21	Ground Level (m OD)	Co-Ordinates ()		
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 2 of 2	

RUN DETAILS			Water	STRATA			Instrument / Backfill	
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thickness)		DESCRIPTION
						10.80	Light grey MUDSTONE <i>(continued)</i>	
						(0.80) 11.60	Dark grey MUDSTONE	
						(8.40)	Light grey MUDSTONE 11.60 - 14.20 ...siltstone bands	
						20.00		

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH2	
Job No J21015A	Date 16-08-21	Ground Level (m OD)	Co-Ordinates ()		
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 1 of 2	

RUN DETAILS			Water	STRATA				Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
						0.30	MADE GROUND (concrete)	
						0.40	MADE GROUND (brick, ash and clay fill)	
						(1.40)	Brown SANDSTONE	
						1.80		
						(1.10)	Light grey MUDSTONE	
						2.90		
						(1.90)	Light brown SANDSTONE	
						4.80		
							Light grey MUDSTONE 4.80 - 7.50 ...traces of coal	
							9.40 - 12.50 ...siltstone bands	

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH2
Job No J21015A	Date 16-08-21	Ground Level (m OD)	Co-Ordinates ()	
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 2 of 2

RUN DETAILS			Water	STRATA				Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thick ness)	DESCRIPTION	
						(15.20)	Light grey MUDSTONE(continued)	
						20.00		

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH3
Job No J21015A	Date 17-08-21	Ground Level (m OD)	Co-Ordinates ()	
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 1 of 2

RUN DETAILS			Water	STRATA				Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
						0.30	MADE GROUND (concrete)	
						0.50	MADE GROUND (brick and ash fill)	
						(1.40)	Brown SANDSTONE	
						1.90		
						(1.70)	Light grey MUDSTONE	
						3.60		
						(1.20)	Light brown SANDSTONE	
						4.80		
						(4.30)	Light grey MUDSTONE	
						9.10		
						9.30	Dark grey MUDSTONE	
						9.70	COAL	
							Light grey MUDSTONE	

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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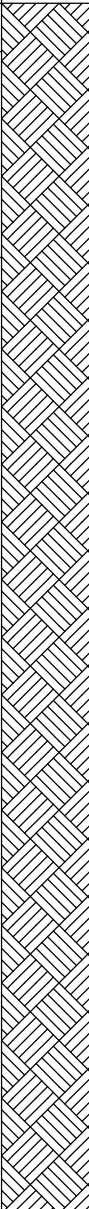
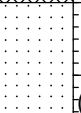
Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH3	
Job No J21015A	Date 17-08-21	Ground Level (m OD)	Co-Ordinates ()		
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 2 of 2	

RUN DETAILS			Water	STRATA					Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thick ness)	DESCRIPTION		
							Light grey MUDSTONE(continued)		

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH4	
Job No J21015A	Date 17-08-21	Ground Level (m OD)	Co-Ordinates ()		
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 1 of 2	

RUN DETAILS			Water	STRATA				Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
						0.40	MADE GROUND (concrete)	
						(1.70)	Brown SANDSTONE	
						2.10	Light grey MUDSTONE	
						(8.20)	5.60 - 10.30 ...traces of coal	

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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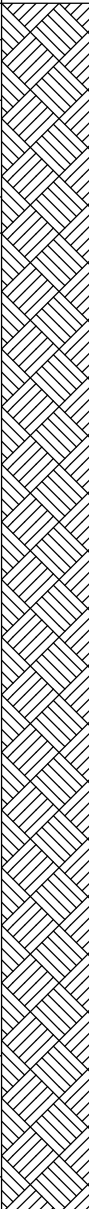


Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH4
Job No J21015A	Date 17-08-21	Ground Level (m OD)	Co-Ordinates ()	
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 2 of 2

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Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH5
Job No J21015A	Date 18-08-21	Ground Level (m OD)	Co-Ordinates ()	
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 1 of 2

RUN DETAILS			Water	STRATA				Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
						0.30	MADE GROUND (concrete)	
						(0.50) 0.80	Light brown SANDSTONE	
						(0.80) 1.60	Light grey MUDSTONE	
						1.90	Light brown SANDSTONE	
						(6.80) 8.70	Light grey MUDSTONE	
						(1.00) 9.70	Dark grey MUDSTONE with traces of coal	
						(0.50)	COAL	

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

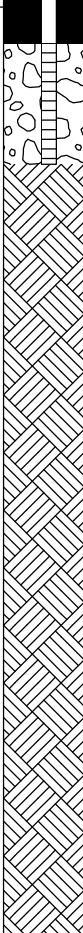
All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH6	
Job No J21015A	Date 18-08-21	Ground Level (m OD)	Co-Ordinates ()		
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 1 of 2	

RUN DETAILS			Water	STRATA			Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thickness)	
					0.30	MADE GROUND (concrete)	
					0.70	Light brown SANDSTONE	
					(7.70)	Light grey MUDSTONE	
					8.40		
					(0.90)	Dark grey MUDSTONE with traces of coal	
					9.30		
					9.70	COAL	
			Light grey MUDSTONE				

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH6
Job No J21015A	Date 18-08-21	Ground Level (m OD)	Co-Ordinates ()	
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 2 of 2

[illegible]

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

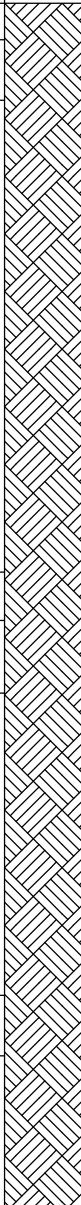
All dimensions in metres
Scale 1:62.5

Method/ Plant Used	Rotary open hole
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Logged By	Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH7
Job No J21015A	Date 19-08-21	Ground Level (m OD)	Co-Ordinates ()	
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 1 of 2

RUN DETAILS			Water	STRATA			Instrument / Backfill	
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thickness)		DESCRIPTION
						0.30	MADE GROUND (concrete)	
						(0.50) 0.80	Light brown SANDSTONE	
						(3.90)	Light grey MUDSTONE	
						4.70	Dark grey MUDSTONE	
						5.10		
						(0.60) 5.70	COAL	
						(2.50)	Light grey MUDSTONE	
						8.20 (0.50) 8.70	Dark grey MUDSTONE	
							Light grey MUDSTONE	

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	



Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH7
Job No J21015A	Date 19-08-21	Ground Level (m OD)	Co-Ordinates ()	
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 2 of 2

RUN DETAILS			Water	STRATA				Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thick ness)	DESCRIPTION	
						(11.30)	Light grey MUDSTONE(continued)	
						20.00		

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH8	
Job No J21015A	Date 19-08-21	Ground Level (m OD)	Co-Ordinates ()		
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 1 of 2	

RUN DETAILS			Water	STRATA			Instrument / Backfill	
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thickness)		DESCRIPTION
						0.20	MADE GROUND (brick fill)	
						(1.10)	MADE GROUND (concrete with rebar)	
						1.30		
						1.50	Light brown SANDSTONE	
							Light grey MUDSTONE	
								
								
								
								
								
								
								
								
								
		4.70						
		4.90			(0.50)	Dark grey MUDSTONE with traces of coal		
					5.40	COAL		
						Light grey MUDSTONE		
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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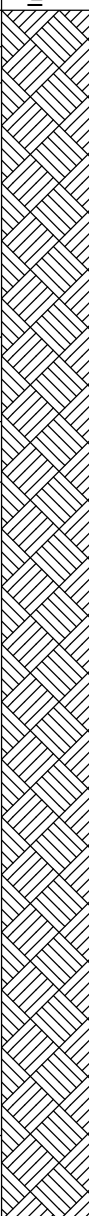
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Job No J21015A	Date 19-08-21	Ground Level (m OD)	Co-Ordinates ()	
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 2 of 2

RUN DETAILS			Water	STRATA				Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thick ness)	DESCRIPTION	
						(2.90)	Dark grey MUDSTONE(continued)	
						12.10		
						(7.90)	Light grey MUDSTONE	
						20.00		

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH9	
Job No J21015A	Date 20-08-21	Ground Level (m OD)	Co-Ordinates ()		
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 1 of 2	

RUN DETAILS			Water	STRATA				Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thickness)	DESCRIPTION	
						0.30	MADE GROUND (concrete with rebar)	
						0.60	Light brown SANDSTONE	
						(2.10) 2.70	Light grey MUDSTONE	
						(0.70) 3.40	Dark grey MUDSTONE with traces of coal	
						(0.50) 3.90	COAL	
						(5.40) 9.30	Light grey MUDSTONE	
						(1.30)	Light brown MUDSTONE	

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH9	
Job No J21015A	Date 20-08-21	Ground Level (m OD)	Co-Ordinates ()		
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 2 of 2	

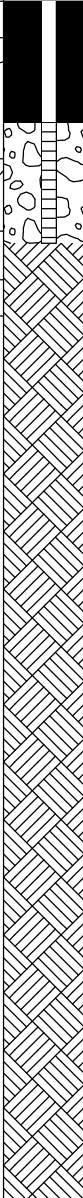
RUN DETAILS			Water	STRATA				Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thick ness)	DESCRIPTION	
						10.60	Light brown MUDSTONE(<i>continued</i>)	
						(9.40)	Light grey MUDSTONE 10.60 - 11.80 ...siltstone bands	
						20.00		

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH10
Job No J21015A	Date 20-08-21	Ground Level (m OD)	Co-Ordinates ()	
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 1 of 2

RUN DETAILS			Water	STRATA			Instrument / Backfill	
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thickness)		DESCRIPTION
						0.30	MADE GROUND (concrete)	
						0.50	Light brown MUDSTONE	
						(0.80)	Light grey MUDSTONE	
						1.30		
						1.40	Dark grey MUDSTONE with traces of coal	
						(0.50) 1.90	COAL	
							Light grey MUDSTONE	
						2.30	COAL	
						2.60		

1.0.2 | 2007, September | Date: 12 October 2024

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	



Project Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP				DRILLHOLE No BH10	
Job No J21015A	Date 20-08-21	Ground Level (m OD)	Co-Ordinates ()		
Client Barnsley Youth Zones		Engineer HL Structural Engineers		Sheet 2 of 2	

RUN DETAILS			Water	STRATA				Instrument / Backfill
Depth Date	TCR (SCR) RQD	Test Result		Reduced Level	Legend	Depth (Thick ness)	DESCRIPTION	
						(17.40)	Light grey MUDSTONE(continued)	
						20.00		

Drilling Progress and Water Observations						GENERAL REMARKS
Depth	Date	Time	Casing	Core Dia mm	Water Depth	

All dimensions in metres Scale 1:62.5	Method/ Plant Used Rotary open hole	Logged By Prelim
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DETS

Certificate of Analysis

Certificate Number 21-17971

Issued: 02-Sep-21

Client Geotechnical & Environmental Associates
Unit 1
Church Farm
Gotham Road
Nottingham
NG11 0DE

Our Reference 21-17971

Client Reference (not supplied)

Order No J21015A

Contract Title Barnsley Youth Zone

Description 10 Soil samples.

Date Received 25-Aug-21

Date Started 25-Aug-21

Date Completed 02-Sep-21

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By



Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 21-17971

Client Ref

Contract Title Barnsley Youth Zone

Sample ID	Depth	Lab No	Completed	Matrix Description
RO1	0.3	1895009	02/09/2021	Grey sandy CLAY
RO2	0.3	1895010	02/09/2021	Grey sandy CLAY
RO3	0.3	1895011	02/09/2021	Grey sandy CLAY
RO4	0.3	1895012	02/09/2021	Grey sandy CLAY
RO5	0.3	1895013	02/09/2021	Brown gravelly SAND
RO6	0.3	1895014	02/09/2021	Brown gravelly SAND
RO7	0.3	1895015	02/09/2021	Brown gravelly SAND
RO8	0.3	1895016	02/09/2021	Brown gravelly SAND
RO9	0.3	1895017	02/09/2021	Brown gravelly SAND
RO10	0.3	1895018	02/09/2021	Brown gravelly SAND

Summary of Chemical Analysis

Soil Samples

Our Ref 21-17971

Client Ref

Contract Title Barnsley Youth Zone

Lab No	1895009	1895010	1895011	1895012	1895013	1895014
Sample ID	RO1	RO2	RO3	RO4	RO5	RO6
Depth	0.30	0.30	0.30	0.30	0.30	0.30
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	16/08/2021	16/08/2021	17/08/2021	17/08/2021	18/08/2021	18/08/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Preparation									
Stones Removed	DETSC 1003*	0	%	0.0	0.0	0.0	0.0	0.0	0.0
Moisture Content 30°C	DETSC 1004*	0.1	%	14	15	19	14	6.9	6.9
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	31	100	9.2	36	3.0	8.1
Cadmium	DETSC 2301#	0.1	mg/kg	1.1	3.7	0.2	1.3	< 0.1	0.2
Chromium	DETSC 2301#	0.15	mg/kg	37	100	19	43	4.2	9.0
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	2.9	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	150	510	39	180	9.2	44
Lead	DETSC 2301#	0.3	mg/kg	160	600	17	200	5.5	36
Mercury	DETSC 2325#	0.05	mg/kg	0.08	0.29	< 0.05	0.09	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	30	42	32	30	6.7	7.1
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	650	2600	110	840	36	150
Inorganics									
pH	DETSC 2008#		pH	10.4	11.3	8.8	10.8	11.7	11.9
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	0.8	0.9	0.9	0.6	< 0.1	0.3
Chloride Aqueous Extract	DETSC 2055	1	mg/l	230	750	22	310	23	78
Sulphate Aqueous Extract as SO ₄	DETSC 2076#	10	mg/l	1000	990	120	950	< 10	10
Sulphide	DETSC 2024*	10	mg/kg	40	80	44	40	20	28
Sulphate as SO ₄ , Total	DETSC 2321#	0.01	%	0.40	1.2	0.03	0.54	0.15	0.33
Petroleum Hydrocarbons									
EPH (C8-C10)	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
EPH (C10-C12)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C12-C16)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C16-C21)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C21-C35)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
EPH (C8-C40)	DETSC 3311*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	0.04	0.05	0.04	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.08	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	0.08	0.08	0.08	0.07	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	0.03	< 0.03	< 0.03	0.09	0.10
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.12	0.24
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.11	0.21
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.05	0.13
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	0.03	< 0.03	0.07	0.10

Summary of Chemical Analysis

Soil Samples

Our Ref 21-17971

Client Ref

Contract Title Barnsley Youth Zone

Lab No	1895009	1895010	1895011	1895012	1895013	1895014
Sample ID	RO1	RO2	RO3	RO4	RO5	RO6
Depth	0.30	0.30	0.30	0.30	0.30	0.30
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	16/08/2021	16/08/2021	17/08/2021	17/08/2021	18/08/2021	18/08/2021
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.05	0.20
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.08
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	0.04	0.16
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.09
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.11
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	0.12	0.13	0.12	0.67	1.4
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis

Soil Samples

Our Ref 21-17971

Client Ref

Contract Title Barnsley Youth Zone

Lab No	1895015	1895016	1895017	1895018
Sample ID	RO7	RO8	RO9	RO10
Depth	0.30	0.30	0.30	0.30
Other ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sampling Date	19/08/2021	19/08/2021	20/08/2021	20/08/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
Preparation							
Stones Removed	DETSC 1003*	0	%	0.0	0.0	0.0	0.0
Moisture Content 30°C	DETSC 1004*	0.1	%	2.9	2.6	2.8	3.1
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	3.1	6.9	3.0	3.0
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	0.2	< 0.1	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	5.6	7.8	4.4	5.3
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	10	27	9.0	15
Lead	DETSC 2301#	0.3	mg/kg	5.2	28	4.5	11
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	11	9.8	10	9.4
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	47	120	21	51
Inorganics							
pH	DETSC 2008#		pH	11.3	11.1	10.7	10.7
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon	DETSC 2002	0.1	%	0.1	0.1	< 0.1	0.1
Chloride Aqueous Extract	DETSC 2055	1	mg/l	28	54	23	33
Sulphate Aqueous Extract as SO ₄	DETSC 2076#	10	mg/l	30	210	55	120
Sulphide	DETSC 2024*	10	mg/kg	12	36	44	36
Sulphate as SO ₄ , Total	DETSC 2321#	0.01	%	0.05	0.09	0.04	0.05
Petroleum Hydrocarbons							
EPH (C8-C10)	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
EPH (C10-C12)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	31
EPH (C12-C16)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	41
EPH (C16-C21)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	31
EPH (C21-C35)	DETSC 3311	10	mg/kg	< 10	< 10	< 10	380
EPH (C8-C40)	DETSC 3311*	10	mg/kg	< 10	< 10	< 10	480
PAHs							
Naphthalene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	0.49
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	0.07	< 0.03	< 0.03	0.22
Fluorene	DETSC 3303	0.03	mg/kg	0.04	< 0.03	< 0.03	0.16
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.43	0.08	0.07	1.1
Anthracene	DETSC 3303	0.03	mg/kg	0.10	< 0.03	< 0.03	0.24
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.53	0.12	0.13	0.84
Pyrene	DETSC 3303#	0.03	mg/kg	0.49	0.11	0.12	0.70
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.23	0.07	0.08	0.33
Chrysene	DETSC 3303	0.03	mg/kg	0.20	0.07	0.07	0.35

Summary of Chemical Analysis

Soil Samples

Our Ref 21-17971

Client Ref

Contract Title Barnsley Youth Zone

Lab No	1895015	1895016	1895017	1895018
Sample ID	RO7	RO8	RO9	RO10
Depth	0.30	0.30	0.30	0.30
Other ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sampling Date	19/08/2021	19/08/2021	20/08/2021	20/08/2021
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.16	0.07	0.07	0.22
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	0.08	< 0.03	< 0.03	0.08
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	0.12	0.04	0.05	0.16
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	0.04	< 0.03	< 0.03	0.05
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	0.05	< 0.03	< 0.03	0.06
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	2.6	0.56	0.58	4.9
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	0.3

Summary of Asbestos Analysis

Soil Samples

Our Ref 21-17971

Client Ref

Contract Title Barnsley Youth Zone

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1895009	RO1 0.30	SOIL	NAD	none	Lee Kerridge
1895010	RO2 0.30	SOIL	NAD	none	Lee Kerridge
1895011	RO3 0.30	SOIL	NAD	none	Lee Kerridge
1895012	RO4 0.30	SOIL	NAD	none	Lee Kerridge
1895013	RO5 0.30	SOIL	NAD	none	Lee Kerridge
1895014	RO6 0.30	SOIL	NAD	none	Lee Kerridge
1895015	RO7 0.30	SOIL	NAD	none	Lee Kerridge
1895016	RO8 0.30	SOIL	NAD	none	Lee Kerridge
1895017	RO9 0.30	SOIL	NAD	none	Lee Kerridge
1895018	RO10 0.30	SOIL	NAD	none	Lee Kerridge

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 21-17971

Client Ref

Contract Barnsley Youth Zone

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1895009	RO1 0.30 SOIL	16/08/21	PT 1L	pH + Conductivity (7 days)	BTEX, Naphthalene, PAH MS, EPH/TPH
1895010	RO2 0.30 SOIL	16/08/21	PT 1L	pH + Conductivity (7 days)	BTEX, Naphthalene, PAH MS, EPH/TPH
1895011	RO3 0.30 SOIL	17/08/21	PT 1L	pH + Conductivity (7 days)	BTEX, Naphthalene, PAH MS, EPH/TPH
1895012	RO4 0.30 SOIL	17/08/21	PT 1L	pH + Conductivity (7 days)	BTEX, Naphthalene, PAH MS, EPH/TPH
1895013	RO5 0.30 SOIL	18/08/21	PT 1L		BTEX, Naphthalene, PAH MS, EPH/TPH
1895014	RO6 0.30 SOIL	18/08/21	PT 1L		BTEX, Naphthalene, PAH MS, EPH/TPH
1895015	RO7 0.30 SOIL	19/08/21	PT 1L		BTEX, Naphthalene, PAH MS, EPH/TPH
1895016	RO8 0.30 SOIL	19/08/21	PT 1L		BTEX, Naphthalene, PAH MS, EPH/TPH
1895017	RO9 0.30 SOIL	20/08/21	PT 1L		BTEX, Naphthalene, PAH MS, EPH/TPH
1895018	RO10 0.30 SOIL	20/08/21	PT 1L		BTEX, Naphthalene, PAH MS, EPH/TPH

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

End of Report

 GEA		Geotechnical & Environmental Associates www.gea-ltd.co.uk		Gas Monitoring	
Site Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP					Job Number J21015A
Client Barnsley Youth Zone					Sheet 1/6
Engineer HL Structural Engineers					
Date	27/08/2021				
Temperature °C	18.5	18.6	20.6		
Barometric Pressure (mB)	1008				
Visit No	1				
Borehole No	BH3	BH6	BH10		
Standpipe Depth (m)	2.25	2.80	2.65		
Condition of Standpipe	Good	Good	Good		
Combustible gas (CH4) % LEL	0	21.40	0		
Combustible gas (CH4) % vol	0	0.90	0		
Carbon Dioxide (CO2) % vol	0	0.60	2.20		
Oxygen (O2) % vol	17.70	17.80	17.10		
Carbon Monoxide (ppm)	0	0	34.00		
Hydrogen Sulphide (H2S) (ppm)	0	0	0		
Flow Rate (max) l/hr	0	0	0		
Relative Downhole Pressure (mb)	0	0	0		
Water Level (m)	Dry	2.20	Dry		
Remarks					



GEA

Geotechnical & Environmental Associates
www.gea-ltd.co.uk

Gas Monitoring

Site	Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP			Job Number
				J21015A
Client	Barnsley Youth Zone			Sheet
Engineer	HL Structural Engineers			2/6
Date	10/09/2021			
Temperature °C	18.30	17.60	20.00	
Barometric Pressure (mB)	996			
Visit No	2			
Borehole No	BH3	BH6	BH10	
Standpipe Depth (m)	2.25	2.80	2.65	
Condition of Standpipe	Good	Good	Good	
Combustible gas (CH4) % LEL	0	0	0	
Combustible gas (CH4) % vol	0	0	0	
Carbon Dioxide (CO2) % vol	0.80	1.20	1.60	
Oxygen (O2) % vol	18.10	16.20	18.10	
Carbon Monoxide (ppm)	0	0	0	
Hydrogen Sulphide (H2S) (ppm)	0	0	0	
Flow Rate (max) l/hr	0	0	0	
Relative Downhole Pressure (mb)	0	0	0	
Water Level (m)	Dry	2.60	Dry	
Remarks				

**GEA**

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Gas Monitoring

Site	Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP			Job Number
				J21015A
Client	Barnsley Youth Zone			Sheet
Engineer				3/6
HL Structural Engineers				
Date	21/09/2021			
Temperature °C	15.80	16.80	19.20	
Barometric Pressure (mB)	1018			
Visit No	3			
Borehole No	BH3	BH6	BH10	
Standpipe Depth (m)	2.25	2.80	2.65	
Condition of Standpipe	Good	Good	Good	
Combustible gas (CH4) % LEL	0	0	0	
Combustible gas (CH4) % vol	0	0	0	
Carbon Dioxide (CO2) % vol	1.40	0.90	1.80	
Oxygen (O2) % vol	17.60	17.00	17.40	
Carbon Monoxide (ppm)	0	0	0	
Hydrogen Sulphide (H2S) (ppm)	0	0	0	
Flow Rate (max) l/hr	0	0	0	
Relative Downhole Pressure (mb)	0	0	0	
Water Level (m)	Dry	2.70	Dry	
Remarks				

 GEA		Geotechnical & Environmental Associates www.gea-ltd.co.uk		Gas Monitoring	
Site Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP					Job Number J21015A
Client Barnsley Youth Zone					
Engineer HL Structural Engineers					Sheet 4/6
Date	08/10/2021				
Temperature °C	17.60	6.00	13.00		
Barometric Pressure (mB)	1016				
Visit No	4				
Borehole No	BH3	BH6	BH10		
Standpipe Depth (m)	2.30	2.80	2.70		
Condition of Standpipe	Good	Good	Good		
Combustible gas (CH4) % LEL	0	0	0		
Combustible gas (CH4) % vol	0	0	0		
Carbon Dioxide (CO2) % vol	1.70	2.00	0.40		
Oxygen (O2) % vol	17.60	15.20	16.70		
Carbon Monoxide (ppm)	0	0	0		
Hydrogen Sulphide (H2S) (ppm)	0	0	0		
Flow Rate (max) l/hr	0	0	0		
Relative Downhole Pressure (mb)	0	0	0		
Water Level (m)	Dry	3.60	Dry		
Remarks					

**GEA**

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Gas Monitoring

Site	Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP			Job Number
				J21015A
Client	Barnsley Youth Zone			Sheet
Engineer	HL Structural Engineers			5/6
Date	22/10/2021			
Temperature °C	9.80	11.60	13.00	
Barometric Pressure (mB)	1004			
Visit No	4			
Borehole No	BH3	BH6	BH10	
Standpipe Depth (m)	2.20	2.80	2.60	
Condition of Standpipe	Good	Good	Good	
Combustible gas (CH4) % LEL		0	0	
Combustible gas (CH4) % vol		0	0	
Carbon Dioxide (CO2) % vol		2.20	1.90	
Oxygen (O2) % vol		15.00	14.30	
Carbon Monoxide (ppm)		0	0	
Hydrogen Sulphide (H2S) (ppm)		0	0	
Flow Rate (max) l/hr		-0.30	-0.60	
Relative Downhole Pressure (mb)		-2.00	-4.00	
Water Level (m)	1.85	2.60	Dry	
Remarks	Borehole flooded, no gas readings. Water level likely water draining after plug removed			

**GEA**

Geotechnical & Environmental Associates
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Gas Monitoring

Site	Barnsley Youth Zone, Land Off Schwabisch Gmund Way, Barnsley, S71 1BP			Job Number
				J21015A
Client	Barnsley Youth Zone			Sheet
Engineer				6/6
HL Structural Engineers				
Date	01/11/2021			
Temperature °C	10.60	13.50	11.80	
Barometric Pressure (mB)	973			
Visit No	4			
Borehole No	BH3	BH6	BH10	
Standpipe Depth (m)	2.20	2.80	2.70	
Condition of Standpipe	Good	Good	Good	
Combustible gas (CH4) % LEL		0	0	
Combustible gas (CH4) % vol		0	0	
Carbon Dioxide (CO2) % vol		1.70	2.50	
Oxygen (O2) % vol		15.40	14.30	
Carbon Monoxide (ppm)		0	0	
Hydrogen Sulphide (H2S) (ppm)		0	0	
Flow Rate (max) l/hr		-0.40	0	
Relative Downhole Pressure (mb)		-2.00	0	
Water Level (m)	1.85	2.45	Dry	
Remarks	Borehole flooded, no gas readings			



GEA

Widbury Barn
Widbury Hill
Ware
SG12 7QE**Generic Risk-Based Soil
Screening Values**

Site	Land off Schwabisch Gmund Way, Barnsley	Job Number J21015A
Client	Barnsley Youth Zone	Sheet 1 / 2
Engineer	HL Structural Engineers	

Proposed End Use Commercial**Soil Organic Matter content % 1.0**

Contaminant	Screening Value mg/kg	Data Source	Contaminant	Screening Value mg/kg	Data Source
Metals			Hydrocarbons		
Arsenic	640	C4SL	Banded TPH (8-10)	5385	Calc1
Cadmium	410	C4SL	Banded TPH (10-12)	24615	Calc1
Chromium (III)	8600	S4UL	Banded TPH (12-16)	55385	Calc1
Chromium (VI)	49	C4SL	Banded TPH (16-21)	43077	Calc1
Copper	68,000	S4UL	Banded TPH (21-35)	43077	Calc1
Lead	2330	C4SL	Benzene	27	C4SL
Elemental Mercury	26	S4UL	Toluene	870	SGV
Inorganic Mercury	1100	S4UL	Ethyl Benzene	48000	SGV
Nickel	980	S4UL	Xylene	475	SGV
Selenium	13000	SGV	Aliphatic C5-C6	3200	S4UL
Zinc	730,000	S4UL	Aliphatic C6-C8	7800	S4UL
Anions			Aliphatic C8-C10	2000	S4UL
Soluble Sulphate	500 mg/l	Structures	Aliphatic C10-C12	9700	S4UL
Sulphide	50	Structures	Aliphatic C12-C16	59000	S4UL
Chloride	400	Structures	Aliphatic C16-C35	1,600,000	S4UL
Others			Aromatic C6-C7	See Benzene	S4UL
Organic Carbon (%)	10	Methanogenic potential	Aromatic C7-C8	See Toluene	S4UL
Total Cyanide	12000	WRAS	Aromatic C8-C10	3500	S4UL
Total Mono Phenols	3200	SGV	Aromatic C10-C12	16000	S4UL
PAH			Aromatic C12-C16	36000	S4UL
Naphthalene	190.00	S4UL	Aromatic C16-C21	28000	S4UL
Acenaphthylene	83,000	S4UL	Aromatic C21-C35	28000	S4UL
Acenaphthene	84,000	S4UL	PRO (C ₅ -C ₁₀)	17397	Calc2
Fluorene	63,000	S4UL	DRO (C ₁₂ -C ₂₈)	1,723,000	Calc2
Phenanthrene	22,000	S4UL	Lube Oil (C ₂₈ -C ₄₄)	1,628,000	Calc2
Anthracene	520,000	S4UL	TPH	750	Trigger to consider speciated testing
Fluoranthene	23,000	S4UL	Chlorinated Solvents		
Pyrene	54,000	S4UL	1,1,1 trichloroethane (TCA)	660	S4UL
Benzo(a)anthracene	170.0	S4UL	tetrachloroethane (PCA)	110	S4UL
Chrysene	350	S4UL	tetrachloroethene (PCE)	19	S4UL
Benzo(b)fluoranthene	44.0	S4UL	trichloroethene (TCE)	1.2	S4UL
Benzo(k)fluoranthene	1,200.0	S4UL	1,2-dichloroethane (DCA)	0.67	S4UL
Benzo(a)pyrene	42.00	C4SL	vinyl chloride (Chloroethene)	0.059	S4UL
Indeno(1 2 3 cd)pyrene	500.0	S4UL	tetrachloromethane (Carbon tetra	2.9	S4UL
Dibenz(a h)anthracene	3.50	S4UL	trichloromethane (Chloroform)	99	S4UL
Benzo (g h i)perylene	3,900	S4UL			
Total PAH Screen	600.0	B(a)P / 0.15			

Notes

Concentrations measured below these screening values may be considered to represent 'uncontaminated conditions' which pose a 'LOW' risk to human health. Concentrations measured in excess of these values indicate a potential risk which require further, site specific risk assessment.

C4SL - Defra Category 4 Screening value based on Low Level of Toxicological Risk

SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009 - where not superseded by C4SL

S4UL - LQM/CIEH Suitable for use Level (2015) based on 'minimal' level of risk

Calc1 - sum of thresholds for Ali & Aro fractions - assuming a 35% Aro:65% Ali ratio as is commonly encountered in the soil

Calc2 - sum of nearest available carbon range specified including BTEX for PRO fraction

Total PAH based on B(a)P / 0.15 - GEA experience indicates that Benzo(a) pyrene rarely exceeds 15% of the total PAH concentration

Site	Land off Schwabisch Grund Way, Barnsley	Job Number J21015A
Client	Barnsley Youth Zone	Sheet 2 / 2
Engineer	HL Structural Engineers	

Proposed End Use **Commercial**

The key generic assumptions for this end use are as follows;

- ☐ that groundwater will not be a critical risk receptor;
- ☐ that the critical receptor for human health will be a working female aged 16 to 65 years old;
- ☐ that the exposure duration will be 49 years;
- ☐ that the building type equates to a three-storey office.
- ☐ that the critical exposure pathways will be direct soil and indoor dust ingestion, skin contact with soils and dust, and inhalation of dust and vapours;

Where contaminant concentrations are measured at concentrations below the generic screening value it is considered that they pose an acceptable level of risk and thus further consideration of these contaminant concentrations is not required. However, where concentrations are measured in excess of the generic screening value there is considered to be a potential that they could pose an unacceptable risk and thus further action will be required which could include:

- ☐ additional testing to zone the extent of the contaminated material and thus reduce the uncertainty with regard to its potential risk;
- ☐ site specific risk assessment to refine the assessment criteria and allow an assessment to be made as to whether the concentration present would pose an unacceptable risk at this site; or
- ☐ soil remediation or risk management to mitigate the risk posed by the contaminant to a degree that it poses an acceptable risk.

Permit Ref.	22519	Project / Site Location	Land off, Schwabisch Gmund Way, Barnsley, S71 1BP
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Please supply all relevant documents, including this completed form within 3 months of the permitted works being completed.

Where relevant the report should include; borehole logs and details of mine or mine entry treatment works carried out (incl. engineering drawings, grout takes etc.) and a scaled site layout plan (correlated to O.S N' Grid) showing all relevant mine entry positions, coal seams, voids and broken ground proved by the works.

Summary of works
Start date

16/8/21

Finish date

20/8/21

Have any variations occurred?
☒ No ☐ Yes

If so was the Authority notified?
☐ No ☐ Yes

Please describe;

Did if any of the following incidents occur?

- ☐ Spontaneous combustion
 ☐ Water emission
 ☐ Gas emission (elevated or above action levels)
☐ Geotechnical instability
 ☐ Legal issues incl. damage or potential claims
 ☒ None

If yes, please detail each item;

Were any of the following encountered? Please give a brief summary of the works undertaken.

- ☒ Intact coal only
 ☐ Broken ground
 ☐ Backfilled ground
 ☐ Voids

Description;

TEN OPEN HOLE WATER FLUSH BOREHOLES TO 20.0m DEPTH

VOIDS / BROKEN GROUND NOT ENCOUNTERED

NO MINE GASES MEASURED

BOREHOLES GROUTED ON COMPLETION; THREE STANDPIPS INSTALLED TO RECORD GAS/GW LEVELS

Will further works be necessary that require a Permit? ☒ No ☐ Yes

If yes, please describe, including any recommendations;

Name: MARTIN COOPER

Email: martin@gea-uk.co.uk

Company: GEA

Tel: 07709 412739



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