

**PHASE 2 GEOTECHNICAL AND GEO-ENVIRONMENTAL
SITE INVESTIGATION**

**LAND AT NEW ROAD,
TANKERSLEY**

FOR

COMPANY SHOP LIMITED

ISSUE 2



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24 November 2017

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EXECUTIVE SUMMARY

1. The site is approximately 1.2 hectares in area and is located south west of New Road, Tankersley, approximately 6 km south of Barnsley City Centre. The site is approximately rectangular in shape on plan and is centred around National Grid Reference 434310, 4100180. We understand that it is proposed to redevelop the site with low rise residential properties.
2. The site is occupied by a distribution depot operated by the Company Shop, comprising two warehouses with associated car parking and soft landscaping. The site appears to have been subject to cut and fill works previously to create three main plateaus around the current buildings.
3. Historically, the site has been occupied by a railway line and station, partly on embankment, from prior to 1855 until around 1978 when the railway features were removed and the site was labelled as a plant engineering depot. By 1999 the site was redeveloped into its current layout.
4. The site overlies sandstone of the Pennine Middle Coal Measures formation. The Lidgett Coal is shown to outcrop just to the west of the site, dipping towards the east and is therefore expected at shallow depth beneath the site.
5. The intrusive investigation comprised the excavation of fourteen trial pits, three cable percussive boreholes, ten rotary boreholes and four infiltration tests.
6. The majority of the trial pits encountered macadam at the surface, typically around 100 mm in thickness, underlain by sandy gravel and cobbles of sandstone or limestone (MOT Type 1) up to between 0.1 and 0.5 m below ground level (bgl).
7. Made ground was encountered below the surfacing in all of the trial pits to depths of between 0.8 m and around 4.7 m (in boreholes), with a general trend of deepening from the south of the site towards the north. The made ground was assorted in composition, but included colliery spoil, sandstone quarry waste, demolition rubble and iron works waste, including slag, in limited areas.
8. Natural ground was encountered within the eastern, southern and western parts of the site and generally comprised stiff sandy clay with gravel or mudstone in the east, with sandstone below this for the majority of the site. Mudstone bedrock was recorded in the west of the site.
9. No groundwater was encountered within any of the trial pits or boreholes.

10. Infiltration tests were carried out but were generally unsuccessful. It is likely that piped drainage will be required discharging off site to a nearby watercourse or public sewer. On-site attenuation is likely to be necessary.
11. Rotary drilling works have confirmed the presence of the Lidget coal seam, encountered from between 8.3 and 10.2 m in the east, and between 0.7 and 2.1 m in the west. The coal was recorded as solid in every borehole. No remedial works are expected to be required, but it is considered prudent to undertake a limited further investigation once the main warehouse has been demolished.
12. A mine entry is shown at the northern boundary of the site. The abandonment plans for the area have been obtained. The plans show a drift entry to enter to the Flockton Thick Coal seam at around 75 m below the site. These workings are not considered to affect the proposed development. However, the drift is expected to cut below the western end of the site at between 15 m and 35 m depth, and therefore some additional investigation is considered necessary to confirm its location and that no remedial works such as drilling and grouting are necessary.
13. Where there is shallow made ground in the west and south east of the site, it is considered that strip and trench fill foundations are considered appropriate, for around 25% of the site, taken into the stiff clay or sandstone at a minimum depth of 900 mm and deepened and constructed in accordance with the NHBC Chapter 4.2 standards where within the influence of trees. Where the made ground is deeper piled foundations will be required.
14. Precast concrete beam and block floors with an underlying 250 mm minimum height ventilated void should be used in all plots.
15. Due to the changes in ground level across the site, a regrade in site levels will likely be required. Retaining structures may also be required.
16. Around 50% of the samples of made ground tested recorded elevated concentrations of arsenic, lead and PAH compounds, and one sample recorded some mildly elevated TPH fractions. One sample of natural ground also recorded an elevated level of arsenic. It is recommended that a 600 mm clean capping layer is provided in all gardens and landscaped areas, including at least 100 mm of topsoil as a growing medium for plants.
17. The chemical test results indicate that DS-3, AC-3 sulphate precautions should be used for concrete in contact with the made ground types and DS-3, with an ACEC of AC3z being appropriate for the natural ground.

18. Gas protection measures in line with NHBC 'Amber 1' classification are required for all plots.
19. Protective measures could be required for potable water supply pipes. The chemical testing will need to be forwarded to the water supplier to confirm.
20. The conclusions made in this report are subject to agreement by the approving bodies, such as the Local Authority and any warranty provider.

1.0 INTRODUCTION

1.1 Terms of Reference

This report presents the findings of a Phase 2 (intrusive) geotechnical and geo-environmental site investigation carried out by Eastwood & Partners (Consulting Engineers) Ltd for, and on the behalf of, Company Shop Limited. Any other parties using the information in this report do so at their own risk and any duty of care is excluded.

1.2 Context

Company Shop have previously commissioned a Phase 1 Geo-environmental report from William Saunders. A copy of report reference 11502/12, dated December 2016, was made available to Eastwood & Partners prior to undertaking our site investigation works. The report is reviewed in Section 2.0, and relevant information has been extracted and used within our investigation were applicable. The Phase 1 report must be read in conjunction with this report.

We are not aware of any other previous investigations having been undertaken on the site.

We understand that the client proposes to offer the site for sale, most likely for redevelopment with residential properties.

1.3 Aims and Objectives

The aims and objectives of this investigation were as follows:

- Obtain additional information and incorporate with previous data enabling refinement and subsequent testing of the conceptual model;
- Detail the ground conditions and their geotechnical properties enabling outline foundation proposals to be made for a likely residential development;
- Carry out tiered risk assessment to establish the likely risks to future receptors, involving the use of generic assessment criteria and where unacceptable risks are identified, site specific assessment criteria within a detailed quantitative risk assessment;
- Identify feasible remediation options if unacceptable risks are highlighted; and
- Develop an appropriate remediation strategy where remediation is required.

1.4 Scope of Investigation

The Phase 2 investigation consisted of intrusive works and laboratory analysis. The findings were used to test the conceptual model and produce a final risk assessment.

The intrusive works comprised the completion of trial pits and boreholes to enable:

- Examination of the upper few metres of ground and determination of the general soil profile at depth;
- In situ description of soils, enabling any localised lateral and vertical changes in soil conditions to be logged;
- Determination of the presence of coal seams and/or historical mine workings beneath the site;
- Assessment of any contamination identified using visual and olfactory methods;
- Collection of soil samples for geotechnical and chemical testing;
- Completion of in-situ infiltration tests; and
- Installation of gas monitoring wells.

1.5 Limitations of Investigation

This report is based on the assumption that the site is proposed to be disposed of via sale for a probable residential redevelopment. We have assumed that any proposed residential properties will be low rise (3 storeys or less) and that they will be of conventional construction, with associated areas of hardstanding, private gardens and communal soft landscaping. Some regrading of the ground level is likely to be necessary. If this is not the case, further advice may be needed.

Where assessments of site areas affected in particular ways are given, these are approximate. All information, comments and opinions given in this report are based on the ground conditions encountered during the site work, on the results of laboratory testing carried out as part of the investigation and information gained from a review of a geological, environmental and historical desk study and supporting information. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata and water conditions between or below investigation points. It should be noted that groundwater and gas levels vary due to seasonal or other effects, and may at times differ from those measured during the investigation.

This report considers the ground and groundwater and does not cover any buildings (and their fabric) or the constituents of any existing hardstanding materials. Generally, testing has only been carried out for contaminants identified as potentially present with no assessment made of biological contamination. Risks to ecological receptors, such as bats, have not been considered.

2.0 SUMMARY OF PHASE 1 REPORT

A copy of report reference 11502/12, dated December 2016 and prepared by William Saunders on behalf of Company Shop Limited has been provided to us to assist with the design of our investigation. The following section summarises the pertinent points raised by the Phase 1 report. Eastwood & Partners have provided additional comments where appropriate, based on our own observations and review of available geological maps and memoirs and other information.

2.1 Site Description

The site is approximately 1.2 hectares in area and is located south west of New Road, in Tankersley, South Yorkshire. This is approximately 6 km south of Barnsley Town Centre. The site is approximately rectangular in shape on plan and is centred around National Grid Reference 434310, 4100180.

The site is occupied by a distribution depot operated by Company Shop, comprising two warehouse buildings with associated car parking and soft landscaping. The main building appears to have a corrugated concrete tile roof, and signage on the buildings indicates this to potentially contain asbestos. However, following a discussion with the current site owner, we understand that the roofing is in fact a composite material which does not contain asbestos. A full asbestos survey will be required prior to demolition.

The external areas of the site are generally covered by macadam or concrete slabs with soft landscaping across the frontage. The site is bounded by woodland to the north and west, New Road to the east and relatively modern housing to the south. A line of conifers is present in the centre of the site, along the eastern side of the car park.

The site appears to have been subject to cut and fill works previously to create three main plateaus around the current buildings. Ground levels appear to be around 138.5 m AOD in the west of the site, between 137 m and 138.5 m AOD in the central car park, and falling to between 132 m and 136 m AOD in the east.

The north eastern quarter of the site currently slopes steeply down to the road below, and is densely vegetated.

2.2 Site History

William Saunders undertook a review of historical mapping, obtained as part of their Phase 1 report.

Historical maps show the site to have been occupied by a railway line and station (Birdwell and Hoyland Common Station), partly on embankment, from prior to 1855. A small goods yard was located in the south of the site, with passenger buildings to the north of the line in the north of the site. The station remained until around 1978 when the railway features were removed and the site was labelled as a plant engineering depot. By 1999 the site has been redeveloped into its current layout.

The surrounding land was originally agricultural to the south, with woodland to the north and a plantation to the south west. A small sandstone quarry was shown adjacent to the north east boundary of the site on the 1893 map sheet and another quarry was also present around 75 m north. Wharnccliffe Silkstone Colliery was present around 100 m to the south west, which remained until around 1965, with spoil heaps extending along the western side of the site. The sandstone quarry on the boundary remains unfilled to the present day, although this is now significantly overgrown. The colliery land to the south west has been redeveloped as an industrial park around 20 to 30 years ago.

2.3 Anticipated Ground Conditions

The Phase 1 report records a bed of sandstone to be present directly below the site, which is part of the Pennine Middle Coal Measures. No faults or drift deposits are indicated to be present. The Envirocheck maps provided show the site to be likely to be underlain by made ground. This is probably due to the former railway embankment.

2.4 Hydrology and Hydrogeology

The nearest surface water feature is recorded as being the Birdwell Dike, which is located around 13 m north of the site.

The solid geology below the site is classified as a Secondary A Aquifer. The site is not within a groundwater source protection zone.

There are no abstraction licenses within 1000 m of the site. There is one pollution incident to controlled waters within 500 m of the site boundary which involved an unknown pollutant into a freshwater stream. The incident was listed as a category 3 minor incident and is not considered to affect this site.

2.5 Coal Mining

A Coal Authority mining report was obtained and was reviewed by William Saunders. The report states that the site is in an area of influence from historical workings in six seams of coal at depths of between 70 m and 300 m, last worked in 1953, and that ground movements associated with these workings should have ceased by now. A mine entry, an adit, is recorded just north of the site. The site is also in an area where the Coal Authority believe there to be coal at shallow depth, which could potentially have undergone unrecorded working in the past.

No further comment is provided by William Saunders.

Eastwood & Partners have reviewed additional information to confirm whether the site may be at risk from shallow mining, given the presence of a recorded mine entry near to the site and the former colliery to the west. Geological map Sheet SK 30 SW conjectures the Lidget Coal to outcrop immediately west of the site, dipping towards the east. The strata to the west of the site are indicated to dip at between 7 and 9°, although a fault runs between this area and the site, meaning that the dip angle could be shallower or steeper below the site. The throw of the fault is not recorded, but the downthrown side is to the north.

Assuming a dip of 7°, the Lidget seam is expected to be present at shallow depth (less than 5 m bgl) below the western end of the site, and at up to approximately 20 m bgl below the eastern end of the site. According to the geological memoir, the seam is recorded to be worked in the local area, and the seam is recorded as comprising 0.6 m of coal over 0.4 m of shale, over a further 0.2 m of coal, in turn overlying a thin band of seatearth and coaly shale. The geological maps also indicate the presence of bell pits in the area south west of the site which would indicate the presence of coal at shallow depth, although these are shown west of the expected Lidget Coal outcrop and therefore probably relate to another seam. Any workings within the Lidget Coal would have the potential to influence developments at surface and would probably require remedial works such as drilling or grouting. The adit to the north of the site is considered to potentially indicate that workings have been attempted in this seam. We understand from the vendor that a seam of coal was encountered during the construction of the smaller building currently present in the west of the site, which was exposed during the excavation to level off the site for the building's floor slab. The coal was dug out within the building footprint. However, this seam was not encountered elsewhere on the site during any construction works. We assume this is due to the dip of the seam taking it beyond the depth of normal excavations.

The next shallowest seam of coal expected beneath the site is the Flockton Thick Coal, which is shown to outcrop around 250 m west of the site. According to the Geological memoir, the seam is recorded as being worked "almost everywhere", and the coal was often extracted with the

overlying Tankersley Ironstone. The geological memoirs record outcrop workings and shallow pits to have been undertaken on the land east of Wharncliffe Silkstone Colliery, formerly to the west of the site. Workings are therefore anticipated in the vicinity of the site. The seam is expected to be up to 1.2 m in thickness, although a band of dirt is often included in the seam, sandwiched between two leaves of coal. The Tankersley Ironstone is recorded as being between 4.5 and 15.0 m above the Flockton Thick coal seam and is recorded in the area as being around 0.9 m thick. The seam is expected to be around 65 m below the Lidget Coal, according to the general stratigraphic sequence, and therefore is expected at around 65-70 m below the western edge of the site, deepening eastwards across the site to around 85-90 m bgl. Workings within these seams are therefore not expected to influence surface developments, and these are anticipated to be the workings which the Coal Authority report records at 70 m bgl.

The site is therefore considered to be at potential risk from unrecorded mine workings within the Lidget Coal at shallow depth and therefore a borehole investigation was recommended by Eastwood & Partners. This has been undertaken as part of the Phase 2 works.

2.6 Ground Gas

There are no active or historical landfill sites within 250 m of the site.

Radon precautions will not be required for properties constructed at the site.

The Phase 1 report concluded that there is a generally a low risk of the site being affected by ground gases.

However, the Envirocheck Report records two potentially infilled features, located on site and 59 m north west of the site. Both features are recorded as 'unknown infilled ground' and are thought to be associated with the former railway embankment and the former quarry to the north west of the site. The former quarry is a very localised feature, and is not considered to present a significant risk of gas generation. However, the site itself may be underlain by a significant thickness of made ground, and this could be a potential source of gas generation depending on the nature of any fill materials present.

Shallow coal mine workings may also be present below site and therefore mine gas migration could also be a potential risk.

A ground gas monitoring programme is therefore recommended to determine the gassing regime on the site.

2.7 Outline Conceptual Model

Historically, the site has been occupied by a railway line and station, partly on embankment, until around 1978 when the railway features were removed and the site was labelled as a plant engineering depot.

Made ground is anticipated on site which could potentially contain elevated concentrations of heavy metals/metalloids, polycyclic aromatic hydrocarbon (PAH) compounds, such as benzo(a)pyrene, as well as sulphates, particularly if the material is ashy in nature. Asbestos fibres or asbestos containing material may also be present on site within materials arising from the demolition of the former buildings.

The natural ground is not expected to be particularly contaminated, although naturally elevated concentrations of heavy metals/metalloids and sulphates may be recorded.

No radon precautions are required. Ground gas precautions may be required across most of the site due to the presence of possible shallow coal mining and deep made ground.

The following table details the possible sources and associated contaminants of concern, pathways and receptors, highlighted by William Saunders within their Phase 1 investigation as potentially present:

Source	Pathway	Receptor	Probability	Consequence	Risk
On site contaminants in near surface soils	Direct contact and ingestion	Long term – future site users	Low	Medium	Low
		Short term – construction workers	Medium	Medium	Moderate
	Inhalation of dust	Long term – future site users	Unlikely	Medium	Low
		Short term – construction workers	Medium	Medium	Moderate
	Leaching through infiltration	Minor aquifer	Low	Medium	Low
On site mobile hydrocarbons in near surface soils	Leaching through infiltration	Minor aquifer	Low	Medium	Low
	Direct contact	Short term – construction workers	Medium	Medium	Moderate
	Groundwater flow	Birdwell Dyke	Low	Medium	Low
On site Aggressive ground conditions	Contact with buried structures	Construction materials	Low	Medium	Low
On and Off-site ground gas	Build-up in confined spaces	Long term – future site users	Low	Severe	Moderate
		Short term – construction workers	Low	Severe	Moderate

Eastwood & Partners would also consider that the following additional potential risks and pathways may be present:

Potential Contaminants	Pathway	Receptor
- Heavy metals/metalloids, PAHs, asbestos fibres, in any made ground - Naturally elevated levels of heavy metals/metalloids in the natural ground	Ingestion, inhalation, direct contact, root uptake	- Future staff & visitors - Site workers - Plants
	Migration through ground	- Secondary A aquifer - Water supply pipes
Total Petroleum Hydrocarbons (TPH) within the made ground due to the former use as a depot and railway.	Ingestion, inhalation, direct contact, Root uptake	- Future staff & visitors - Site workers - Plants
	Migration through ground	- Secondary A aquifer - Water supply pipes
Ground gas	Inhalation	Future staff & visitors

We would also consider that the potential for aggressive ground conditions in relation to buried structures may be relatively high, due to the expected presence of made ground of unknown composition.

3.0 GROUND INVESTIGATION

3.1 Site Works

The intrusive investigation comprised the excavation of fourteen trial pits, referenced TP1, TP1B, TP2, TP2B, TP3 to TP12, undertaken between 12 and 13 July 2017. The pits reached depths of between 1.4 m to 3.9 m below ground level (bgl).

Four infiltration tests, referenced SA1 to SA4, were carried out within trial pits referenced TP1B, TP7, TP9 and TP10.

Additionally, three cable percussive boreholes, referenced BH1 to BH3, were completed, to investigate the deeper made ground, characterise the strength of the ground and to install wells for gas and groundwater monitoring. These reached depths of between 4.4 m and 5.7 m below ground level (bgl). Standard Penetration tests (SPTs) were undertaken at regular intervals within the boreholes to determine the density of the soils.

Ten rotary boreholes were also undertaken, referenced R1 to R10, which were all drilled to a depth of 30 m bgl, in order to investigate the presence of any coal seams beneath the site.

All of the exploratory holes were positioned to give good site coverage, but were constrained by the presence of live services, the existing buildings (which were inaccessible to plant) and by the need to maintain the site access. The area in the north east of the site was also inaccessible due to dense vegetation and steeply sloping ground. A water main was also recorded to be present below this area, the exact position of which could not be verified.

Copies of the exploratory hole logs are presented in Appendix 2 and their locations are shown on the Exploratory Hole Location Plan, Drawing number 41492/001A, in Appendix 1.

Following the initial site works, six rounds of gas monitoring were undertaken on two wells, which were installed on the site. The monitoring was undertaken between 28 July and 16 November 2017.

3.2 Laboratory Testing

Four samples of clay were dispatched for geotechnical testing at Professional Soils Laboratory. The results are presented in Appendix 4 and discussed further in Section 5.

Fourteen samples of the made ground and four samples of natural ground were despatched for chemical testing. Soil samples were taken in 500 g plastic tubs and 250 ml amber glass jars and analysed at Chemtech Environmental Limited, using MCERTs accredited methodologies

where available. The chemical test results are presented in Appendix 5 and discussed further in Section 6.

4.0 GROUND CONDITIONS

4.1 Surface Covering

The majority of the trial pits encountered macadam at the surface, typically around 100 mm in thickness, underlain by sandy gravel and cobbles of sandstone or limestone (MOT Type 1) up to between 0.1 and 0.5 m below ground level (bgl).

Trial pits in the east of the site, TP1, TP1B, TP2, TP2B and TP3 were excavated on a grassed verge and recorded made ground comprising brown sandy gravelly slightly organic soil from the surface up to 0.6 m bgl, with gravel of brick, glass, sandstone and ash.

4.2 Made Ground

Made ground was encountered in all of the trial pits to depths of between 0.8 m and around 4.7 m (in boreholes), with a general trend of deepening from the south of the site towards the north.

The made ground was assorted in composition, but included colliery spoil, sandstone quarry waste and demolition rubble. Iron works waste, including slag, was also encountered in limited areas. The assorted materials are described below:

Colliery Spoil

The colliery spoil material comprised gravelly clay/ clayey gravel of mudstone, sandstone and occasional ironstone nodules and was encountered within TP2B, TP3 and TP7 from between 0.8 and 1.0 m up to between 2.1 and 3.0 m bgl.

BH1, adjacent to TP3, recorded N-values of between 12 and 14 during SPT tests within the colliery material. This classifies the material as being medium dense/firm.

Sandstone Quarry Waste/Reworked sandstone

The sandstone backfill comprised sandy gravel and cobbles of tabular angular sandstone and was encountered within trial pits TP1B, TP2, TP2B, TP3 to TP6, TP8 and TP10 and was generally encountered from between 0.85 and 3.0 m bgl up to between 2.1 and 3.9 m bgl.

BH1 recorded similar material between 2.8 m and 3.9 m bgl, and BH2 in the central northern part of the site recorded sandstone material between 1.7 m and 4.6 m bgl. N-values of between 10 and 28 were recorded, indicating a classification of medium dense to dense.

Demolition rubble

The demolition rubble type material was recorded in the majority of the pits, encountered from the surface up to 2.0 m below ground level and comprised sandy, locally ashy, gravel and cobbles of brick and sandstone blocks with occasional coal, glass, timber and metal fragments.

An SPT was undertaken within this material within BH2, which recorded an N-value of 28, indicating the material to be medium dense in compaction.

Iron Works waste

Iron works waste was present in the east of the site in pits referenced, TP1, TP1B, TP2, TP4, TP5, TP7 and BH2 and comprised ashy sandy gravel of brick, clinker, coal fragments and occasional gravel and cobble sized pieces of slag, encountered from between 0.1 m and 1.6 m bgl.

Miscellaneous

Other made ground comprising reworked clay was encountered within TP2 between 0.9 and 1.8 m bgl and TP7 between 2.1 and 2.3 m bgl and possible relic topsoil comprising brown gravelly sand was encountered within TP5 between 1.9 and 2.3 m bgl.

4.3 Natural Ground

Natural ground was encountered within the eastern, southern and western parts of the site in TP1, TP1B, TP2, TP2B, TP5, TP7 and TP9 to TP12. The natural ground generally comprised stiff sandy clay with gravel of mudstone and rare coal fragments and was encountered from between 1.6 and 3.4 m in the east of the site, and from between 0.8 and 1.5 m in the west.

Strong sandstone bedrock was generally encountered below this for the majority of the site, with mudstone being recorded in BH3, TP11 and TP12 adjacent to the western boundary of the site.

SPT tests undertaken within the natural ground in the cable percussion boreholes generally recorded N-values of 50.

4.4 Coal

Ten rotary boreholes were undertaken across the site. Boreholes in the west of the site recorded a single seam of coal, considered to be the Lidget Coal, from around 2.1 m bgl. The seam deepened towards the east where the coal was encountered from between 8.3 m and 10.2 m bgl up to between 9.9 m and 11.5 m. The seam was generally recorded as being between 1.1 m and 1.4 m thick, but was 1.6 m thick in BH7 in the north of the site.

The coal was found to be intact in all ten positions. All ten boreholes were taken to 30 m depth, with no further coal seams or other workings encountered.

One trial pit in the west of the site, TP11, recorded intact shallow coal from between 0.75 m and 1.5 m, and at 1.7 to 2.1 m, separated by 200 mm of grey clay. Coal was also recorded within one borehole, BH3, as 'fine coal dust' between 1.1 and 1.5 m depth.

4.5 Groundwater

Groundwater was not recorded within any of the exploratory holes.

5.0 GEOTECHNICAL APPRAISAL

5.1 General

The site is mainly covered by a thin layer of macadam. Made ground was encountered below, within all of the trial pits, comprising either colliery spoil, sandstone quarry waste, demolition rubble or iron works waste up to between 0.8 m and 4.6 m bgl.

Limited amounts of slag were noted locally within the made ground, which can potentially be expansive. However, there was only a very low quantity of this material amongst the surrounding soils, and therefore it is considered that there no significant risk of soil heave due to expansion of the slag material, with any ground movement being accommodated by the surrounding clay and sand soils. The material has also been in place for many years after being exposed to air and surface water, meaning that any expansion is already likely to occurred. All foundations should be taken through the made ground to the natural ground below in any case, and therefore no risk of the structures being disturbed by the slag is considered to be presented. Floor slabs will need to be of a suspended construction, however, with a void below to accommodate any slight localised movement.

Penetrometer readings were carried out where natural clay was encountered within TP1, TP2 and TP7 at depths of between 1.6 and 2.5 m. The unconfined compressive strength was generally recorded as being between 150 kN/m² and 300 kN/m². The strengths generally increased with depth.

Standard penetration tests (SPT) were carried out in the cable percussive boreholes, generally at 1 m intervals. SPTs were undertaken in the made ground when it was deeper than 1 m. N-values ranging from 10 to 28 were recorded. The SPT N values refused (N value of over 50) within the natural sandstone in BH1 and BH2 between 4.0 and 5.0 m depth and also within the mudstone in BH3 between 3.0 and 5.0 m depth.

For the purposes of foundation design, a characteristic allowable bearing capacity of 150 kN/m² is considered acceptable for the natural clay soils from around 1.6 m, with the sandstone and mudstone bedrock being capable of providing a bearing capacity of at least 300 kN/m².

5.2 Geotechnical Testing

Four samples of the natural clay were collected from around the site from depths ranging from 1.7 to 3.3 m, which were submitted to PSL in Doncaster for plasticity testing. The modified plasticity indices range between 6.2% and 22% corresponding to unshrinkable to medium volume change potential in accordance with the NHBC Chapter 4.2 Standards.

A worst case scenario is considered appropriate, therefore the clay on site should be classed as having medium volume change potential.

5.3 Shallow Coal Mining Assessment

The Lidget Coal seam is inferred to outcrop immediately to the west of the site, dipping to the east at a shallow gradient. The exploratory holes undertaken have confirmed the presence of this seam, encountered from between 0.7 and 2.1 m depth in the west of the site, and from between 8.3 and 10.2 m in the east.

The coal was recorded as being intact in each borehole and was recorded as being between 1.1 m and 1.6 m thick. No other seams were recorded within 30 m from ground level.

Due to the indicated presence of a mine adit immediately north of the site, workings were anticipated within the Lidget Seam, but the results of the intrusive works suggested that this is not the case. We have therefore made further enquiries with the Coal Authority as to the possible seam that this mine entry may be associated with.

We requested that the Coal Authority to undertake a search of their archives, and to supply a list of mine abandonment plans that they have available. The Coal Authority confirmed known workings in a number of seams, the shallowest being the Flockton Thick Coal. We obtained a copy of the abandonment plan for this seam (Plan Reference NE573) and attach a copy of this in Appendix 3.

The abandonment plan shows workings within the Flockton Thick coal at a level of 215 ft above Ordnance Datum, and therefore at a depth of around 73 m below the western end of the site, and at around 75 m bgl in the east of the site. The seam is shown to have a total seam thickness of around 53 inches (1.35 m), comprising a top and bottom leaf of coal separated by dirt and a thin coal. The workings were undertaken between April and September 1953. At this depth, it is not considered that the workings will present a risk to the proposed development, and remedial works will not be required.



The abandonment plan also shows a mine entry in the approximate location of that shown on the mining report and geological map. This is shown to be a drift/adit which has an incline gradient of 1:1, and a length of 100 yards (91 m). It is assumed that this drift serves workings in a deeper seam as well as the Flockton Coal. The drift is indicated to run beneath the north western-most corner of the site, below the north western corner of the main warehouse, and then below the western part of the site. Using the 1:1 incline, the adit would be expected to be at around 15 m below the north west corner, and around 34 m below the northern boundary in the west of the site.

No detail as to the dimensions of the drift are given. We therefore also requested a mine entry data sheet from the Coal Authority. However, this also did not record any dimensions, and also confirmed that no record of any treatment of this mine entry are on record. The coordinates of the top of the drift are given as 434235 400189.

No mention of any access into the Lidget seam from the adit or from the other levels within the Flockton seam is made by the abandonment plans.

Based on our investigations, the Flockton Thick Coal is at sufficient depth not to influence developments at surface.

The Lidget Coal does not appear to have been worked beneath the site, and therefore remedial works are not required for this seam, although it would be prudent to undertake a limited amount of additional investigation in the north of the site within the footprint of the existing main

warehouse building, once this is removed, to rule out any localised extraction of the coal in this area.

The mine entry which runs beneath the north western corner of the site is expected to be deep enough not to present a significant risk to new structures, but it would be prudent to undertake some additional boreholes to locate this feature and prove its depth, height and width. It may not be necessary to drill and grout the drift, and it may be instead possible to locate plots out of its zone of influence, but this would be dependent on its exact depth and size. A row of closely spaced boreholes should be drilled along the boundary in the positions where the drift passes beneath the site to delineate this feature. The drift is expected at depths of between 15 m and 34 m below the existing ground level on site, but will only affect a very limited portion of the development. However, if the drift is present at shallower depth than indicated, drilling and grouting could be necessary.

5.4 Foundations

Where there is only a shallow thickness of made ground, such as in the west and south east of the site, it is considered that reinforced strip or trench fill foundations can be used, dependant of proposed ground and finished floor levels. Around 25% of the site could therefore use this foundation type. The reinforcement is provided due to the local variations in the composition of the weathered sandstone between gravel and sandy gravel.

Depending on proposed ground levels, additional areas of the site could also use this type of foundation, where ground levels are reduced from existing, for example.

The footings would need to be taken through any made and soft ground and into the stiff clay or sandstone at a minimum depth of 900 mm below original or finished ground level whichever is the lowest. Wherever existing or removed trees are within influencing distance of the foundation, these will need to be deepened in accordance with NHBC Chapter 4.2 Standards, and heave precautions should be included where the footing depth due to trees exceeds 1500 mm.

Where coal is present in the base of a footing, that footing would need to be deepened until competent clay/mudstone is exposed in the base. Any coal that is exposed in the sides of footings should be blinded off, using a lean mix of concrete.

Due to the depth and variability of the made ground across the remaining 75% of the site, piled foundations are considered suitable for the proposed plots. Piles should be taken down to competent bedrock at depths of up to approximately 6 m below existing level. Heave protection should be included where the piled plots are within influencing distance of trees.

5.5 Ground Slabs

Due to the depth of made ground, and the local inclusion of slag material, it is recommended that precast concrete floors are used in all plots with a minimum 250 mm void below to accommodate any potential ground heave due to expansion of the slag, although the risk of heave is considered to be fairly negligible.

The use of precast floors would also satisfy the requirement of 'Amber 1' gas protection, which the gas monitoring confirms to be required. The results of the gas monitoring are discussed in Section 6.2.

5.6 Retaining Structures

Depending on the proposed finished levels across the site, significant regrading of the ground may be required, and retaining walls or embankments may also be needed. The construction of retaining structures will be dependent on the specific details and ground conditions in each location, but any retaining walls that are required will need to be founded on competent material. Therefore, in some areas of the site, it is possible that retaining walls will require piled foundations.

5.7 Superstructure Precautions

No additional superstructure precautions are considered necessary due to the ground conditions encountered on the site at this stage. Allowance should be made to incorporate masonry reinforcement within any plots located above the mine entry in the west of the site, if this is found to be within influencing depth of foundations.

5.8 Excavation Problems

The sides of excavations may be unstable, particularly where the deep, relatively loose granular made ground was encountered. Excavations should be possible using conventional plant, although a breaker could be required for deeper trenches within the shallow sandstone bedrock.

Temporary support will be required in accordance with current Health & Safety Regulations wherever access is required to trenches deeper than 1.2 m, or less where there is risk of collapse.

5.9 Obstructions

TP6 encountered a buried structure, comprising intact brickwork, TP7 encountered an old clay pipe at 1.4 m, TP9 encountered a concrete obstruction at 0.8 m depth and TP10 encountered a possible backfilled drainage run comprising cobbles of limestone. As such, localised

obstructions may be encountered comprising old foundations associated with the former buildings occupying the site, and redundant service runs which may comprise culverts and surface water drains. However, it is expected that such features can be easily removed where necessary.

5.10 Roads

A CBR value of at least 2% is expected to be appropriate for road design on the shallow made ground. It is recommended that this value is used as a guide only and that full scale CBR tests are undertaken along roadways prior to construction so that accurate values can be obtained to satisfy the Local Authority. We also recommend that a contingency for removing and infilling local soft spots is allowed.

The ground should be assumed to be frost susceptible and therefore a minimum construction thickness of 450 mm will apply.

5.11 Surface Water Drainage

Infiltration tests were carried out within TP1B and TP7, within the natural sandy clay at 2.7 m and 2.9 m bgl and within the natural sandstone bedrock within TP9 and TP10 at 1.4 and 1.8 m bgl.

The infiltration rates are summarised below:

Infiltration Rates			
Hole ID	Test	BR365 Infiltration Rate ($\times 10^{-6}$ m/s)	Average Infiltration Rate ($\times 10^{-6}$ m/s)
TP7/SA1	Test 1	n/a	n/a
TP1B/SA2	Test 1	n/a	1.9
TP9/SA3	Test 1	75	85
TP10/SA4	Test 1	1200	1200
	Test 2	1000	1000

The soakaway pit logs, test results and infiltration calculations are provided within Appendix 4.

The results were variable, with tests undertaken in the western, highest area of the site draining rapidly, but tests in the lower eastern area being unsuccessful. It is unlikely that any possible viable development layout could be brought forward to provide falls for drainage runs to the western end of the site, with the lowest ground being in the east where the impermeable soils

are located. The presence of deep made ground across the northern half of the site also makes infiltration drainage unviable due to the potential for settlement to occur.

Based on the test results obtained, we do not consider that soakaways will be a suitable means of dealing with surface water from the site. The site is understood to currently drain by gravity into the local sewer network, with the site currently being predominantly hard surfaced. We consider that it should be acceptable to retain this connection, although some additional attenuation may be required.

6.0 CONTAMINATION APPRAISAL

6.1 Source Characterisation

This section of the report documents the works undertaken to obtain information to test and refine the outline conceptual model enabling a risk assessment to be produced and, where significant risks are expected, remediation recommendations.

6.2 Gas Precautions

Deep made ground up to around 4.6 m has been recorded on site. Materials within the made ground included industrial waste and a limited amount of timber, which could potentially cause a risk of gas generation to the site.

Two monitoring wells were installed in the cable percussive boreholes. One of these was installed within the area of deep made ground on the site, and the other in the west to target the former colliery spoil heaps to the west of the site.

In accordance with CIRIA document C665, the risk of general made ground producing significant concentrations of gas is considered to be low to moderate. It was therefore considered that six rounds of gas monitoring over a period of at least 3 months would be appropriate for the site.

The first visit was undertaken on 28 July 2017 with five further visits being undertaken during or after period of low or falling atmospheric pressure. The atmospheric pressured were monitored using the BBC weather service. The final visit was completed on 16 November 2017. The following results have been recorded:

- Methane – all concentrations noted to be 0% by volume in all locations on all monitoring occasions;
- Carbon dioxide – concentrations of between 0.6 and 9.5% were recorded, the highest concentrations tending to be recorded in BH3;
- Oxygen – concentrations between 9.8% and 20.7%; and
- Flow – flow rates of between -0.3 and 0.1 l/hr were recorded.

Copies of the results are included within Appendix 6.

Gas screening values (GSVs) have been calculated for both methane and carbon dioxide, based on a maximum borehole flow of 0.1 l/hr. For methane, the GSV is 0 l/hr (0.1 l/hr x 0.0%), and for carbon dioxide, the GSV is 0.0098 l/hr (0.1 l/hr x 9.8%).

The development is expected to be classified as Situation B in accordance with the CIRIA guidance in that it will be developed with low rise residential properties which will have a ventilated sub floor void. This approach of risk assessment uses a traffic light system of risk, to determine the level of protection required in new dwellings.

The GSV for methane is below all applicable threshold values.

The GSV for carbon dioxide also falls below the relevant threshold value for classification as 'green' of 0.78 l/hr. However, the maximum recorded gas concentration of 9.8% exceeds the typical maximum concentration stated in the CIRIA guidance (5% v/v), and therefore it is considered appropriate to increase the classification to 'Amber 1'. The maximum concentration of carbon dioxide is approaching the upper threshold of this classification, but given the lack of any significant gas flow, it is considered appropriate to maintain the Amber 1 classification.

Therefore, all plots on the site will require a fully lapped and sealed proprietary gas resistant membrane which is continuous across the floor to the external leaf of brickwork, with all service penetrations being sealed. In addition, a precast concrete floor with underlying ventilated void will also be required.

6.3 Unexpected Contamination

A slight sulphurous odour was recorded within the ironworks type made ground between 0.6 and 1.6 m in TP1 and a slight hydrocarbon odour was noted within TP7 between 1.0 and 1.1 m depth and TP12 between 0.4 and 0.6 m depth.

Several of the trial pits in the east of the site, TP1, TP1B, TP2, TP4, TP5 and TP7, encountered cobbles of slag within the upper 1.5 m of made ground.

No other visual or olfactory evidence of possible significant contamination was identified.

6.4 Chemical Testing

Fourteen samples of the made ground and four samples of natural ground were sent for chemical testing. Each of the samples were analysed for the suite of contaminants listed below:

Contaminant Type	Actual Contaminants
Metals/Metalloids	Arsenic, cadmium, chromium (III and VI), lead, mercury, nickel, selenium, copper and zinc
pH	pH
PAHs	Speciated Polycyclic Aromatic Hydrocarbons
Sulphates	Acid soluble sulphate, water soluble sulphate and sulphur.

Additionally, the following testing was undertaken:

- Asbestos screen on ten samples of made ground;
- Fully fractionated petroleum hydrocarbons (TPH CWG) on two samples of made ground; and
- Total organic carbon (TOC) on five samples of made ground.

A copy of the test results is included in Appendix 5.

6.5 Assessment Criteria

The proposed development of the site is likely to be residential with private gardens and public open space. Therefore the assessment criteria relating to residential with home-grown produce have been used. Tables detailing the relevant assessment concentrations used are included in Appendix 5.

6.6 Chemical Test Results

Some preliminary risk assessment is undertaken in this section of the report where determinants can be readily discounted.

6.6.1 Made Ground

Colliery Spoil

Two samples of the colliery spoil were tested, TP3 at 1.2 m and TP7 at 1.1 m bgl. A TOC of 7.5% was recorded from one sample, equating to 12.9% soil organic matter (SOM). Assessment criteria derived using 6% SOM have therefore been used in this assessment. No elevated levels of any of the contaminants tested for were recorded.

Demolition Rubble

Six samples of the demolition rubble were sent for chemical testing, TP1 0.3 m, TP3 0.6 m, TP6 0.8 m, TP8 0.4 m, TP10 0.7 m and TP11 0.4 m. A TOC of 6.65% was recorded from two

samples of the made ground, equating to 11.6% soil organic matter (SOM). Assessment criteria derived using 6% SOM have therefore been used in this assessment.

The following samples recorded a number of elevated concentrations in relation to human health:

Determinant	Assessment Value (mg/kg)	Elevated Concentration (mg/kg)		Modified/Corrected Mean (mg/kg)
		TP1, 0.3 m	TP10, 0.7 m	
Lead	200	590	-	199
Dibenz(a,h)anthracene	0.3	-	1.0	0.56
Benzo(b)fluoranthene	3.7	-	11	6.64
Benzo(a)pyrene	3.0	-	8.9	5.17

One sample, TP1 at 0.3 m also recorded an elevated concentration of zinc of 820 mg/kg compared to the phytotoxicity assessment value of 300 mg/kg for plant uptake.

Iron Works Waste

Three samples were tested from TP1 0.8 m, TP2 0.6 m and TP5 1.0 m. A TOC of 16.45% was recorded from two samples of the made ground, equating to 28.3% soil organic matter (SOM). Assessment criteria derived using 6% SOM have therefore been used in this assessment.

The following samples recorded a number of elevated concentrations in relation to human health:

Determinant	Assessment Value (mg/kg)	Elevated Concentration (mg/kg)			Modified/Corrected Mean (mg/kg)
		TP1, 0.8 m	TP5, 1.0 m	TP2, 0.6 m	
Arsenic	37	41	-	74	91.34
Lead	200	400	-	-	644
Dibenz(a,h)anthracene	0.3	0.91	0.37	-	1.16
Benzo(b)fluoranthene	3.7	11	5.9	-	14.68
Benzo(a)pyrene	3.0	8.8	4.8	-	11.82

One sample, TP1 at 0.8 m also recorded an elevated concentration of zinc of 530 mg/kg compared to the phytotoxicity assessment value of 300 mg/kg for plant uptake.

Other Made Ground

One sample of reworked clay, collected from TP2 at 1.1 m bgl, recorded elevated concentrations of 3.4 mg/kg for benzo(b)fluoranthene and 2.5 mg/kg for benzo(a)pyrene compared to the assessment values of 2.6 and 2.2 mg/kg respectively (assuming 1% SOM).

One sample of the sandstone backfill made ground from TP8 at 1.5 m was tested and did not record any concentrations of contaminants which exceeded their respective residential end use values.

One sample of limestone gravel from TP12 at 0.5 m recorded some TPH fractions that exceeded the 1% SOM assessment values. The results are summarised below:

TPH Fraction	Assessment Value (mg/kg)	Elevated Concentration (mg/kg)
		TP12, 0.5 m
Aliphatic >C8-C10	27	35
Aliphatic >C10-C12	130	240
Aromatic >C10-C12	74	83
Aromatic >C12-C16	140	370

None of the samples of made ground detected any asbestos containing material.

6.6.2 Natural Ground

Four samples of the natural ground were tested from TP1 2.3, TP7 2.7, TP11 1.6 and TP12 1.0 m.

One of the samples, TP11 at 1.6 m recorded an elevated concentration of arsenic of 66 mg/kg compared to the assessment value of 37 mg/kg.

No other elevated concentrations were recorded.

6.6.3 Sulphates

The site has been taken as a brownfield location in relation to the Aggressive Chemical Environment for concrete classifications, and groundwater is considered to be mobile.

Made Ground

Fourteen samples of the made ground were tested. The samples recorded total potential sulphate concentrations of between 0.075 and 1.62%, and water soluble sulphate concentrations of between less than 10 and 210 mg/l. pH values ranged between 7.5 and 10.1.

Natural Ground

Four samples of natural ground were tested. The samples recorded total potential sulphate concentrations of between 0.45 and 2.58%, and water soluble sulphate concentrations of between less than 10 and 27 mg/l. pH values ranged between 4.7 and 7.6.

6.7 Significant Pollutant Linkages

The significant pollutant linkages identified are documented in the table below:

Source	Pathway	Receptor
PAHs, TPH and heavy metals/metalloids within the made ground.	- Inhalation, ingestion, direct contact. - Root Uptake.	- Future residents and visitors to the site. - Construction workers. - Plants. - Secondary A aquifer. - Water supply pipes.
Localised elevated levels of arsenic within the natural ground.	- Inhalation, ingestion, direct contact - Root Uptake.	- Future residents and visitors to the site. - Construction workers. - Plants. - Secondary A aquifer. - Water supply pipes.
Sulphates in made ground and natural ground.	Direct contact.	Buried concrete structures.
Elevated concentrations of Carbon Dioxide.	Upward Migration into buildings.	- Future residents and visitors to the site. - Buildings.

7.0 RISK ASSESSMENT

7.1 Human Health: Future Site Users

Made Ground

Elevated concentrations of arsenic, lead and various PAH compounds were recorded in approximately half of the samples of made ground. One sample, TP12 at 0.5 m, also recorded elevated concentrations of a number of TPH fractions. The levels recorded were generally only slightly elevated, at around 2 to 3 times the respective assessment values. It is therefore not considered necessary to remove this material from site, and that the potential risk to the health of future residents and visitors can be mitigated through the use of a cover system.

Therefore, where made ground is to remain below gardens and soft landscaped areas, a minimum 600 mm thick clean capping layer is recommended. This will need to include at least 100 mm of topsoil. It would also be prudent to place a geotextile membrane at the base of the capping layer to separate the clean material from the underlying soils.

Suitable topsoil and subsoil will need to be imported to site.

Natural Ground

One sample of the natural ground recorded an elevated concentration of arsenic. An average concentration of 27 mg/kg is calculated from all of the natural ground samples which is below the assessment value for human health.

It is unlikely that this single elevated result will present a significant risk to human health. The soil guideline values and generic assessment criteria are based on a comparison of predicted human exposure against a health criteria value. For example, the health criteria value for arsenic is based on epidemiological studies of people exposed via drinking water. Sequestration as a result of adsorption, partitioning, and/or chemical bonding as well as its potential presence in discrete mineral phases however, is likely to mean that the arsenic will be more tightly bound within the soil in comparison to the medium of the exposure study. The soil guideline value for arsenic also assumes that all of the contaminant is bioavailable referring to the fraction of the arsenic that can be absorbed by the human body through the gastrointestinal system, the pulmonary system and the skin. In reality, this is generally not the case and the soil guideline value is therefore conservative. The use of a physiology based extraction test (PBET) would enable a site specific assessment value to be derived, and this would be expected to indicate that the levels recorded are not significantly high. It is not proposed at this stage that the PBET is undertaken, however, but based on the anticipated result, a significant risk to human health

from this isolated exceedance would not be anticipated, and specific remedial works should not be required.

In any case, some made ground is expected to remain in the affected area, and therefore the 600 mm thick capping layer proposed above would also be provided in this area, and this would mitigate any potential risk to human health in any case.

7.2 Human Health: During Construction

Ground workers employed during the construction phase of the development are most at risk of harm due to them having direct contact with the affected soils. However, the contact is generally of short duration, and all competent ground workers will be aware of the potential risks associated with the made ground soils. Therefore, the overall risk to the health of construction workers is considered to be low.

All ground workers employed on the site should be made aware that elevated concentrations of heavy metals and PAHs are present. Normal site procedures, such as the wearing of gloves when handling soils and the washing of hands prior to eating, should be implemented at all times, plus any additional protective measures deemed appropriate.

7.3 Plants

Elevated concentrations of phytotoxic metals such as arsenic, lead and zinc are present within the made ground and therefore a potential risk to plant growth is presented. The made ground will be capped with at least 600 mm of clean material including minimum 100 mm of topsoil which will provide a suitable growing medium for plants. This will mitigate any potential risk to plants.

7.4 Ground Gas

As discussed in Section 6.2, six rounds of gas monitoring have been carried. The results have recorded no methane, but a maximum concentration of 9.8% carbon dioxide and a maximum flow rate of 0.1 l/h.

Based on the gas screening values and maximum gas concentrations recorded in the boreholes, the site is considered to comply with Amber 1 classification in accordance with CIRIA C665/NHBC guidance. Therefore Amber 1 gas precautions should be incorporated into all plots, which include a fully lapped and sealed proprietary gas membrane and a minimum 150 mm ventilated void beneath the ground floor slab.

7.5 Controlled Waters

Although samples of the made ground recorded elevated concentrations of contaminants at depth, only one sample of the natural ground recorded an elevated concentration of arsenic. However, the natural ground comprises clay and it is therefore unlikely that any contamination will be able to leach into the underlying Secondary A aquifer. It is therefore considered that a significant risk to controlled waters is not presented from the made ground soils on site.

7.6 Construction Materials

Taking the three highest concentrations for total potential sulphate, a characteristic value of 1.05% is calculated for the made ground indicating that DS-3, AC-3 conditions apply for concrete in contact with all made ground types.

One sample of the natural ground, TP11 1.6 m, recorded a total potential sulphate concentration of 2.58% whereas the other three results recorded values between 0.45 and 0.93%. It is considered likely that this result is spurious, perhaps due to the inclusion of deleterious material within the sample, such as a fragment of coal, or similar. Excluding the result from TP11, the natural ground can be assigned a design sulphate class of DS-3, with an ACEC of AC3z.

It is recommended the chemical test results are forwarded to the water supply company, for assessment of whether protective water supply pipes are needed. Due to the localised presence of PAHs and TPH, it is possible that protective measures will be required for potable water supplies.

7.7 Unexpected Contamination

As with any brownfield site, there is the possibility that areas more significantly contaminated than identified to date may be present. Any unusual, brightly coloured, ashy or odorous material, or material suspected of containing asbestos encountered during the construction phase should be brought to the attention of the site staff and investigated.

7.8 Disposal of Material

If material needs to be removed, it should to be taken to a suitably licensed landfill or waste treatment facility. The costs of disposal and landfill tax can be substantial. The disposal of material should therefore be seen as a last resort with options such as treatment and reuse either on-site or off-site considered where possible.

The category of landfill which can accept the waste (inert, non-hazardous or hazardous) would need to be determined and will also have a significant effect on the costs. Additional testing may be required by the landfill operator and the acceptance of material is generally at their discretion.

Any macadam surfacing may contain coal tar and this should be tested at an early stage to ensure that it can be dealt with.

Appendix 1

Exploratory Hole Location Plan – Drawing 40492/001A



INFORMATION WITHIN THIS DRAWING IS NOT NECESSARILY PRODUCED TO SCALE.
ALWAYS USE FIGURED DIMENSIONS AND CO-ORDINATES - IF IN DOUBT, ASK.



KEY:

Approximate location of trial pits excavated by Eastwood & Partners between 13 & 14 July 2017.

Approximate location of trial pit with incorporated soakaway test carried out on 14 July 2017.

Approximate location of cable percussive borehole drilled by Eastwood & Partners between 14 & 15 July 2017. I Denotes gas monitoring well installed.

Approximate location of rotary borehole drilled by Eastwood & Partners between 25 & 26 July 2017.

(1.9+)

Denotes depth to made ground (m).

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COMPANY SHOP

NEW ROAD, TANKERSLEY, SHEFFIELD

EXPLORATORY HOLE LOCATION PLAN

A	First Issue.					
REV	DESCRIPTION			SIG	CHK	DATE
SCALE WHEN PLOTTED AT A3			DRAWING STATUS			
1:750			INFORMATION			
DRAWN	CHECKED	DATE	DRAWING NUMBER		REV	
RH	SRI	28.07.17	41492/001		A	

Appendix 2

Trial Pit Logs – TP1 to TP12
Cable Percussive Logs – CP1 to CP3
Rotary Borehole Logs – R1 to R10
Photographs of Trial Pits

Project Name
New Road

Project No.
41492

Co-ords: -
Level: 133.43 m AOD

Date
12/07/2017

Location: Tankersley

Dimensions: -

Scale
1:25

Client: Company Shop

Depth
2.60m

Logged By
AJK

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.30	D					Grass over MADE GROUND: Brown and grey gravelly SAND with clay lumps. Gravel is fine to coarse, angular of brick, much glass fragments, sandstone cobbles, ash and glass bottles.	
0.80	D		0.60	132.83		MADE GROUND: Dark grey/black loose ashy gravelly SAND. Gravel is fine to coarse, angular of slag, plastic sheet, clay lumps. (Slight sulphur odour)	1
1.60	IPP 1	150	1.60	131.83		Stiff brown sandy slightly friable CLAY with rare gravel of mudstone and coal fragments.	
1.60	IPP 2	190					
1.60	IPP 3	160					
1.80	D						
1.90	D		2.00	131.43		Stiff grey sandy friable CLAY with gravel of thinly laminated mudstone and coal fragments. (weathered mudstone)	2
			2.20	131.23		Brown very friable clayey SAND with sandstone/siltstone gravel	
2.30	D		2.50	130.93		Grey SANDSTONE recovered as fine grained angular gravel and cobbles.	
			2.60	130.83		Trialpit Complete at 2.60 m	3
							4

Remarks: Difficult to progress at base of pit.

Groundwater: None encountered



Project Name
New Road

Project No.
41492

Co-ords: -
Level: 133.80 m AOD

Date
12/07/2017

Location: Tankersley

Dimensions: -

Scale
1:25

Client: Company Shop

Depth
2.70m

Logged By
SRI

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.05			0.05	133.75		TOPSOIL/MADE GROUND: Dark brown gravelly SAND	1
						MADE GROUND: Grey/black ashy gravelly SAND with low cobble content Gravel and cobbles are angular of brick fragments, coal, clinker, concrete, sandstone, glass, ceramics and rare slag.	
1.30			1.30	132.50		MADE GROUND: Brown silty slightly sandy GRAVEL with occasional cobbles. Gravel and cobbles are angular of sandstone	2
1.90			1.90	131.90		Orange/brown slightly sandy gravelly CLAY. Rare iron nodules present from 2.5 m Lense of wet soft sandy clay from 2.1 to 2.2 m.	
2.70			2.70	131.10		Trialpit Complete at 2.70 m	3
							4

Remarks:

Groundwater: None encountered



Project Name
 New Road

Project No.
 41492

Co-ords: -
 Level: 135.49 m AOD

Date
 12/07/2017

Location: Tankersley

Dimensions: -

Scale
 1:25

Client: Company Shop

Depth
 2.30m

Logged By
 AJK

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.60	D		0.15	135.34		Turf over Dark brown sand with rootlets	
			0.40	135.09		MADE GROUND: Brown moderately loose gravelly SAND with high cobble content. Gravel and cobbles are angular of sandstone	
			0.90	134.59		MADE GROUND: Dark brown/grey/black ashy gravelly SAND. Gravel is fine to coarse, angular of sandstone, clinker, coal, rare slag, slate and rare macadam fragments.	
1.10	D					MADE GROUND: reworked firm dull brown sandy friable CLAY with occasional cobbles of sandstone and occasional pockets of ashy made ground.	1
1.80	IPP 1	170	1.80	133.69		Pale brown/ mottled grey sandy friable CLAY with mudstone gravel	2
1.80	IPP 2	200					
2.00	D						
			2.30	133.19		Trialpit Complete at 2.30 m	
							3
							4

Remarks: Difficult to progress further at base.

Groundwater: None encountered



Project Name
New Road

Project No.
41492

Co-ords: -
Level: 134.90 m AOD

Date
12/07/2017

Location: Tankersley

Dimensions: -

Scale
1:25

Client: Company Shop

Depth
3.80m

Logged By
SRI

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.10	D					MADE GROUND: Brown gravelly SAND. Gravel is fine to coarse, angular of brick, sandstone and macadam gravel.	
0.50	D		0.40	134.50		MADE GROUND: Brown sandy gravel and cobbles of concrete and sandstone	
			0.80	134.10		MADE GROUND: Dark brown gravelly sandy CLAY with low cobble content. Gravel and cobbles are angular of brick, sandstone and concrete.	
1.30	D		1.00	133.90		MADE GROUND: Brown/grey slightly clayey GRAVEL with medium cobble content. Gravel and cobbles are angular of sandstone, mudstone and occasional nodules of iron. (colliery spoil) Orange/grey clay lumps recovered from around 2.4 m	1
2.90	D		2.80	132.10		MADE GROUND: Firm dark grey slightly sandy, silty CLAY with vegetative fragments. Lense of wet clayey sand around 3.0 m depth.	3
			3.40	131.50		Brown/grey gravelly CLAY with low cobble content. Gravel is angular of moderately weak sandstone.	
3.70	D		3.80	131.10			
						Trialpit Complete at 3.80 m	4

Remarks:

Groundwater: None encountered



Project Name
 New Road

Project No.
 41492

Co-ords: -
 Level: 135.94 m AOD

Date
 12/07/2017

Location: Tankersley

Dimensions: -

Scale
 1:25

Client: Company Shop

Depth
 3.90m

Logged By
 AJK

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.05			0.05	135.89		MADE GROUND: Limestone gravel	
0.40	D					MADE GROUND: Medium dense brown and grey clayey very gravelly SAND. Gravel is fine to coarse, angular of brick, andstone, macadam, rare timber, coal fragments, clay and some pea gravel.	
0.80			0.80	135.14		MADE GROUND: Grey/brown very sandy gravelly CLAY. Gravel is fine to coarse, angular of mudstone and rare ironstone nodules (colliery spoil).	1
1.20	D						
3.00			3.00	132.94		MADE GROUND: Orange/brown moderately loose gravelly SAND with high cobble content. Gravel and cobbles are angular, tabular of sandstone.	3
3.90			3.90	132.04		Trialpit Complete at 3.90 m	4

Remarks:

Groundwater: None encountered



Project Name

New Road

Project No.

41492

Co-ords: -

Level: 138.36 m AOD

Date

12/07/2017

Location: Tankersley

Dimensions: -

Depth

2.50m

Scale

1:25

Client: Company Shop

Logged By

AJK

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.30	D		0.10	138.26		MADE GROUND: Macadam	
			0.11	138.25		MADE GROUND: Yellow sandy GRAVEL (Type 1).	
0.90	D					MADE GROUND: Brown grey gravelly SAND with medium cobble content. Gravel is fine to coarse, angular of sandstone, brick, clinker, limestone, rare timber, occasional roots/rootlets, metal, slag and burnt brick.	1
1.30	D		1.20	137.16		MADE GROUND:Black loose ash ith coal and clinker gravel	
			1.40	136.96		MADE GROUND: Brown gravelly SAND with medium cobble content. Gravel and cobbles are angular of sandstone.	
2.00	D						2
			2.50	135.86		Trialpit Complete at 2.50 m	3
							4

Remarks:

Groundwater: None encountered



Project Name
New Road

Project No.
41492

Co-ords: -
Level: 136.93 m AOD

Date
12/07/2017

Location: Tankersley

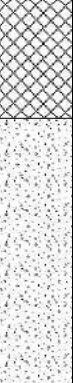
Dimensions: -

Scale
1:25

Client: Company Shop

Depth
3.20m

Logged By
AJK

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.05	D		0.05	136.88		MADE GROUND: Macadam	
			0.15	136.78		MADE GROUND: Brown gravelly SAND (MOT Type 1)	
0.50	D					MADE GROUND: Brown compact very gravelly, locally ashy SAND. Gravel is fine and medium, angular of brick, sandston, occasional clinker, coal and rare slag	
1.00	D						1
1.70	D		1.50	135.43		MADE GROUND: Brown and grey very sandy gravelly CLAY. Gravel is fine to coarse, abgular of flaggy fine grained thinly bedded sandstone.	
			1.90	135.03		MADE GROUND: Dark brown gravelly SAND. Gravel is fine, angular of brick and sandstone. (Possible relic topoil)	
			2.30	134.63		Pale brown gravelly SAND with occasional cobbles. Gravel and cobbles are angular, tabular of sandstone	3
			3.20	133.73		Trialpit Complete at 3.20 m	4

Remarks: Hard to progress at base of pit

Groundwater: None encountered



Project Name
New Road

Project No.
41492

Co-ords: -
Level: 138.78 m AOD

Date
12/07/2017

Location: Tankersley

Dimensions: -

Scale
1:25

Client: Company Shop

Depth
3.00m

Logged By
AJK

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.50	D		0.10	138.68		MADE GROUND: Macadam	
			0.40	138.38		MADE GROUND: Brown sandy gravel of sandstone. (MOT Type 1)	
0.80	D					MADE GROUND: Black/brown ashy gravelly compact SAND. Gravel is fine to coarse, angular of sandstone, brick, coal, rare metal, clinker, tarmac and rare plastic with local clay inclusions. Intact brickwork in side of pit from 0.6 to 1.0 m.	1
2.20	D		2.00	136.78		MADE GROUND: Brown moderately loose clayey SAND and gravel with medium cobble content. Gravel and cobbles are angular, tabular of sandstone	2
			3.00	135.78		Trialpit Complete at 3.00 m	3
							4

Remarks:

Groundwater: None encountered



Project Name
New Road

Project No.
41492

Co-ords: -
Level: 137.46 m AOD

Date
12/07/2017

Location: Tankersley

Dimensions: -

Scale
1:25

Client: Company Shop

Depth
2.90m

Logged By
SRI

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.30	D		0.10	137.36		MADE GROUND: Macadam	
			0.20	137.26		MADE GROUND: Yellow/brown sandy GRAVEL and cobbles of sandstone (Type 1)	
						MADE GROUND: Yellow sandy GRAVEL and cobbles of limestone (Type 1)	
0.80	D		0.50	136.96		MADE GROUND: Dark grey/black slightly sandy ashy GRAVEL with medium cobble content. Gravel and cobbles are angular of, coal, brick, clay lumps, rare metal and slag.	
1.10	D		1.00	136.46		MADE GROUND: Orange/grey/brown gravelly CLAY. Gravel is fine to coarse, angular of mudstone and sandstone Slight hydrocarbon odour between 1.0 and 1.1 m depth.	1
2.10	D						
			2.10	135.36		Possible MADE GROUND: Firm orange/brown CLAY with occasional gravel of sandstone and coal.	
			2.30	135.16		Stiff grey/orange CLAY with rare gravel and cobbles of sandstone.	
2.50	IPP 1	300					
2.50	IPP 2	250					
2.50	IPP 3	300					
2.70	D						
			2.90	134.56		Trialpit Complete at 2.90 m	3
							4

Remarks: Clay pipe hit at 1.4 m

Groundwater: None encountered



Project Name
New Road

Project No.
41492

Co-ords: -
Level: 137.82 m AOD

Date
12/07/2017

Location: Tankersley

Dimensions: -

Scale
1:25

Client: Company Shop

Depth
3.20m

Logged By
SRI

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.40	D					MADE GROUND: One side of pit - reinforced concrete Other side of pit - Brown gravelly soil with medium cobble content. Gravel and cobbles of concrete, brick, sandstone, macadam gravel. Rare boulders of concrete recovered.	1
1.20			1.20	136.62		MADE GROUND: Dark grey ashy gravelly SAND. Gravel is fine to medium, angular of clinker, brick, coal	
1.30			1.30	136.52		MADE GROUND: Orange/yellow sandy GRAVEL with high cobble content. Gravel and cobbles are angular of sandstone	
1.50	D						2
							3
			3.20	134.62		Trialpit Complete at 3.20 m	4

Remarks:

Groundwater: None encountered



Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
0.30	D		0.05	138.13		MADE GROUND: Macadam
			0.15	138.03		MADE GROUND: Yellow sandy gravel and cobbles of limestone (type 1)
			0.40	137.78		MADE GROUND: Dark grey slightly sandy slightly clayey slightly ashy GRAVEL. Gravel is fine to coarse, angular of brick, sandstone and macadam
0.80	D					MADE GROUND: Brown sandy slightly clayey GRAVEL. Gravel is fine to coarse, angular of brick, concrete, sandstone and occasional metal. (Made ground reached 1.4 m at one side of pit)
			0.90	137.28		Obstruction down northern side of pit - concrete slab at 0.8 m depth over sandstone.
			1.40	136.78		Yellow moderately strong SANDSTONE recovered as angular gravel and cobbles.
						----- Trialpit Complete at 1.40 m -----



Project Name
New Road

Project No.
41492

Co-ords: -
Level: 138.75 m AOD

Date
12/07/2017

Location: Tankersley

Dimensions: -

Scale
1:25

Client: Company Shop

Depth
1.80m

Logged By
SRI

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.20	D		0.10	138.65		MADE GROUND: Macadam	
						MADE GROUND: Yellow sandy GRAVEL and cobbles of limestone (Type 1)	
0.25	138.50			MADE GROUND: dark brown/grey slightly ashy GRAVEL. Gravel is fine to coarse, angular of brick, wood, clinker, macadam, limestone and rare metal			
0.70	D		0.85	137.90		MADE GROUND: Yellow/brown sandy GRAVEL with medium cobble content. Gravel and cobbles are of angular sandstone	1
1.30	D		1.20	137.55		MADE GROUND: Dark grey ashy sandy GRAVEL. Gravel is fine to coarse, angular of, coal and brick fragments	
			1.50	137.25		Yellow moderately strong SANDSTONE recovered as slightly sandy angular gravel and cobbles.	
			1.80	136.95			
Trialpit Complete at 1.80 m							2
							3
							4

Remarks: Obstruction down one end of pit comprising cobbles of sub-rounded limestone between 0.25 and 1.5 m bgl.

Groundwater: None encountered



Project Name
New Road

Project No.
41492

Co-ords: -
Level: 138.70 m AOD

Date
12/07/2017

Location: Tankersley

Dimensions: -

Scale
1:25

Client: Company Shop

Depth
3.40m

Logged By
SRI

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.40	D		0.10	138.60		MADE GROUND: Macadam	
			0.20	138.50		MADE GROUND: Yellow sandy GRAVEL and cobbles of limestone (Type 1)	
						MADE GROUND: Brown clayey slightly sandy GRAVEL. Gravel is fine to coarse, angular of sandstone, brick, coal and limestone	
0.90	D		0.75	137.95		Black GRAVEL of angular coal.	1
1.60	D		1.50	137.20		Stiff grey gravelly CLAY with low cobble content. Gravel is angular of weak mudstone and coal	
			1.70	137.00		Black GRAVEL of angular coal.	
2.50	D		2.10	136.60		Grey GRAVEL with medium cobble content. Gravel and cobbles are angular of weak mudstone and rare sandstone and coal	2
3.30	D		2.90	135.80		Grey weak GRAVEL. Gravel of weak shale/mudstone	3
			3.20	135.50		Brown MUDSTONE recovered as weak angular gravel	
			3.40	135.30		Trialpit Complete at 3.40 m	
							4

Remarks:

Groundwater: None encountered



Project Name
New Road

Project No.
41492

Co-ords: -
Level: 138.66 m AOD

Date
12/07/2017

Location: Tankersley

Dimensions: -

Scale
1:25

Client: Company Shop

Depth
3.00m

Logged By
SRI

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
Depth (m)	Type	Results					
0.30	D		0.10	138.56		MADE GROUND: Macadam	
			0.20	138.46		MADE GROUND: Yellow sandy GRAVEL and cobbles of limestone (Type 1)	
0.50	D		0.40	138.26		MADE GROUND: Brown slightly sandy gravelly CLAY. Gravel is fine to coarse, angular of brick, sandstone and limestone	
			0.60	138.06		MADE GROUND: Grey slightly sandy GRAVEL. Gravel is fine to coarse, angular of limestone. (slight hydrocarbon odour)	
1.00	D		0.80	137.86		MADE GROUND: Brown gravelly slightly ashy SAND. Gravel is fine to coarse, angular of coal, brick	
						Stiff orange/brown CLAY (dark grey band 0.05 m thick at 1.1 m and at 1.35 m)	
1.70	D		1.50	137.16		Grey GRAVEL of weak mudstone	
			1.90	136.76		Orange/brown GRAVEL with medium cobble content. Gravel and cobbles are angular to sub-rounded of shale/mudstone and iron nodules.	
2.70	D		3.00	135.66		Trialpit Complete at 3.00 m	

Remarks:

Groundwater: None encountered



Project Name
New Road

Project No.
41492

Co-ords: -

Hole Type
Cable

Location: Tankersley

Level: 135.75 m AOD

Scale
1:30

Client: Company Shop

Dates: 12/07/2017

Logged By
Drillers

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40	135.35		MADE GROUND: Hardcore over gravelly SAND. Gravel of brick, concrete and rubble	
		1.20 1.20	SPT SPTLS	N=14 N=14 (1,3,4,3,3,4)				MADE GROUND: Brown/grey sandy gravelly CLAY with sandstone gravel and cobbles.	1
		2.00 2.00	SPT SPTLS	N=12 N=12 (1,2,3,3,3,3)	2.20	133.55		MADE GROUND: Brown stiff gravelly CLAY	2
		3.00 3.00	SPT SPTLS	N=22 N=22 (4,6,5,5,5,7)	2.80	132.95		MADE GROUND: Gravel and cobbles of SANDSTONE	3
		3.90 4.10 4.35	SPT CPT CPT	50/70mm 70mm (25,50) 50/40mm 40mm (25,50) 50/30mm 30mm (25,50)	3.90 4.40	131.85 131.35		SANDSTONE	4
								End of Borehole at 4.41 m	5
			Type	Results					

Remarks: No groundwater encountered. Chiselling from 3.9 to 4.1 (30 minutes), then from 4.1 to 4.35 (30 minutes).



Project Name
New Road

Project No.
41492

Co-ords: -

Hole Type
Cable

Location: Tankersley

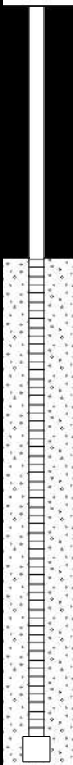
Level: 138.30 m AOD

Scale
1:30

Client: Company Shop

Dates: 13/07/2017

Logged By
Drillers

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10	138.20		MACADAM.	
								MADE GROUND: Hardcore over GRAVEL of brick, sand, coal, slag, concrete and rubble	
		1.10	SPT	N=28	1.00	137.30		MADE GROUND: Black SAND and GRAVEL of coal, slag, brick	1
		1.10	SPTLS	N=28 (1,1,6,9,7,6)					
		2.00	SPT	N=11	1.70	136.60		MADE GROUND: Brown/grey CLAY with orange bands and gravel of sandstone	2
		2.00	SPTLS	N=11 (4,2,2,3,4,2)					
		3.00	SPT	N=10					3
		3.00	SPTLS	N=10 (4,4,3,2,3,2)					
		4.00	SPT	N=16					4
		4.00	SPTLS	N=16 (2,3,4,4,4,4)					
		5.00	SPT	50/75mm	4.60	133.70		SANDSTONE.	5
		5.00	SPTLS	75mm (15,10,50)					
		5.60	SPT	50/30mm					
		5.70	CPT	30mm (25,50)	5.70	132.60			
				20mm (25,50)				End of Borehole at 5.74 m	
		Type	Results						

Remarks: Chiselled from 5.4m to 5.6m (30 mins) and from 5.6m to 5.7m (30 mins).

Project Name
 New Road

Project No.
 41492

Co-ords: -

Hole Type
 Cable

Location: Tankersley

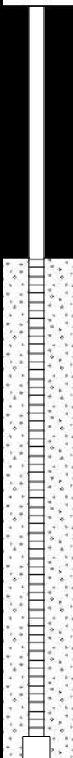
Level: 138.80 m AOD

Scale
 1:30

Client: Company Shop

Dates: 12/07/2017

Logged By
 Drillers

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
		0.10			0.10	138.70		MACADAM.	1
								MADE GROUND: Hardcore Gravel	
		0.40			0.40	138.40		MADE GROUND: Grey/black silty sandy gravelly clay with some gravel of coal	1
								Fine coal dust	
		1.10			1.10	137.70			2
		1.20	SPT	N=23					
		1.20	SPTLS	N=23 (2,3,5,5,6,7)					2
								Grey silty sandy gravelly CLAY with some coal gravel	
		1.50			1.50	137.30			3
								Brown SANDSTONE/MUDSTONE	
		2.00							3
		2.00	SPT	N=41					
			SPTLS	N=41 (4,11,6,10,12,13)					4
		2.70			2.70	136.10			
								MUDSTONE.	5
		3.00							
		3.00	SPT	50/80mm					4
			SPTLS	80mm (9,16,41,9)					
		4.00							5
		4.00	SPT	50/85mm					
			SPTLS	85mm (12,13,40,10)					5
		4.70			4.70	134.10			
								MUDSTONE.	5
		4.90							
		4.90	SPT	50/70mm					5
			SPTLS	70mm (25,50)					
		5.10							5
			SPT	50/70mm					
									5
		5.30							5
			CPT	50/75mm					
									5
		5.40			5.40	133.40		End of Borehole at 5.40 m	5

Remarks: Chiselled from 4.9m to 5.1m (30 mins) and from 5.1m to 5.3m (30 mins)



Remarks:

Project Name
New Road

Project No.
41492

Co-ords: -

Hole Type
Rotary

Location: Tankersley

Level: 135.90 m AOD

Scale
1:150

Client: Company Shop

Dates: 25/07/2017

Logged By
Drillers

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								SANDSTONE	1
									2
									3
									4
									5
									6
									7
					7.80	128.10		Grey MUDSTONE	8
									9
									10
					10.40	125.50		COAL	11
					11.50	124.40		Grey MUDSTONE	12
									13
									14
									15
									16
									17
									18
					18.60	117.30		SANDSTONE	19
									20
									21
									22
									23
									24
									25
									26
									27
									28
									29
		Type	Results					End of Borehole at 30.00 m	

Remarks:



Project Name
New Road

Project No.
41492

Co-ords: -

Hole Type
Rotary

Location: Tankersley

Level: 138.50 m AOD

Scale
1:150

Client: Company Shop

Dates: 25/07/2017

Logged By
Drillers

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								SANDSTONE	1
									2
									3
									4
									5
									6
									7
					8.30	130.20			8
								Grey MUDSTONE	9
									10
					10.20	128.30		COAL	11
									12
					11.40	127.10		Grey MUDSTONE	13
									14
									15
									16
									17
									18
					18.20	120.30		SANDSTONE	19
									20
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									85
									86
									87
									88
									89
									90
									91
									92
									93
									94
									95
									96
									97
									98
									99
									100

Remarks:

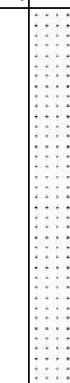
End of Borehole at 30.00 m



Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					8.20	130.30		SANDSTONE	1
									2
									3
									4
									5
									6
									7
									8
								Grey MUDSTONE	9
									10
									11
									12
									13
									14
									15
									16
									17
									18
									19
									20
									21
									22
									23
									24
									25
									26
									27
									28
									29
							Type	Results	



Project Name New Road	Project No. 41492	Co-ords: -	Hole Type Rotary
Location: Tankersley		Level: 137.75 m AOD	Scale 1:150
Client: Company Shop		Dates: 26/07/2017	Logged By Drillers

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					7.80	129.95		SANDSTONE	1
									2
									3
									4
									5
									6
									7
									8
									9
									10
									11
									12
									13
									14
									15
									16
									17
									18
									19
									20
									21
									22
									23
									24
									25
									26
									27
									28
									29

Remarks:



Project Name
New Road

Project No.
41492

Co-ords: -

Hole Type
Rotary

Location: Tankersley

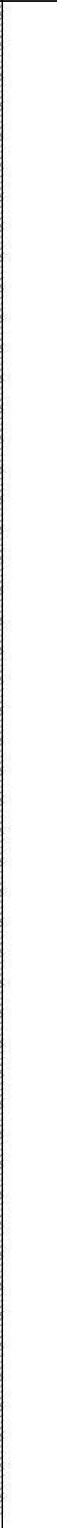
Level: 138.50 m AOD

Scale
1:150

Client: Company Shop

Dates: 26/07/2017

Logged By
Drillers

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								SANDSTONE	1
									2
									3
									4
									5
					5.90	132.60		COAL	6
					7.30	131.20		Grey MUDSTONE	7
									8
									9
									10
									11
									12
									13
									14
					15.60	122.90		SANDSTONE	15
									16
									17
									18
									19
									20
									21
									22
									23
									24
									25
									26
									27
									28
									29
		Type	Results					End of Borehole at 30.00 m	

Remarks:

Project Name
New Road

Project No.
41492

Co-ords: -

Hole Type
Rotary

Location: Tankersley

Level: 138.80 m AOD

Scale
1:150

Client: Company Shop

Dates: 26/07/2017

Logged By
Drillers

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								SANDSTONE	1
									2
					3.00	135.80		COAL	3
					4.40	134.40		Grey MUDSTONE	4
									5
									6
									7
									8
									9
									10
									11
									12
									13
					14.20	124.60		SANDSTONE	14
									15
									16
									17
									18
									19
									20
									21
									22
									23
									24
									25
									26
									27
									28
									29
		Type	Results					End of Borehole at 30.00 m	

Remarks:



Project Name
New Road

Project No.
41492

Co-ords: -

Hole Type
Rotary

Location: Tankersley

Level: 138.60 m AOD

Scale
1:150

Client: Company Shop

Dates: 26/07/2017

Logged By
Drillers

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description	
		Depth (m)	Type	Results					
								SANDSTONE	1
					2.10	136.50		COAL	2
					3.30	135.30		Grey MUDSTONE	3
									4
									5
									6
									7
									8
									9
									10
									11
									12
									13
					13.40	125.20		SANDSTONE	14
									15
									16
									17
									18
									19
									20
									21
									22
									23
									24
									25
									26
									27
									28
									29
		Type	Results					End of Borehole at 30.00 m	

Remarks:



TP1 – Made ground over natural clay from 1.6 m



TP5 – Made ground over natural sand from 2.3 m

Prepared	SRI	Checked	AJK	Date	13.07.17	Photograph No	1/2
----------	-----	---------	-----	------	----------	---------------	-----

E+P
Eastwood & Partners
 CONSULTING ENGINEERS

St Andrew's House
 23 Kingfield Road
 Sheffield S11 9AS
 Tel: (0114) 2554554 Fax: (0114) 2554330

COMPANY SHOP

NEW ROAD, TANKERSLEY

PHOTOGRAPHS OF TRIAL PITS



TP6 – intact brickwork between 0.6 and 1.0 m



TP9 – Sandstone bedrock from 0.9 m

Prepared	SRI	Checked	AJK	Date	13.07.17	Photograph No	3/4
----------	-----	---------	-----	------	----------	---------------	-----

E+P
Eastwood & Partners
 CONSULTING ENGINEERS

St Andrew's House
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 Sheffield S11 9AS
 Tel: (0114) 2554554 Fax: (0114) 2554330

COMPANY SHOP

NEW ROAD, TANKERSLEY

PHOTOGRAPHS OF TRIAL PITS



TP10 – Made ground over natural sandstone. Limestone cobbles make up a possible relict drainage run



TP11 – Made ground over coal separated by dirt bands.

Prepared	SRI	Checked	AJK	Date	13.07.17	Photograph No	5/6
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St Andrew's House
23 Kingfield Road
Sheffield S11 9AS
Tel: (0114) 2554554 Fax: (0114) 2554330

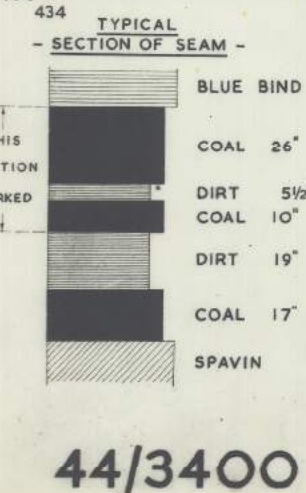
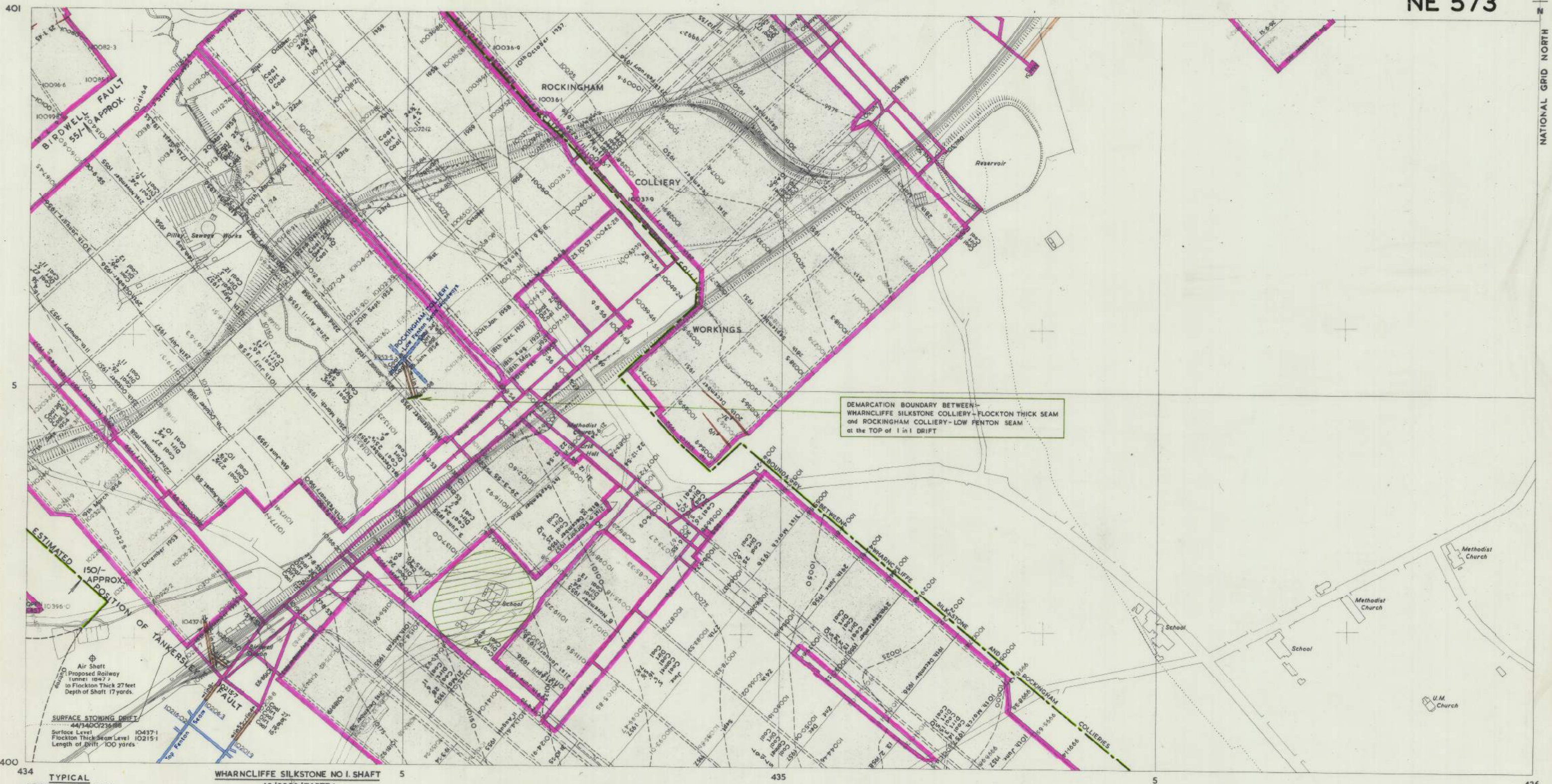
COMPANY SHOP

NEW ROAD, TANKERSLEY

PHOTOGRAPHS OF TRIAL PITS

Appendix 3

Coal Authority Mine Abandonment Plan Mine Entry Data Sheet



WHARNCLIFFE SILKSTONE NO. 1. SHAFT

43/3399/765774

SURFACE DECKING LEVEL 10504.4
 SURFACE LEVEL 10484.9
 TOP FENTON SEAM INSET LEVEL 10373.0
 PARKGATE SEAM INSET LEVEL 10303.0
 THORNCLIFFE SEAM INSET LEVEL 10219.0
 SILKSTONE SEAM INSET LEVEL 10032.1
 DEPTH OF SHAFT 162 YDS

TANKERSLEY DRIFT

43/3499/203000

SURFACE LEVEL 10558.4
 FLOCKTON THICK SEAM LEVEL 10509.3
 LENGTH OF DRIFT 71.3 YDS

WHARNCLIFFE DRIFT

43/3399/731675

SURFACE LEVEL 10490.3
 TOP FENTON SEAM LEVEL 10418.7
 LENGTH OF DRIFT 102 YDS

WHARNCLIFFE SILKSTONE NO. 3. SHAFT

43/3399/750811

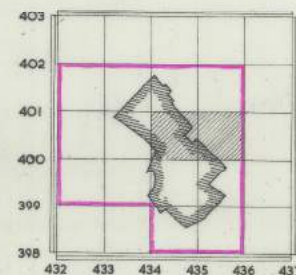
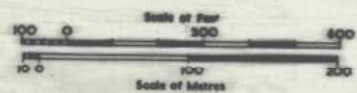
SURFACE LEVEL 10483.4
 TOP FENTON SEAM INSET LEVEL 10367.0
 PARKGATE SEAM INSET LEVEL 10297.0
 THORNCLIFFE SEAM INSET LEVEL 10213.4
 DEPTH OF SHAFT 91 YDS

WHARNCLIFFE SILKSTONE COLLIERY

4

SCALE - 1/2500

DATUM FOR LEVELS
 10000 feet below ORDNANCE DATUM



This plan is a true copy of the working plan of the mine as completed up to 6th January 1967 and I certify after thorough examination and enquiry that to the best of my knowledge and belief it is an accurate plan of the mine.

Signed *W. Dawkins* Surveyor
 Certificate No. 2828 dated 26.1.54

I hereby certify that no further working has taken place after the date of abandonment which would affect the accuracy of this plan.

Signed *W. Dawkins* Manager
 Certificate No. 8826 dated 1961

FLOCKTON THICK SEAM

DATE OF ABANDONMENT 6th JANUARY 1967
 DATE OF CONSTRUCTION DECEMBER 1954

Issued by:

The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0345 762 6848

**ANDREW KERSLAKE
ST ANDREWS HOUSE
23 KINGFIELD ROAD
SHEFFIELD
S11 9AS**

Our reference:	51001540732001
Your reference:	41492
Date of your enquiry:	10 August 2017
Date we received your enquiry:	10 August 2017
Date of issue:	10 August 2017

This report is for the property described in the address below and the attached plan.

Shaft Plan and Data Sheets

COMPANY SHOP, NEW ROAD, TANKERSLEY, SOUTH YORKSHIRE

I refer to the enquiry dated 10 August 2017, received 10 August 2017, in connection with the above.

As requested I enclose the mine entry data sheet(s) held for the mine entry/entries referred to.

Mine Entry Data

Shaft/adit:	Adit
Reference:	434400-005
Source:	Ab plans NE852 NE851.NG Ed. Geological.
Colliery name:	Unknown
Entry name:	Unknown
Date abandoned:	Unknown
Depth of superficial deposits (m):	Unknown
Depth of shaft (m):	Unknown
Diameter of shaft (m):	Unknown
Probable adit azimuth:	165
Treatment details:	Unknown
Conveyance:	Not Applicable
Easting:	434235
Northing:	400189
Other information:	None

Issued by:	The Coal Authority, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG
Tax Point Date:	10 August 2017
Issued to:	ANDREW KERSLAKE ST ANDREWS HOUSE 23 KINGFIELD ROAD SHEFFIELD S11 9AS
Property Search for:	COMPANY SHOP, NEW ROAD, TANKERSLEY, SOUTH YORKSHIRE
Reference Number:	51001540732001
Date of Issue:	10 August 2017
Cost:	£51.92
VAT @ 20%:	£10.38
Total Received:	£62.30
VAT Registration	598 5850 68

Location map

Approximate position of enquiry



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Ordnance Survey Licence number: 100020315

This plan shows the approximate location of the disused mine entry / entries referred to in the attached mining report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by visiting www.groundstability.com.

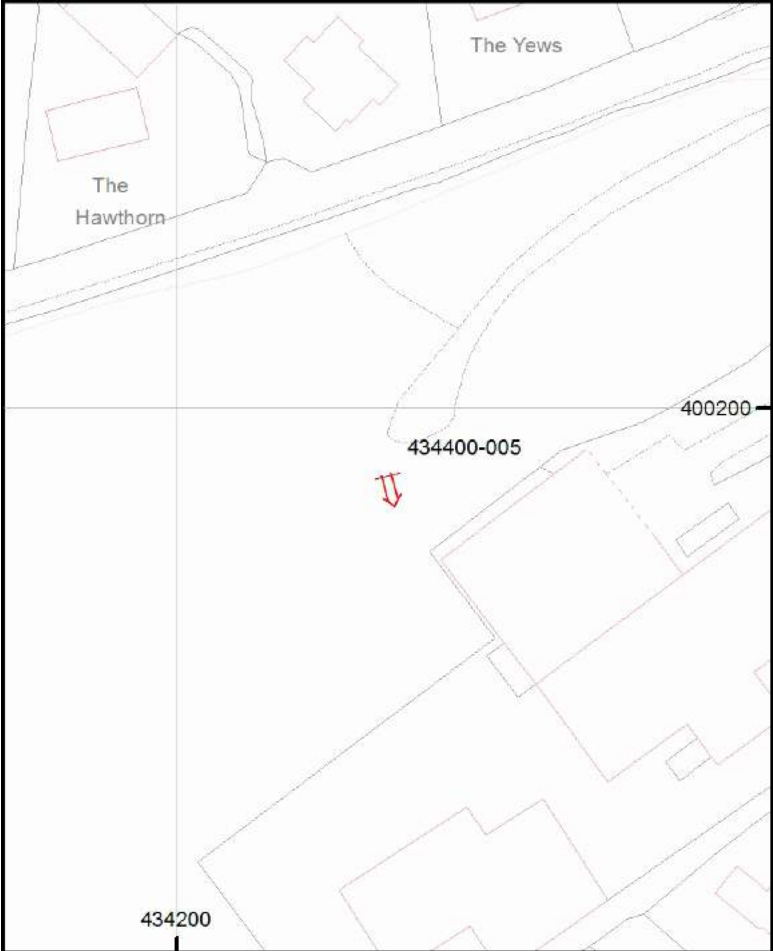
If you wish to discuss the relevance of any of the information contained in this report, you should seek the advice of a qualified mining engineer or surveyor. If you or your advisor wish to examine the source plans from which the information has been taken, these are available to view, free of charge, at our Head Office in Mansfield. To book an appointment please ring 01623 637225. Should you or your advisor wish to carry out a physical investigation that may enter, disturb or interfere with any disused mine entry, prior permission of the owner must be sought. For coal mine entries, the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries).

Our emergency telephone number is 01623 646333.

Key

Disused Adit or Mineshaft



Appendix 4

Geotechnical Test Results – PSL3463 Infiltration Rate Calculations



LABORATORY REPORT REPORT



4043

Contract Number: PSL17/3463

Report Date: 24 July 2017
Client's Reference: 41492
Client Name: Eastwood & Partners
St Andrews House
23 Kingfield Road
Sheffield
S11 9AS

For the attention of: Sarah Illingworth

Contract Title: New Road, Tankersley
Date Received: 20/7/2017
Date Commenced: 20/7/2017
Date Completed: 24/7/2017

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)

L Knight
(Senior Technician)

C Marshall
(Laboratory Manager)

A Fry
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
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fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

PSL
Professional Soils Laboratory

New Road, Tankersley

Contract No:

PSL17/3463

Client Ref:

41492

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

New Road, Tankersley

Contract No:

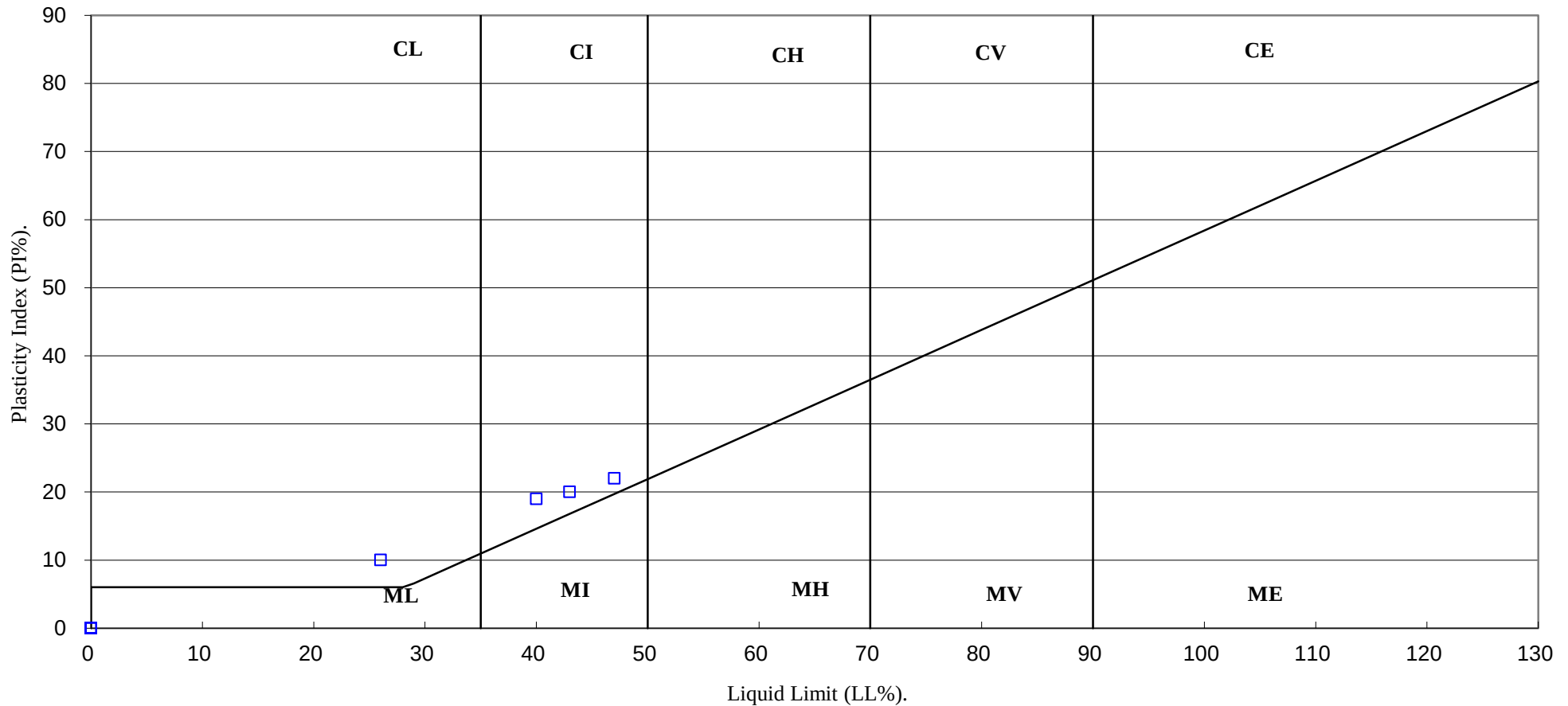
PSL17/3463

Client Ref:

41492

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



PSL
Professional Soils Laboratory

New Road, Tankersley

Contract No:

PSL17/3463

Client Ref:

41492

(Consulting Engineers) Ltd

PROJECT:	New Road, Tankersley	Job No. 41492	Date 07.08.17
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SRI	Checked AJK

Test No. SA1/TP7 - Test 1**Test Pit Dimensions**

Length = **1100 mm** Plan area = **0.77 m²**
 Width = **700 mm**
 Depth = **2900 mm (Total depth)**

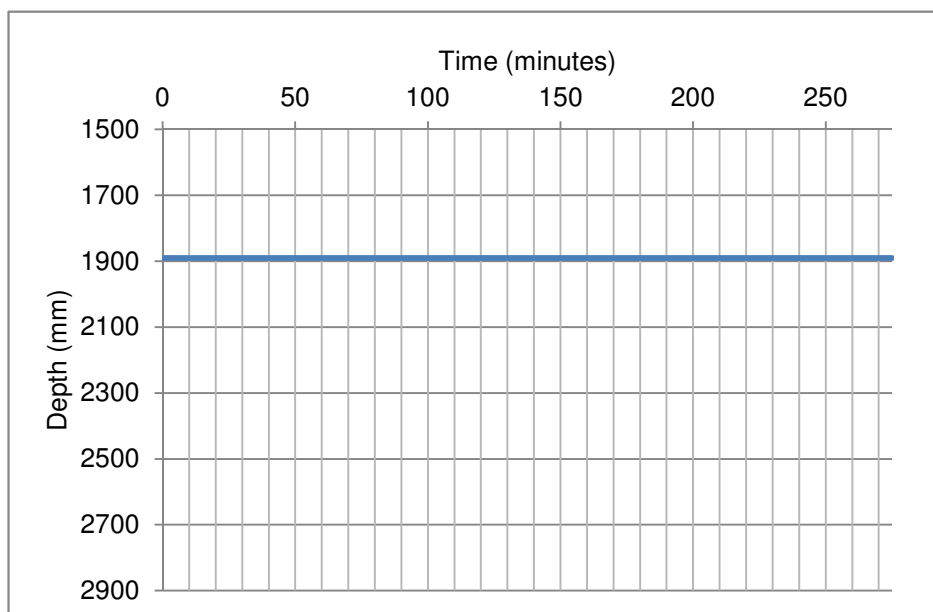
Approximate time to discharge water into the hole:

15 Seconds

Depth to water after completion of pumping:

1890 mm

Time (min)	Depth (mm)
0	1890
3	1890
7	1890
42	1890
151	1890
275	1890

**Test Pit Log**

Depth (m)	Description
0.0-0.1	Macadam
0.1-0.2	Yellow/brown sandy GRAVEL with cobbles of sandstone (Type 1)
0.2-0.5	MADE GROUND: yellow sandy gravel and cobbles of limestone
0.5-1.0	MADE GROUND: grey/black sandy ashy gravel
1.0-2.1	MADE GROUND: orange/brown/grey gravelly clay
2.1-2.3	MADE GROUND? Firm orange brown clay with occasional gravel of sandstone
2.3-2.9	Stiff grey/orange CLAY with gravel and cobbles of sandstone

PROJECT:	New Road, Tankersley	Job No. 41492	Date 07.08.17
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SRI	Checked AJK

Test No. SA1/TP7 - Test 1

Soil Infiltration Rate in Accordance with BR365

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

Where: V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters

Depth to water = **1890** mm Average water depth: **1010** mm
Start time = **0** min Change in water depth: **0** mm

Final parameters

Depth to water = **1890** mm Time interval: **275** min
End time = **275** min

Effective Storage Volume of Water in the Trial Pit = **0.7777** m³
75% Effective Depth = **2143** mm from ground level
25% Effective Depth = **2648** mm from ground level
Time at 75% Effective Depth = **n/a** minutes
Time at 25% Effective Depth = **n/a** minutes

V_{p75-25} = **0.39** m³
 a_{p50} = **2.59** m²
 t_{p75-25} = **0** sec
 f = **#DIV/0! m/sec**

Average Soakaway Rate = **0.0E+00** m³/sec
Average soakaway area = **4.41** m² (sides + base)

BR365 Soil Infiltration Rate = 0.0E+00 m/sec
Average Infiltration Rate = 0.0E+00 m/sec

(Consulting Engineers) Ltd

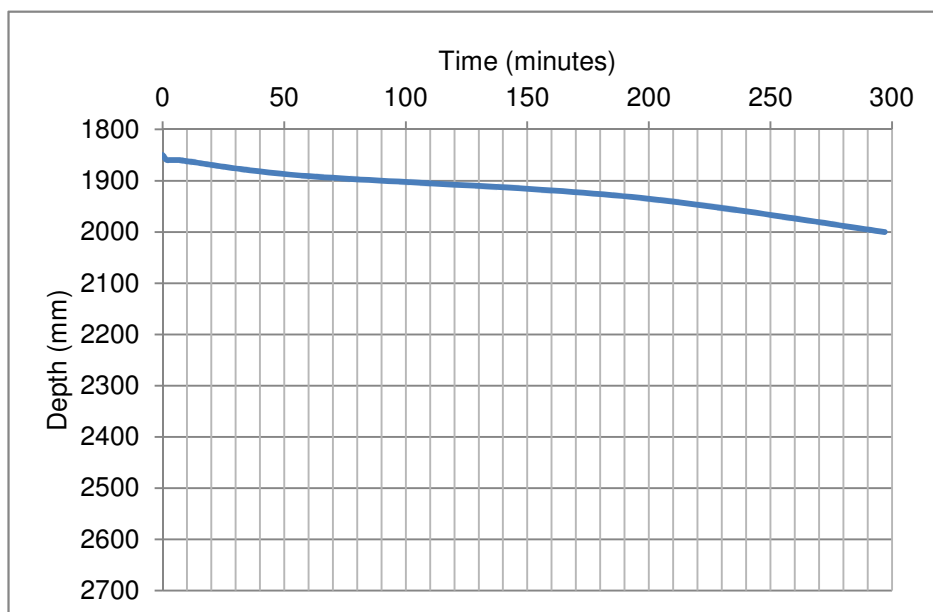
PROJECT:	New Road, Tankersley	Job No. 41492	Date 07.08.17
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SRI	Checked AJK

Test No. SA2/TP1B - Test 1**Test Pit Dimensions**

Length = **1600** mm Plan area = **1.04** m²
 Width = **650** mm
 Depth = **2700** mm (Total depth)

Approximate time to discharge water into the hole: **30** SecondsDepth to water after completion of pumping: **1900** mm

Time (min)	Depth (mm)
0	1850
2	1860
7	1860
57	1890
189	1930
297	2000

**Test Pit Log**

Depth (m)	Description
0.0-0.05	TOPSOIL/MADE GROUND: Dark brown gravelly SAND
0.05-1.3	MADE GROUND: Grey/black ashy gravelly sand
1.3-1.9	MADE GROUND: Brown silty slightly sandy gravel
1.9-2.7	Orange/brown slightly sandy gravelly CLAY

PROJECT:	New Road, Tankersley	Job No. 41492	Date 07.08.17
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SRI	Checked AJK

Test No. SA2/TP1B - Test 1

Soil Infiltration Rate in Accordance with BR365

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

Where: V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters

Depth to water = **1850** mm Average water depth: **775** mm
Start time = **0** min Change in water depth: **150** mm

Final parameters

Depth to water = **2000** mm Time interval: **297** min
End time = **297** min

Effective Storage Volume of Water in the Trial Pit = **0.884** m³
75% Effective Depth = **2063** mm from ground level
25% Effective Depth = **2488** mm from ground level
Time at 75% Effective Depth = **n/a** minutes
Time at 25% Effective Depth = **n/a** minutes

V_{p75-25} = **0.44** m³
 a_{p50} = **2.95** m²
 t_{p75-25} = **0** sec
 f = **#DIV/0! m/sec**

Average Soakaway Rate = **8.8E-06** m³/sec
Average soakaway area = **4.53** m² (sides + base)

BR365 Soil Infiltration Rate = N/A m/sec
Average Infiltration Rate = 1.9E-06 m/sec

PROJECT:	New Road, Tankersley	Job No. 41492	Date 07.08.17
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SRI	Checked AJK

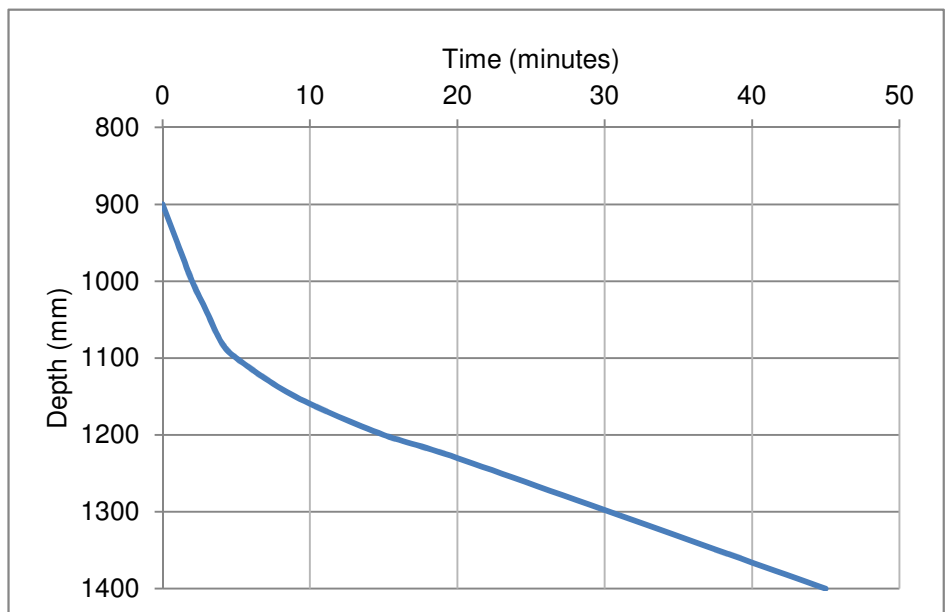
Test No. SA3/TP9 - Test 1

Test Pit Dimensions

Length = **1100 mm** Plan area = **0.77 m²**
 Width = **700 mm**
 Depth = **1400 mm** (Total depth)

Approximate time to discharge water into the hole: **20 Seconds**
 Depth to water after completion of pumping: **900 mm**

Time (min)	Depth (mm)
0	900
1	950
2	1000
3	1040
4	1080
5	1100
9	1150
15	1200
20	1230
45	1400



Test Pit Log

Depth (m)	Description
0.0-0.05	Macadam
0.05-0.15	MADE GROUND: Yellow sandy gravel and cobbles of limestone (Type 1)
0.15-0.4	MADE GROUND: Dark grey slightly sandy slightly clayey ashy gravel
0.4-0.9	MADE GROUND: Brown sandy slightly clayey gravel
0.9-1.4	Yellow moderately strong SANDSTONE

PROJECT:	New Road, Tankersley	Job No. 41492	Date 07.08.17
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SRI	Checked AJK

Test No. SA3/TP9 - Test 1

Soil Infiltration Rate in Accordance with BR365

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

Where: V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters

Depth to water = **900** mm Average water depth: **250** mm
Start time = **0** min Change in water depth: **500** mm

Final parameters

Depth to water = **1400** mm Time interval: **45** min
End time = **45** min

Effective Storage Volume of Water in the Trial Pit = **0.385** m³
75% Effective Depth = **1025** mm from ground level
25% Effective Depth = **1275** mm from ground level
Time at 75% Effective Depth = **3** minutes
Time at 25% Effective Depth = **28** minutes

V_{p75-25} = **0.19** m³
 a_{p50} = **1.67** m²
 t_{p75-25} = **1530** sec
 f = **7.5E-05** m/sec

Average Soakaway Rate = **1.4E-04** m³/sec
Average soakaway area = **1.67** m² (sides + base)

BR365 Soil Infiltration Rate = 7.5E-05 m/sec
Average Infiltration Rate = 8.5E-05 m/sec

PROJECT:	New Road, Tankersley	Job No. 41492	Date 07.08.17
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SRI	Checked AJK

Test No.	SA4/TP10 - Test 1
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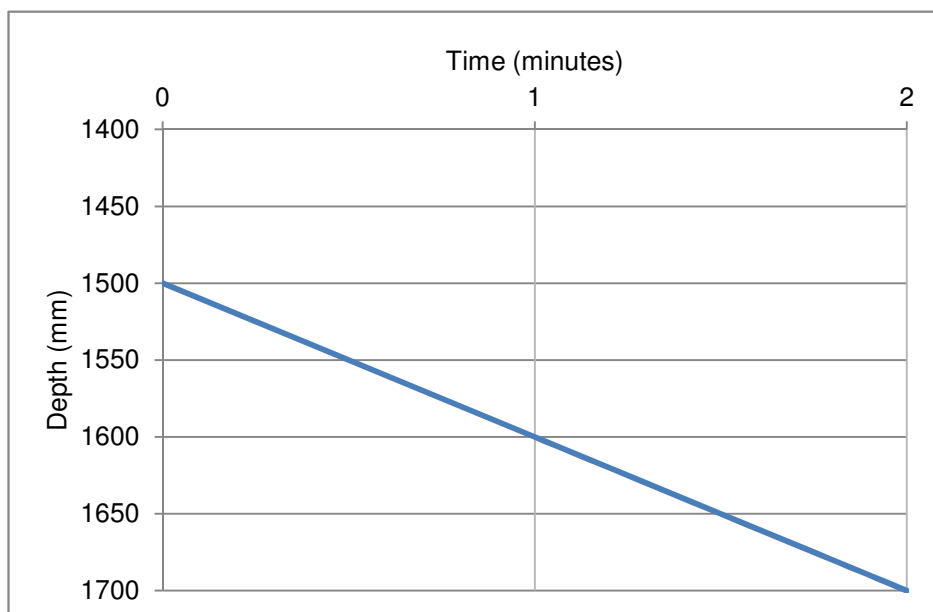
Test Pit Dimensions

Rectangular Dimensions

Length =	1600 mm	Plan area =	1.12 m²
Width =	700 mm		
Depth =	1700 mm (Total depth)		

Approximate time to discharge water into the hole: **30 Seconds**
 Depth to water after completion of pumping: **1600 mm**

Time (min)	Depth (mm)
0	1500
1	1600
2	1700



Test Pit Log

Depth (m)	Description
0.0-0.1	Macadam
0.1-0.25	MADE GROUND: yellow sandy gravel and cobbles of limestone (Type 1)
0.25-0.85	MADE GROUND: brown/grey ahsy grvae
0.85-1.2	MADE GROUND: Yellow/brown sandy gravel and cobbles of sandstone
1.2-1.5	MADE GROUND: dark grey ashy sandy gravel
1.5-1.8	Yellow moderately strong SANDSTONE

PROJECT:	New Road, Tankersley	Job No. 41492	Date 07.08.17
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SRI	Checked AJK

Test No. SA4/TP10 - Test 1

Soil Infiltration Rate in Accordance with BR365

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

Where: V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters

Depth to water = **1500** mm Average water depth: **100** mm
Start time = **0** min Change in water depth: **200** mm

Final parameters

Depth to water = **1700** mm Time interval: **2** min
End time = **2** min

Effective Storage Volume of Water in the Trial Pit = **0.224** m³
75% Effective Depth = **1550** mm from ground level
25% Effective Depth = **1650** mm from ground level
Time at 75% Effective Depth = **1** minutes
Time at 25% Effective Depth = **1.5** minutes

V_{p75-25} = **0.11** m³
 a_{p50} = **1.58** m²
 t_{p75-25} = **60** sec
 f = **1.2E-03** m/sec

Average Soakaway Rate = **1.9E-03** m³/sec
Average soakaway area = **1.58** m² (sides + base)

BR365 Soil Infiltration Rate = 1.2E-03 m/sec
Average Infiltration Rate = 1.2E-03 m/sec

PROJECT:	New Road, Tankersley	Job No. 41492	Date 07.08.17
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SRI	Checked AJK

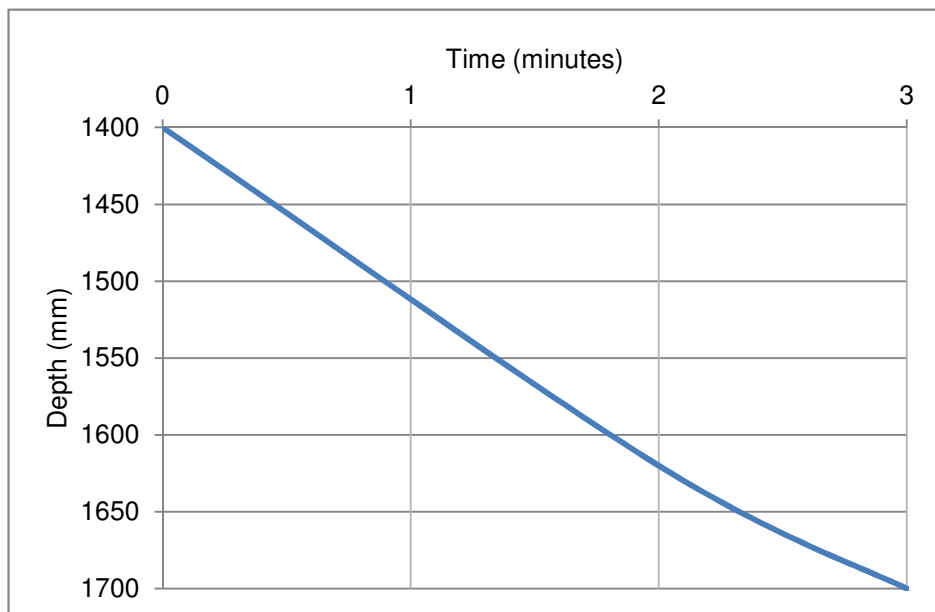
Test No. SA4/TP10 - Test 2

Test Pit Dimensions

Length = **1600 mm** Plan area = **1.12 m²**
 Width = **700 mm**
 Depth = **1700 mm** (Total depth)

Approximate time to discharge water into the hole: **20 Seconds**
 Depth to water after completion of pumping: **1400 mm**

Time (min)	Depth (mm)
0	1400
2	1620
3	1700



Test Pit Log

Depth (m)	Description
0.0-0.1	Macadam
0.1-0.25	MADE GROUND: yellow sandy gravel and cobbles of limestone (Type 1)
0.25-0.85	MADE GROUND: brown/grey ashy gravel
0.85-1.2	MADE GROUND: Yellow/brown sandy gravel and cobbles of sandstone
1.2-1.5	MADE GROUND: dark grey ashy sandy gravel
1.5-1.8	Yellow moderately strong SANDSTONE

PROJECT:	New Road, Tankersley	Job No. 41492	Date 07.08.17
SUBJECT:	Infiltration Test Results and Calculation of Infiltration Rates	Prepared SRI	Checked AJK

Test No. SA4/TP10 - Test 2

Soil Infiltration Rate in Accordance with BR365

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

Where: V_{p75-25} is the effective storage volume of water in the trial pit between 75% and 25% effective depth;

a_{p50} is the internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} is the time for the water level to fall from 75% to 25% effective depth

Initial parameters

Depth to water = **1400** mm Average water depth: **150** mm
Start time = **0** min Change in water depth: **300** mm

Final parameters

Depth to water = **1700** mm Time interval: **3** min
End time = **3** min

Effective Storage Volume of Water in the Trial Pit = **0.336** m³
75% Effective Depth = **1475** mm from ground level
25% Effective Depth = **1625** mm from ground level
Time at 75% Effective Depth = **1** minutes
Time at 25% Effective Depth = **2.5** minutes

V_{p75-25} = **0.17** m³
 a_{p50} = **1.81** m²
 t_{p75-25} = **90** sec
 f = **1.0E-03** m/sec

Average Soakaway Rate = **1.9E-03** m³/sec
Average soakaway area = **1.81** m² (sides + base)

BR365 Soil Infiltration Rate = 1.0E-03 m/sec
Average Infiltration Rate = 1.0E-03 m/sec

Appendix 5

Chemical Test Results – Report 17-18799

Table of Assessment Values

Modified Mean Calculations



Final Report

Report No.: 17-18799-1

Initial Date of Issue: 26-Jul-2017

Client Eastwood & Partners

Client Address: St. Andrews House
23 Kingfield Road
Sheffield
South Yorkshire
S11 9AS

Contact(s): Geo
Sarah Illingworth

Project 41492 New Road, Tankersley

Quotation No.: **Date Received:** 20-Jul-2017

Order No.: 41492/AJK/SRI **Date Instructed:** 20-Jul-2017

No. of Samples: 20

Turnaround (Wkdays): 5 **Results Due:** 26-Jul-2017

Date Approved: 26-Jul-2017

Approved By:



Details: Robert Monk, Technical Development
Chemist

Results - Soil

Project: 41492 New Road, Tankersley

Client: Eastwood & Partners	Chemtest Job No.:				17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799
Quotation No.:	Chemtest Sample ID.:				486329	486330	486332	486333	486334	486335	486336	486337	486339
Order No.: 41492/AJK/SRI	Client Sample Ref.:				TP1	TP1	TP1	TP2	TP2	TP3	TP5	TP3	TP5
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.30	0.80	2.30	0.60	1.10	0.60	1.00	1.20	0.50
	Date Sampled:				12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017
	Asbestos Lab:				COVENTRY			COVENTRY		COVENTRY			COVENTRY
Determinand	Accred.	SOP	Units	LOD									
ACM Type	U	2192		N/A	-			-		-			-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected			No Asbestos Detected		No Asbestos Detected			No Asbestos Detected
Moisture	N	2030	%	0.020	15	19	16	16	23	12	12	9.9	
Soil Colour	N	2040		N/A	Brown	Brown	Yellow	Black	Brown	Brown	Brown	Brown	
Other Material	N	2040		N/A	Stones, Roots	Stones	NONE	Stones	Stones	Stones	Stones	Stones	
Soil Texture	N	2040		N/A	Sand	Clay	Clay	Sand	Clay	Sand	Sand	Sand	
pH	M	2010		N/A	7.8	7.6	6.4	7.6	7.5	7.8	8.9	8.7	
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.016	0.046	< 0.010	< 0.010	0.026	< 0.010	< 0.010	0.019	
Total Sulphur	M	2175	%	0.010	0.12	0.30	0.15	0.29	0.20	0.22	0.13	0.22	
Sulphate (Acid Soluble)	M	2430	%	0.010	0.098	0.17	0.040	0.12	0.13	0.059	0.11	0.14	
Arsenic	M	2450	mg/kg	1.0	16	41	11	74	20	19	19	26	
Cadmium	M	2450	mg/kg	0.10	3.1	3.2	0.51	0.32	0.20	0.20	0.69	0.45	
Chromium	M	2450	mg/kg	1.0	51	44	35	27	20	20	33	170	
Copper	M	2450	mg/kg	0.50	130	190	45	100	49	32	40	74	
Mercury	M	2450	mg/kg	0.10	0.27	0.64	0.14	0.27	0.16	0.27	0.25	0.24	
Nickel	M	2450	mg/kg	0.50	48	53	38	48	36	24	22	38	
Lead	M	2450	mg/kg	0.50	590	400	45	96	34	37	79	64	
Selenium	M	2450	mg/kg	0.20	0.67	1.5	0.58	1.6	0.57	0.31	0.31	0.47	
Zinc	M	2450	mg/kg	0.50	820	530	140	86	70	75	100	91	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	
Total Organic Carbon	M	2625	%	0.20				28			4.9		
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0									
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0									
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0									
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0									
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0									
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0									
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0									
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0									
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0									
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0									
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0									
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0									
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0									
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0									
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0									
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0									
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0									

Results - Soil

Project: 41492 New Road, Tankersley

Client: Eastwood & Partners	Chemtest Job No.:				17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799
Quotation No.:	Chemtest Sample ID.:				486329	486330	486332	486333	486334	486335	486336	486337	486339
Order No.: 41492/AJK/SRI	Client Sample Ref.:				TP1	TP1	TP1	TP2	TP2	TP3	TP5	TP3	TP5
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.30	0.80	2.30	0.60	1.10	0.60	1.00	1.20	0.50
	Date Sampled:				12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017	12-Jul-2017
	Asbestos Lab:				COVENTRY			COVENTRY		COVENTRY			COVENTRY
Determinand	Accred.	SOP	Units	LOD									
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0									
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0									
Naphthalene	M	2800	mg/kg	0.10	0.57	1.4	0.21	1.9	0.28	< 0.10	0.62	0.64	
Acenaphthylene	N	2800	mg/kg	0.10	0.19	0.16	< 0.10	< 0.10	0.31	< 0.10	1.2	< 0.10	
Acenaphthene	M	2800	mg/kg	0.10	0.20	0.46	< 0.10	< 0.10	0.10	< 0.10	0.86	0.38	
Fluorene	M	2800	mg/kg	0.10	0.27	0.55	< 0.10	< 0.10	0.36	< 0.10	2.0	0.30	
Phenanthrene	M	2800	mg/kg	0.10	4.5	11	3.2	2.5	4.8	0.82	16	4.9	
Anthracene	M	2800	mg/kg	0.10	0.89	2.5	0.50	0.17	1.6	< 0.10	4.0	1.1	
Fluoranthene	M	2800	mg/kg	0.10	6.5	19	6.2	1.3	7.8	0.22	15	8.1	
Pyrene	M	2800	mg/kg	0.10	5.5	16	4.7	1.2	6.6	0.17	11	6.9	
Benzo[a]anthracene	M	2800	mg/kg	0.10	2.4	8.0	1.9	0.34	3.2	< 0.10	5.8	2.8	
Chrysene	M	2800	mg/kg	0.10	2.7	8.3	2.1	0.45	3.1	< 0.10	5.3	2.8	
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	3.2	11	2.5	0.44	3.4	< 0.10	5.9	3.5	
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	1.2	4.4	1.0	< 0.10	1.2	< 0.10	2.2	1.1	
Benzo[a]pyrene	M	2800	mg/kg	0.10	2.2	8.8	1.0	0.26	2.4	< 0.10	4.8	2.6	
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	1.8	6.6	1.2	0.15	1.3	< 0.10	3.0	1.7	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	0.15	0.91	< 0.10	< 0.10	0.14	< 0.10	0.37	0.14	
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	1.7	5.7	1.0	0.30	1.3	< 0.10	2.4	1.6	
Total Of 16 PAH's	N	2800	mg/kg	2.0	34	100	26	9.0	38	< 2.0	81	39	

Results - Soil

Project: 41492 New Road, Tankersley

Client: Eastwood & Partners	Chemtest Job No.:				17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799
Quotation No.:	Chemtest Sample ID.:				486340	486341	486343	486344	486345	486346	486347	486348	486349
Order No.: 41492/AJK/SRI	Client Sample Ref.:				TP6	TP6	TP7	TP7	TP8	TP8	TP10	TP11	TP11
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.80	1.10	2.70	0.40	1.50	0.70	0.40	1.60
	Date Sampled:				12-Jul-2017	12-Jul-2017	13-Jul-2017	13-Jul-2017	13-Jul-2017	13-Jul-2017	13-Jul-2017	13-Jul-2017	13-Jul-2017
	Asbestos Lab:				COVENTRY		COVENTRY		COVENTRY		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD									
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	
Moisture	N	2030	%	0.020		20	18	20	10	8.5	9.5	8.4	14
Soil Colour	N	2040		N/A		Black	Black	Brown	Brown	Brown	Brown	Black	Brown
Other Material	N	2040		N/A		Stones	NONE	NONE	Stones	Stones, Roots	Stones	Stones	Stones
Soil Texture	N	2040		N/A		Sand	Clay	Sand	Sand	Sand	Sand	Sand	Sand
pH	M	2010		N/A		8.4	7.0	7.6	8.2	8.2	10.1	10.1	5.1
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010		< 0.010	0.075	0.027	< 0.010	< 0.010	0.034	0.21	< 0.010
Total Sulphur	M	2175	%	0.010		0.025	0.15	0.092	0.12	0.056	0.18	0.54	0.86
Sulphate (Acid Soluble)	M	2430	%	0.010		0.018	0.064	0.029	0.088	0.037	0.090	0.20	0.76
Arsenic	M	2450	mg/kg	1.0		6.3	14	8.9	19	9.7	24	28	66
Cadmium	M	2450	mg/kg	0.10		0.28	0.18	< 0.10	0.73	0.14	1.7	0.51	< 0.10
Chromium	M	2450	mg/kg	1.0		20	18	22	25	15	360	89	11
Copper	M	2450	mg/kg	0.50		23	57	33	45	19	77	39	14
Mercury	M	2450	mg/kg	0.10		0.10	0.12	< 0.10	0.26	0.10	1.1	0.25	0.10
Nickel	M	2450	mg/kg	0.50		33	34	27	20	20	40	29	4.5
Lead	M	2450	mg/kg	0.50		16	28	19	87	25	110	41	13
Selenium	M	2450	mg/kg	0.20		0.29	0.66	0.40	0.36	0.51	0.22	0.74	0.56
Zinc	M	2450	mg/kg	0.50		76	83	73	100	63	130	83	8.7
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total Organic Carbon	M	2625	%	0.20			7.5		7.0		6.3		
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0			< 1.0						
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0			< 1.0						
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0			< 1.0						
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0			< 1.0						
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0			62						
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0			120						
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0			1400						
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0			< 1.0						
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0			1500						
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0			< 1.0						
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0			< 1.0						
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0			< 1.0						
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0			< 1.0						
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0			7.1						
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0			< 1.0						
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0			260						
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0			< 1.0						

Results - Soil

Project: 41492 New Road, Tankersley

Client: Eastwood & Partners	Chemtest Job No.:				17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799	17-18799
Quotation No.:	Chemtest Sample ID.:				486340	486341	486343	486344	486345	486346	486347	486348	486349
Order No.: 41492/AJK/SRI	Client Sample Ref.:				TP6	TP6	TP7	TP7	TP8	TP8	TP10	TP11	TP11
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				0.50	0.80	1.10	2.70	0.40	1.50	0.70	0.40	1.60
	Date Sampled:				12-Jul-2017	12-Jul-2017	13-Jul-2017	13-Jul-2017	13-Jul-2017	13-Jul-2017	13-Jul-2017	13-Jul-2017	13-Jul-2017
	Asbestos Lab:				COVENTRY		COVENTRY		COVENTRY		COVENTRY	COVENTRY	
Determinand	Accred.	SOP	Units	LOD									
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0			270						
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0			1800						
Naphthalene	M	2800	mg/kg	0.10		< 0.10	0.16	< 0.10	0.29	< 0.10	1.3	0.44	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10		< 0.10	< 0.10	< 0.10	0.28	< 0.10	1.0	0.12	< 0.10
Acenaphthene	M	2800	mg/kg	0.10		< 0.10	< 0.10	< 0.10	0.22	< 0.10	0.51	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10		< 0.10	< 0.10	< 0.10	0.46	< 0.10	1.4	0.16	< 0.10
Phenanthrene	M	2800	mg/kg	0.10		< 0.10	1.2	< 0.10	4.6	0.25	15	3.3	< 0.10
Anthracene	M	2800	mg/kg	0.10		< 0.10	0.16	< 0.10	0.95	< 0.10	3.9	0.76	< 0.10
Fluoranthene	M	2800	mg/kg	0.10		< 0.10	0.72	< 0.10	6.0	0.20	21	3.3	< 0.10
Pyrene	M	2800	mg/kg	0.10		< 0.10	0.65	< 0.10	4.8	0.18	18	2.7	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10		< 0.10	0.27	< 0.10	2.4	< 0.10	9.3	1.2	< 0.10
Chrysene	M	2800	mg/kg	0.10		< 0.10	0.20	< 0.10	2.2	< 0.10	8.7	0.97	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10		< 0.10	0.17	< 0.10	2.9	< 0.10	11	1.3	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10		< 0.10	< 0.10	< 0.10	1.1	< 0.10	4.1	0.30	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10		< 0.10	< 0.10	< 0.10	2.3	< 0.10	8.9	1.1	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10		< 0.10	< 0.10	< 0.10	1.7	< 0.10	6.0	0.65	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10		< 0.10	< 0.10	< 0.10	0.16	< 0.10	1.0	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10		< 0.10	< 0.10	< 0.10	1.6	< 0.10	5.1	0.74	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0		< 2.0	3.5	< 2.0	32	< 2.0	120	17	< 2.0

Project: 41492 New Road, Tankersley

Client: Eastwood & Partners	Chemtest Job No.:				17-18799	17-18799
Quotation No.:	Chemtest Sample ID.:				486350	486351
Order No.: 41492/AJK/SRI	Client Sample Ref.:				TP12	TP12
	Sample Type:				SOIL	SOIL
	Top Depth (m):				0.50	1.00
	Date Sampled:				13-Jul-2017	13-Jul-2017
	Asbestos Lab:				COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
ACM Type	U	2192		N/A	-	
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	
Moisture	N	2030	%	0.020	5.3	16
Soil Colour	N	2040		N/A	Grey	Black
Other Material	N	2040		N/A	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Clay
pH	M	2010		N/A	8.7	4.7
Sulphate (2:1 Water Soluble) as SO ₄	M	2120	g/l	0.010	0.061	0.025
Total Sulphur	M	2175	%	0.010	0.030	0.31
Sulphate (Acid Soluble)	M	2430	%	0.010	0.051	1.1
Arsenic	M	2450	mg/kg	1.0	30	23
Cadmium	M	2450	mg/kg	0.10	0.87	< 0.10
Chromium	M	2450	mg/kg	1.0	12	10
Copper	M	2450	mg/kg	0.50	8.7	24
Mercury	M	2450	mg/kg	0.10	0.10	0.15
Nickel	M	2450	mg/kg	0.50	4.7	2.6
Lead	M	2450	mg/kg	0.50	16	49
Selenium	M	2450	mg/kg	0.20	< 0.20	0.32
Zinc	M	2450	mg/kg	0.50	64	7.0
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50
Total Organic Carbon	M	2625	%	0.20		
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	< 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	< 1.0	
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	35	
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	240	
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	710	
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	890	
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	340	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	2200	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	< 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	< 1.0	
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	< 1.0	
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	83	
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	370	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	260	
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	91	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	< 1.0	

Project: 41492 New Road, Tankersley

Client: Eastwood & Partners	Chemtest Job No.:				17-18799	17-18799
Quotation No.:	Chemtest Sample ID.:				486350	486351
Order No.: 41492/AJK/SRI	Client Sample Ref.:				TP12	TP12
	Sample Type:				SOIL	SOIL
	Top Depth (m):				0.50	1.00
	Date Sampled:				13-Jul-2017	13-Jul-2017
	Asbestos Lab:				COVENTRY	
Determinand	Accred.	SOP	Units	LOD		
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	810	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	3000	
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	0.18	< 0.10
Fluorene	M	2800	mg/kg	0.10	0.77	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	2.2	< 0.10
Anthracene	M	2800	mg/kg	0.10	0.31	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	0.28	< 0.10
Pyrene	M	2800	mg/kg	0.10	0.56	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0	4.3	< 2.0

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	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-MS

Report Information

Key

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

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

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

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

All Asbestos testing is performed at the indicated laboratory

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

Sample Deviation Codes

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

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

Inorganic Compounds	Human Health - Residential with Homegrown Produce (mg/kg)
Arsenic	37
Cadmium	11
Chromium (III)	910
Chromium (VI)	6
Lead	200
Mercury	1.2
Nickel	180
Selenium	250
Copper	2400
Zinc	3700

Organic Compounds	Human Health - Residential with Homegrown Produce (mg/kg)		
	1% SOM	2.5% SOM	6% SOM
Naphthalene	2.3	5.6	13
Acenaphthene	210	510	1100
Acenaphthylene	170	420	920
Fluorene	170	400	860
Phenanthrene	95	220	440
Anthracene	2400	5400	11000
Fluoranthene	280	560	890
Pyrene	620	1200	2000
Benzo(a)anthracene	7.2	11	13
Chrysene	15	22	27
Benzo(b)fluoranthene	2.6	3.3	3.7
Benzo(k)fluoranthene	77	93	100
Benzo(a)pyrene	2.2	2.7	3.0
Dibenz(a,h)anthracene	0.24	0.28	0.3
Indeno(1,2,3-cd)pyrene	27	36	41
Benzo(g,h,i)perylene	320	340	350
Benzene	0.087	0.17	0.37
Toluene	130	290	660
Ethylbenzene	47	110	260
o-Xylene	60	140	330
m-Xylene	59	140	320
p-Xylene	56	130	310

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Prepared	KDL	Checked	CAT	Date	09.08.16	Job No	41492
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 Eastwood & Partners CONSULTING ENGINEERS St Andrew's House 23 Kingfield Road Sheffield S11 9AS Tel: (0114) 255 4554 Fax: (0114) 255 4330	COMPANY SHOP LIMITED NEW ROAD, TANKERSLEY ASSESSMENT CRITERIA – RESIDENTIAL WITH HOMEGROWN PRODUCE
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Contaminant	Phytotoxicity			
	pH 5.0 to 5.5	pH 5.5 to 6.0	pH 6.0 to 6.5	pH >7.0
Arsenic	50			
Cadmium	3			
Chromium	400			
Lead	300			
Mercury	1			
Nickel	50	60	75	110
Copper	80	100	135	200
Zinc	200	200	200	300

The assessment concentration for lead is the Category 4 Screening Level produced by Contaminated Land: Applications in Real Environments (CL:AIRE) and outlined in Appendix H of their report SP1010. The others have been taken from Nathanail, C. P., McCaffrey, C., Gillett, A., Ogden, R., and Nathanail, J., 2015, *'The LQM/CIEH S4ULs for Human Health Risk Assessment'*, Land Quality Press, Nottingham. The metals/metalloids are based on a sandy loam soil and 6% soil organic matter. The assessment values are not intended to be applied to individual sample results where materials are similar, as the levels of contaminants will have a natural variability across the site. Instead, the modified mean value should be compared with the assessment concentration.

The assessment values for phytotoxicity are the levels at which plant growth is thought to be affected. They are taken from the maximum permissible and advisable concentrations in soil after application of soil sludge given in the *'The Code of Good Agricultural Practice for the Protection of Soil'*, MAFF, 1998.

The assessment of sulphate, water soluble sulphate, elemental sulphur and sulphide is to determine the aggressive nature of the ground with respect to concrete and consequently the results are compared with BRE Special Digest 1:2005 *'Concrete in Aggressive Ground'*.

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Prepared	KDL	Checked	CAT	Date	09.08.16	Job No	41492
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TPH Fraction	Intended Land Use Residential (mg/kg)		
	1% SOM	2.5% SOM	6% SOM
Aliphatic EC 5-6	42	78	160
Aliphatic EC >6-8	100	230	530
Aliphatic EC >8-10	27	65	150
Aliphatic EC >10-12	130 (48) ^{vap}	330 (118) ^{vap}	760 (283) ^{vap}
Aliphatic EC >12-16	1100 (24) ^{sol}	2400 (59) ^{sol}	4,300 (142) ^{sol}
Aliphatic EC >16-35	65,000 (8.48) ^{f, sol}	92,000 (21) ^{f, sol}	110,000 ^f
Aliphatic EC >35-44	65,000 (8.48) ^{f, sol}	92,000 (21) ^{f, sol}	110,000 ^f
Aromatic EC 5-7	70	140	300
Aromatic EC >7-8	130	290	660
Aromatic EC >8-10	34	83	190
Aromatic EC >10-12	74	180	380
Aromatic EC >12-16	140	330	660
Aromatic EC >16-21	260 ^f	540 ^f	930 ^f
Aromatic EC >21-35	1,100 ^f	1,500 ^f	1,700 ^f
Aromatic EC >35-44	1,100 ^f	1,500 ^f	1,700 ^f

^f oral, dermal, and inhalation exposure compared with oral HCV

^{sol} S4UL presented exceeds the solubility saturation limit, which is presented in brackets

^{vap} S4UL presented exceed the vapour saturation limit, which is presented in brackets

The assessment criteria for each of the petroleum hydrocarbon fractions have been taken from Nathanail, C. P., McCaffrey, C., Gillett, A., Ogden, R., and Nathanail, J., 2015, *'The LQM/CIEH S4ULs for Human Health Risk Assessment'*, Land Quality Press, Nottingham. These are also all based on a sandy loam soil.

Within the Environment Agency Science Report P5-080/TR3, Askari, K. & Pollard, S., 2005 *'The UK Approach for Evaluating Human Health Risks from Petroleum Hydrocarbons in Soils'* it is stated that the assessment values should not be considered individually; instead the potential additive effects should be calculated. This is achieved by calculating an individual Hazard Quotient (HQ) for each fraction. The HQ is the proportion of the assessment concentration represented by the recorded concentration. The HQs are then added together to form a Hazard Index (HI) and where this exceeds unity a potential significant risk to human health may exist.

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Prepared	KDL	Checked	CAT	Date	09.08.16	Job No	41492
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SITE: New Road, Tankersley	Job No. 41492	Date 09.08.17
SUBJECT: Mean and Maximum Value Test for Arsenic Made Ground - Iron Works Waste	Prepared SRI	Checked AJK

Results	Sample	Log x = y	
41.00		1.613	Number of results : n
74.00		1.869	Mean : X =
19.00		1.279	Standard deviation : s
			T value : t =

3

44.67

27.68

2.920

Corrected mean (95% confidence)

$$\underline{= X + t * s / n^{0.5} = 91.34}$$

Max value = 74.00

log xm = ym = 1.869

Number of results : N 3

Mean y = 1.587

Standard deviation of 0.296

T = (ym-ya) / S = 0.953

Tcrit (fom table A1.3) #VALUE!

#VALUE!

end

#REF!

SITE: New Road, Tankersley	Job No. 41492	Date 09.08.17
SUBJECT: Mean and Maximum Value Test for Benzo(b)fluoranthene Made Ground - Iron Works Waste	Prepared SRI	Checked AJK

Results	Sample	Log x = y	
11.00		1.041	Number of results : n
0.44		-0.357	Mean : X =
5.90		0.771	Standard deviation : s
			T value : t =

3

5.78

5.28

2.920

Corrected mean (95% confidence)

$$= X + t * s / n^{0.5} = 14.68$$

Max value = 11.00

log xm = ym = 1.041

Number of results : N 3

Mean y = 0.485

Standard deviation of 0.741

T = (ym-ya) / S = 0.750

Tcrit (fom table A1.3) #VALUE!

#VALUE!

end

#REF!

SITE: New Road, Tankersley	Job No. 41492	Date 09.08.17
SUBJECT: Mean Value Test for Lead - Made Ground, Iron Works Waste	Prepared SRI	Checked AJK

The method uses the geometric mean rather than the arithmetic mean which is used for other contaminants.

Results mg/kg	Sample	Log Results
400.00		2.602
96.00		1.982
79.00		1.898

Calculations based on log results

Number of results : n = 3
Mean : $\bar{X}$ = 2.161
Standard deviation : s = 0.385
T value : t = 2.920
Corrected mean (95% confidence) =
= $\bar{X} + t * s / n^{0.5}$ = 2.809

Final results

Mean : $\bar{X}$ = 145 mg/kg

Corrected mean (95% confidence) : 644 mg/kg

SITE: New Road, Tankersley	Job No. 41492	Date 09.08.17
SUBJECT: Mean and Maximum Value Test for Dibenz(a,h)anthracene Made Ground - Iron Works Waste	Prepared SRI	Checked AJK

Results	Sample	Log x = y	
0.91		-0.041	Number of results : n = 3
0.10		-1.000	Mean : X = 0.46
0.37		-0.432	Standard deviation : s = 0.41
			T value : t = 2.920

Corrected mean (95% confidence)

$$\underline{= X + t * s / n^{0.5} = 1.16}$$

Max value = 0.91

log xm = ym = -0.041

Number of results : N = 3

Mean y = -0.491

Standard deviation of 0.482

T = (ym-ya) / S = 0.933

Tcrit (fom table A1.3) #VALUE!

#VALUE!

end

#REF!

SITE: New Road, Tankersley	Job No. 41492	Date 09.08.17
SUBJECT: Mean and Maximum Value Test for Benzo(a)pyrene Made Ground - Iron Works Waste	Prepared SRI	Checked AJK

Results	Sample	Log x = y	
8.80		0.944	Number of results : n
0.26		-0.585	Mean : X =
4.80		0.681	Standard deviation : s
			T value : t =

3

4.62

4.27

2.920

Corrected mean (95% confidence)

$$= X + t * s / n^{0.5} = 11.82$$

Max value = 8.80

log xm = ym = 0.944

Number of results : N 3

Mean y = 0.347

Standard deviation of 0.818

T = (ym-ya) / S = 0.731

Tcrit (fom table A1.3) #VALUE!

#VALUE!

end

#REF!

SITE: New Road, Tankersley	Job No. 41492	Date 09.08.17
SUBJECT: Mean and Maximum Value Test for Dibenz(a,h)anthracene Made Ground - Demolition Rubble	Prepared SRI	Checked AJK

Results	Sample	Log x = y
0.15		-0.824
0.10		-1.000
0.10		-1.000
0.16		-0.796
1.00		0.000
0.10		-1.000

Number of results : n 6
Mean : $\bar{X}$ = 0.27
Standard deviation : s 0.36
T value : t = 2.015

Corrected mean (95% confidence)

$\bar{X} + t * s / n^{0.5} = 0.56$

Max value = 1.00

log xm = ym = 0.000

Number of results : N 6
Mean y = -0.770

Standard deviation of 0.389

T = (ym-ya) / S = 1.981

Tcrit (fom table A1.3) 1.73

Result probably an outlier

end

#REF!

SITE: New Road, Tankersley	Job No. 41492	Date 09.08.17
SUBJECT: Mean Value Test for Lead - Made Ground, Demolition Rubble	Prepared SRI	Checked AJK

The method uses the geometric mean rather than the arithmetic mean which is used for other contaminants.

Results mg/kg	Sample	Log Results
590.00		2.771
37.00		1.568
16.00		1.204
87.00		1.940
110.00		2.041
41.00		1.613

Calculations based on log results

Number of results : n = 6
Mean : $\bar{X}$ = 1.856
Standard deviation : s = 0.538
T value : t = 2.015
Corrected mean (95% confidence) =
= $\bar{X} + t * s / n^{0.5}$ = 2.298

Final results

Mean : $\bar{X}$ = 72 mg/kg

Corrected mean (95% confidence) : 199 mg/kg

SITE: New Road, Tankersley	Job No. 41492	Date 09.08.17
SUBJECT: Mean and Maximum Value Test for Benzo(b)fluoranthene Made Ground - Demolition Rubble	Prepared SRI	Checked AJK

Results	Sample	Log x = y
3.20		0.505
0.10		-1.000
0.10		-1.000
3.90		0.591
11.00		1.041
1.30		0.114

Number of results : n 6
Mean : $\bar{X}$ = 3.27
Standard deviation : s 4.10
T value : t = 2.015

Corrected mean (95% confidence)

$= \bar{X} + t * s / n^{0.5} =$ 6.64

Max value = 11.00

log xm = ym = 1.041

Number of results : N 6
Mean y = 0.042

Standard deviation of 0.859

T = (ym-ya) / S = 1.163

Tcrit (fom table A1.3) 1.73

Result probably not an outlier

end

#REF!

SITE: New Road, Tankersley	Job No. 41492	Date 09.08.17
SUBJECT: Mean and Maximum Value Test for Benzo(a)pyrene Made Ground - Demolition Rubble	Prepared SRI	Checked AJK

Results	Sample	Log x = y
2.20		0.342
0.10		-1.000
0.10		-1.000
2.30		0.362
8.90		0.949
1.10		0.041

Number of results : n 6
Mean : $\bar{X}$ = 2.45
Standard deviation : s 3.30
T value : t = 2.015

Corrected mean (95% confidence)

$\bar{X} + t * s / n^{0.5} = 5.17$

Max value = 8.90

log xm = ym = 0.949

Number of results : N 6
Mean y = -0.051

Standard deviation of 0.792

T = (ym-ya) / S = 1.263

Tcrit (fom table A1.3) 1.73

Result probably not an outlier

end

#REF!

Appendix 6

Gas Monitoring Results

Table of Atmospheric Conditions

Round 1 – 28.07.17 (DN)

Location	CH ₄ %	CO ₂ %	O ₂ %	H ₂ S (ppm)	CO (ppm)	Atmos P. (mb)	Flow (l/hr)	Water Level (mbgl)	Base of Pipe (mbgl)
BH2	0.0	0.6	20.7	0	0	987	-0.1 to 0.1	Dry	3.10
BH3	0.0	3.6	11.7	0	0	985	0.0	1.90	3.40

- Time increment of 3 minutes used for monitoring

Round 2 – 11.08.17 (AJK)

Location	CH ₄ %	CO ₂ %	O ₂ %	H ₂ S (ppm)	CO (ppm)	Atmos P. (mb)	Flow (l/hr)	Water Level (mbgl)	Base of Pipe (mbgl)
BH2	0.0	1.9	19.1	0	1	997	-0.1	Dry	3.10
BH3	0.0	3.0	13.1	0	1	996	0.0	1.86	3.40

Round 3 – 08.09.17 (SAE)

Location	CH ₄ %	CO ₂ %	O ₂ %	H ₂ S (ppm)	CO (ppm)	Atmos P. (mb)	Flow (l/hr)	Water Level (mbgl)	Base of Pipe (mbgl)
BH2	0.0	0.7	19.9	-	-	981	0.0	Dry	3.10
BH3	0.0	8.6	8.1	-	-	981	0.0	1.90	3.40

 Eastwood & Partners CONSULTING ENGINEERS St Andrew's House 23 Kingfield Road Sheffield S11 9AS Tel: (0114) 2554554 Fax: (0114) 2554330	COMPANY SHOP LIMITED NEW ROAD, TANKERSLEY GROUND GAS MONITORING RESULTS	JOB NO. DATE	41492 July – November 2017
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Round 4 – 04.10.17 (DN)

Location	CH ₄ %	CO ₂ %	O ₂ %	H ₂ S (ppm)	CO (ppm)	Atmos P. (mb)	Flow (l/hr)	Water Level (mbgl)	Base of Pipe (mbgl)
BH2	0.0	0.8	20.0	-	-	1002	0.0	Dry	3.10
BH3	0.0	3.0	12.3	-	-	1001	-0.1	1.60	3.40

Round 5 – 03.11.17 (NG)

Location	CH ₄ %	CO ₂ %	O ₂ %	H ₂ S (ppm)	CO (ppm)	Atmos P. (mb)	Flow (l/hr)	Water Level (mbgl)	Base of Pipe (mbgl)
BH2	0.0	2.1	18.9	-	--	995	0	Dry	3.10
BH3	0.0	6.3	17.6	-	-	995	-0.3	2.53	3.40

Round 6 – 16.11.17 (AJK)

Location	CH ₄ %	CO ₂ %	O ₂ %	H ₂ S (ppm)	CO (ppm)	Atmos P. (mb)	Flow (l/hr)	Water Level (mbgl)	Base of Pipe (mbgl)
BH2	0.0	0.7	20.4	1	0	999	0.1	Dry	3.10
BH3	0.0	9.5	9.8	0	0	999	0.0	2.77	3.40



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COMPANY SHOP LIMITED

NEW ROAD, TANKERSLEY

GROUND GAS MONITORING RESULTS

JOB NO.

41492

DATE

July – November 2017

Date	Atmospheric P	Trend	Humidity	Temp.	Weather
03.07.17	1018	Steady	82	16	Partly Cloudy
04.07.17	1021	Falling	67	15	Overcast
05.07.17	1020	Rising	88	15	Overcast
06.07.17	1018	Falling	83	18	Partly Cloudy
07.07.17	1016	Rising	73	20	Partly Cloudy
10.07.17	1009	Falling	73	18	Clear
11.07.17	1009	Steady	88	14	Light rain
12.07.17	1016	Rising	77	15	Scattered Clouds
13.07.17	1022	Falling	77	16	Clear
14.07.17	1018	Rising	77	15	Clear
17.07.17	1025	Steady	59	18	Clear
18.07.17	1021	Falling	72	18	Sunny Intervals
19.07.17	1007	Falling	89	18	Light Cloud
20.07.17	1007	Rising	67	15	Light Cloud
21.07.17	1007	Steady	72	16	Light Cloud
22.07.17	1006	Steady	77	16	Cloudy
23.07.17	1010	Steady	84	15	Cloudy/sun
24.07.17	1013	Rising	87	14	Cloudy/showers
25.07.17	1017	Falling	69	18	Cloudy
26.07.17	1006	Falling	87	16	Rain
27.07.17	1001	Steady	66	16	Cloud/sun
28.07.17	1004	Rising	67	16	Cloud/sun
29.07.17	1006	Falling	74	15	Cloudy
30.07.17	1003	Rising	74	16	Rain Showers
31.07.17	1008	Rising	66	18	Sunny Intervals
01.08.17	1012	Falling	65	17	Sunny Intervals
02.08.17	1011	Falling	84	16	Rain Showers
03.08.17	1002	Rising	65	19	Rain/Sun Showers
04.08.17	1004	Rising	67	18	Rain/Sun Showers
05.08.17	1015	Rising	62	16	Rain/Sun Showers
06.08.17	1018	Falling	75	14	Partly Cloudy

Prepared	ET	Date	01.07.17	Job	41492
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COMPANY SHOP

NEW ROAD, TANKERSLEY

ATMOSPHERIC CONDITIONS

07.08.17	1015	Falling	75	16	Mostly Cloudy
08.08.17	1013	Rising	92	12	Rain
09.08.17	1018	Rising	73	15	Mostly Cloudy
10.08.17	1023	Falling	60	19	Sunny
11.08.17	1016	Falling	69	16	Cloudy
12.08.17	1014	Rising	62	18	Sunny Intervals
13.08.17	1020	Falling	50	18	Sunny Intervals
14.08.17	1016	Falling	67	17	Cloudy
15.08.17	1015	Rising	58	19	Sunny
16.08.17	1017	Falling	56	19	Sunny Intervals
17.08.17	1008	Steady	54	21	Sunny
18.08.17	1008	Rising	61	16	Rain/Sunny Intervals
19.08.17	1017	Rising	62	17	Sunny intervals
20.08.17	1019	Falling	65	18	Sunny Intervals
21.08.17	1018	Steady	74	18	Sunny Intervals
22.08.17	1018	Falling	70	20	Cloudy
23.08.17	1011	Rising	67	19	Mostly Cloudy
24.08.17	1012	Rising	60	18	Sunny Intervals
25.08.17	1015		61	18	Cloudy
26.08.17	1016	Rising	70	16	Overcast
27.08.17	1018	Falling	72	15	Partly Cloudy
28.08.17	1015	Falling	73	18	Mostly Cloudy
29.08.17	1013	Falling	71	15	Overcast
30.08.17	1012	Rising	76	14	Overcast
31.08.17	1016	Rising	79	12	Scattered Clouds
01.09.17	1022	Falling	77	12	Scattered Clouds
02.09.17	1021	Falling	73	12	Scattered Clouds
03.09.17	1012	Falling	74	14	Mostly Cloudy
04.09.17	1009	Rising	88	16	Light Drizzle
05.09.17	1013	Rising	83	15	Cloudy
06.09.17	1017	Falling	75	14	Sunny Intervals

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ATMOSPHERIC CONDITIONS

07.09.17	1010	Falling	78	14	Mostly Cloudy
08.09.17	995	Steady	80	14	Rain Showers
09.09.17	995	Falling	75	15	Rain Showers
10.09.17	992	Falling	86	11	Mostly Cloudy
11.09.17	988	Rising	71	15	Mostly Rain
12.09.17	1004	Falling	67	14	Mostly Sunny
13.09.17	995	Rising	68	13	Rain Showers
14.09.17	1009	Rising	72	14	Sunny Intervals
15.09.17	1016	Falling	63	14	Sunny intervals
16.09.17	1011	Rising	67	13	Cloudy
17.09.17	1015	Rising	71	15	Sunny Intervals
18.09.17	1020	Steady	62	14	Cloudy
19.09.17	1020	Falling	71	14	Sunny intervals
20.09.17	1015	Falling	73	16	Cloudy
21.09.17	1013	Falling	87	14	Rain
22.09.17	1020	Rising	62	16	Sunny/cloudy
23.09.17	1021	Steady	79	16	Cloudy
24.09.17	1021	Rising	68	17	Cloudy
25.09.17	1022	Rising	88	15	Rain Showers
26.09.17	1023	Falling	86	15	Cloudy
27.09.17	1019	Falling	73	17	Cloudy
28.09.17	1018	Falling	71	16	Sunny Intervals
29.09.17	1015	Rising	77	15	Cloudy
30.09.17	1016	Falling	67	15	Mostly Cloudy
01.10.17	999	Rising	83	18	Rain Showers
02.10.17	1005	Rising	75	12	Rain Showers
03.10.17	1022	Falling	62	13	Sunny Intervals
04.10.17	1016	Falling	70	13	Cloudy
05.10.17	1013	Rising	61	13	Sunny Intervals
06.10.17	1021	Falling	61	13	Sunny Intervals

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NEW ROAD, TANKERSLEY

ATMOSPHERIC CONDITIONS

07.10.17	1014	Rising	80	13	Mostly cloudy
08.10.17	1020	Falling	68	15	Sunny intervals
09.10.17	1019	Falling	79	15	Mostly cloudy
10.10.17	1012	Falling	70	13	Mostly cloudy
11.10.17	1004	Falling	83	15	Rain/Sunny intervals
12.10.17	1018	Rising	65	13	Cloudy
13.10.17	1017	Falling	76	18	Sunny intervals
14.10.17	1017	Steady	78	17	Sunny intervals
15.10.17	1013	Falling	76	16	Cloudy
16.10.17	1009	Rising	79	18	Sunny intervals
17.10.17	1017	Falling	63	13	Sunny intervals
18.10.17	1013	Falling	86	11	Light rain
19.10.17	1001	Falling	84	15	Light cloud
20.10.17	1000	Falling	81	14	Light cloud
21.10.17	993	Rising	81	13	Sunshine/showers
22.10.17	1005	Rising	81	12	Sunny intervals
23.10.17	1010	Rising	72	14	Sunny intervals
24.10.17	1011	Rising	73	14	Cloudy
25.10.17	1018	Rising	69	14	Sunny
26.10.17	1022	Rising	84	13	Light cloud
27.10.17	1026	Rising	71	12	Light cloud
28.10.17	1021	Falling	74	13	Sunny Intervals
29.10.17	1025	Rising	63	11	Sunny
30.10.17	1029	Falling	61	8	Light cloud
31.10.17	1020	Falling	86	13	Light cloud
01.11.17	1018	Steady	73	12	Light cloud
02.11.17	1018	Falling	71	9	Sunny intervals
03.11.17	1012	Falling	76	9	Sunny intervals
04.11.17	1005	Rising	73	9	Light cloud
05.11.17	1012	Rising	78	5	Scattered cloud

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NEW ROAD, TANKERSLEY

ATMOSPHERIC CONDITIONS

06.11.17	1022	Falling	78	9	Sunny
07.11.17	1012	Rising	89	10	Heavy rain
08.11.17	1023	Steady	68	9	Sunny
09.11.17	1023	Falling	71	11	Light cloud
10.11.17	1016	Falling	84	11	Light rain
11.11.17	1010	Falling	80	6	
12.11.17	1012	Rising	65	4	
13.11.17	1023	Rising	70	4	
14.11.17	1021	Falling	89	11	Sunshie/Cloud
15.11.17	1025	Rising	91	9	Cloudy
16.11.17	1020	Falling	83	10	Sunshine/Cloudy
17.11.17	1025	Rising	72	11	Sunshine/Cloud
18.11.17	1019	Falling	71	11	Sunshine/Cloud
19.11.17	1014	Falling	80	8	Cloudy
20.11.17	1013	Falling	83	8	Cloudy

Readings taken from bbc.co.uk/weather

Historical readings taken from wunderground.com - Weather website

Highlighted rows denote when gas monitoring took place.

*Wells installed on 15.06.17.

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