RODGERS LEASK ENVIRONMENTAL
Consulting Geotechnical & Environmental Engineers

Land off Wakefield Road, Athersley

Phase 2 Geo-Environmental Report

LAND OFF WAKEFIELD ROAD, ATHERSLEY,

PHASE 2 GEO-ENVIRONMENTAL REPORT

for

HARWORTH ESTATES LTD

Document Reference & Approval

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Approval Status	Name & Position	Signature
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Revision Status	Date	Summary of Revisions
Rev A	28th September 2017	**Exec Sum**: site area ameneded to 7.73ha. **Para 1.2**: number of proposed properties ameneded to 220 dwellings. **Para 2.2**: site area ameneded to 7.73ha.

Executive Summary

This executive summary presents the salient points of the report and should not be referred to in isolation.

Instruction	In May 2017 Rodgers Leask Environmental Ltd (RLE) were commissioned by Harworth Estates Ltd to compile a geo-environmental investigation for a proposed residential development on land located to the west of Wakefield Road, Athersley, Nr Barnsley.
Site Description	The Site has an irregular outline, comprises open fields and scrubland and covers an area of approximately 7.73 hectares (ha) to the west of Wakefield Road.
History	The earliest map of 1850 shows the Site to be undeveloped until the 1890s when railways and buildings associated with the East Gawber Hall Colliery were developed across the northern portion of the Site. The buildings associated with the colliery subsequently became engineering works, which were subsequently demolished. No other significant changes have occurred on the Site. Two shafts are shown on later maps dating from 1904, located within the northern portion of the Site.
Geology	**Made Ground** Made ground is shown on BGS mapping beneath the area formerly occupied by the colliery infrastructure and engineering works. **Superficial Deposits** No superficial deposits are shown on-Site. **Solid Geology** The Site is underlain by the Pennine Middle Coal Measures Formation, comprising mudstone, siltstone and sandstone with occasional coal seams. Three mapped beds of sandstone are shown outcropping beneath the south, centre and north of the Site. Three separate mapped coal seams are shown to outcrop on Site. The Two Foot Coal seam is associated with a marine band (fossil marker horizon) and outcrops in three different locations on Site due to faulting. **Structure** Three normal faults are shown on Site. Two faults trend west-northwest through the centre of the Site and one trends northwest along the northern boundary. The coal bearing strata dip 5-10° to the northeast.
Mining	No visual of evidence of workings within coal seams encountered during this investigation was noted. Further investigation using rotary drilling has been recommended to investigate both recorded and possible unrecorded workings.
Mineshaft	Nine mine entries are shown on or within 20m of the Site, five of which are mine shafts and four are adits. Two mine shafts and three adits are shown within the north-western extents of the Site. No evidence was encountered during this investigation of the shafts however the presence of deep made ground hindered inspection. Rotary probe drilling will be required.
Ground Conditions	The ground conditions encountered during the fieldwork generally comprised initial topsoil or made ground topsoil, overlying made ground and/or the Pennine Middle Coal Measures Formation, which comprised clays mudstone, sandstone and siltstone.
Risk from combustible material	Coal has been identified in near surface strata and precautions will be required. Further assessment of the risk of combustion within made ground is on going.

Radon	Basic radon protection measures will be required in new dwellings for the Site.
Gas Protection	Amber 1 gas protections are considered necessary subject to verification on completion of the gas monitoring program.
Hydrogeology	The bedrock stratum underlying the Site is classified as a Secondary A Aquifer.
Contamination assessment	The findings of the investigation would suggest a low to moderate risk to human from the soils on the site in their current condition. It is considered the site would be suitable for residential use following implementation of some conventional remedial techniques. The risk to human health could be mitigated by placement of clean cover in garden and landscaped areas, with any areas of gross or hazardous contamination removed or remediated.
Foundations	Subject the outcome of further investigation of potential historic mine working, traditional strip/trenchfill foundations are considered appropriate for proposed new dwellings. Foundations will need to be deepened to reach suitable bearing strata where located in made ground exceeding the minimum founding depth. This may apply to plots in the area of the historic mine railway in the north of the Site (where made ground depths were encountered up to 2.7m bgl).
Floor Slabs	Topsoil should be removed from beneath plot footprints. Suspended beam and block ground floor construction for proposed dwellings is considered appropriate for the proposed development
Sulphate Classification	It is recommended buried concrete complies with DS4 AC5.
Drainage	Based on the negligible infiltration rate recorded, it is not considered likely that soakaway drainage would be feasible and we recommend at this stage that an alternative positive outfall be sourced.
Roads and Hardstanding	CBR testing should be undertaken at formation to facilitate detailed design of roads and hardstandings.

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Appendices

1.0 Introduction

1.1 Terms of Reference

In May 2017 Rodgers Leask Environmental (RLE) Ltd was commissioned by Harworth Estates Ltd to compile a geo- environmental investigation for a proposed residential development on land located to the west of Wakefield Road, Athersley, Nr Barnsley. This land will henceforth be referred to as the 'Site'.

The scope of works proposed was outlined within RLE's proposal dated 23rd June 2017.

1.2 Proposed Development

A residential development is proposed for the Site, including up to 220 dwellings with private gardens and public open space. An Illustrative Masterplan is included within Appendix A.

1.3 Existing Phase 1 Desk Study and Coal Mining Risk Assessment

RLE have previously issued the following reports which should be read in conjunction with this Phase 2 Geo-Environmental report:

- Phase 1 Desk Study, Land off Wakefield Road, Athersley, Barnsley for Harworth Estates (Ref: 17176-RLE-17-00-RP-O-0001 dated 31st May 2017)
- Coal Mining Risk Assessment, Land off Wakefield Road, Athersley, Barnsley for Harworth Estates (Ref: 17176-RLE-17-00-RP-O-002), dated 31st May 2017)

1.4 Objectives

The objectives of the Geo Environmental investigation were to:

- Assess the suitability of the Site for the proposed residential development, taking into account the ground conditions and contaminative status of the Site.
- Identify foundation depths and substructure design types appropriate to the ground investigation results.
- Investigate the potential for unrecorded historic coal mining.
- Identify issues that may potentially give rise to abnormal development costs.

1.5 Scope

In order to achieve the outlined objectives the scope of the Geo Environmental report encompassed:

- An intrusive ground investigation based on a trial pits and window sample borehole investigation.
- An assessment of Site contamination levels and geotechnical properties after laboratory testing of material samples collected during the Site investigation.
- The production of a Site-specific contamination assessment.
- A preliminary investigation of near surface coal seams and recorded mine entries.
- Recommendations for foundation solutions and proposed substructure design types.

RLE provided additional proposals involving rotary drilling to investigate historic mine workings beneath however the Client considered these works were outside the scope of investigation required at this stage in the project.

1.6 Limitations and Confidentiality

All conclusions and recommendations made within this report are based upon and limited to the factual information obtained as part of this investigation. No responsibility can be taken by RLE Ltd for information obtained by third parties and it has been assumed that all third party information provided is true and correct.

No liability can be accepted for conditions not revealed within the exploratory holes or pits undertaken by this investigation. The exploratory points cover only a small proportion of the total Site area. RLE Ltd has where necessary undertaken extrapolation between locations and no responsibility can be taken for different conditions which may occur between locations.

RLE Ltd has undertaken the work in accordance with our understanding of current best practice at the time of undertaking the report. Further assessment and revision of the report may be required should new information come to light or legislation/changes to best practice be introduced after the date of issue of the report.

RLE Ltd has prepared the report for the sole use and reliance of the Client. The report may not be used or relied upon by any unauthorised third party without the explicit written agreement of RLE Ltd.

The interpretive work undertaken within this report remains the intellectual property of RLE Ltd and must not be divulged to any commercial third party without prior written agreement of RLE Ltd.

No assessment has been made for the presence of pernicious plant species e.g. Japanese Knotweed and Giant Hogweed, within the remit of this investigation. However Japanese knotweed was not noted on the Site.

2.0 Site Location and Description

2.1 Site Location

The Site is located on land to the west of Wakefield Road (A61), Athersley, Nr Barnsley, South Yorkshire. The Site centre co-ordinates are at approximately 434724E, 408742N. A Site location plan is included in Appendix B.

2.2 Site Description and Walkover Features

A Site walkover was conducted on 11th May 2017 by an RLE engineer. The purpose of the Site walkover was to provide a general description of the Site. Detailed surveys such as wildlife or tree surveys were outside the scope of this report.

The Site has an irregular outline, and covers an area of approximately 7.73 hectares (ha) to the west of Wakefield Road, Athersley.

The Site comprises of two distinct areas, separated by a hedgerow which runs down the centre of the Site from northeast to southwest. The area of the Site to the west of the hedgerow is owned by a local resident who resides within a property located adjacent to the northern Site boundary. The northern portion of this area was occupied by open paddocks which at the time of the Site walkover were being used to graze horses. The rest of this area comprised an open grass field which gently slopes downwards in a southerly direction.

The eastern half of the Site comprises of undulating grassland and scrubland which generally slope downwards in a southerly direction. A concrete pipe drain was identified within the central area of this area which, at the time of the Site walkover was discharging water to an open drainage channel which ran through a 'valley feature' located within the southern portion of this area. The drainage channel flowed into a pond located within the southernmost extent of the Site.

A large wooded embankment runs the entire length of the southern Site boundary on top of which is a public right of way.

The area adjacent to the north/ northwest of the Site was formerly occupied by the East Gawber Hall Colliery. This was demolished at some point during the 1920s/30s. At the time of the Site walkover the area was covered by stockpiles of overgrown colliery spoil (red shale and coal fines) and some demolition waste. Evidence of fly tipping was also seen in this area.

Residential gardens and properties bound the Site to the far north and the Site rises steeply to a driveway which serves these properties. A retaining wall approximately 2m to 3m metres high is located along the eastern Site boundary beyond which is a car park and car sales business.

Mature trees and hedgerows are located within the southern, western and northern boundaries.

Overhead power lines cross the Site from east to west and north to south.

A Site features plan is presented in the Phase 1 DTS report and is included here in Appendix C.

2.3 Site Access

Access to the Site was gained from residential properties (East Gawber Farm) located off Wakefield Road, which were located within the northern portion of the Site.

2.4 Surrounding Area

The land beyond the Site boundaries consists of:

- **North –** Various commercial buildings and sheds located adjacent to the Site. An area of 'rough ground' containing various overgrown stockpiles of colliery spoil and other fly tipped wastes were located to the north/northwest.
- **East –** Wakefield road bounds the Site to the east, beyond which are residential properties, a recreation ground and a playground. A car wash and car park are located adjacent to the southern half of the eastern Site boundary and an electricity substation is located to the southernmost tip of the eastern Site boundary.
- **South –** A bus maintenance depot and construction plant depot are located adjacent to the southern Site boundary. A council depot with a road salt storage building is located approximately 60m south of the Site.
- **West –** A former railway embankment bounds the entire length of the western Site boundary. Open fields are located beyond the embankment.

3.0 Phase 1 Desk Study/CMRA Information

For ease of reference, pertinent desk study information has been taken from the Phase 1 Desk Study and Coal Mining Risk Assessment (CMRA) and is presented in the following sections.

3.1 Historical Lane Use

The earliest map of 1850 shows the Site to be undeveloped until the 1890s when railways and buildings associated with the East Gawber Hall Colliery were developed across the northern portion of the Site. Two shafts were also located within the northern portion of the Site. The East Gawber Hall Colliery was located adjacent to the north/northwest of the Site but was demolished at some time during the 1920s/1930s as the Site and related infrastructure were not shown on the map of 1929/1930. No other significant changes have occurred on the Site.

Further afield from the Site, the Primrose Colliery and the Wharncliff Carlton Colliery were located 150m and 300m south of the Site respectively between 1890 and 1929. The Barnsley Coal Railway Extension was located along the western Site boundary between 1890 and 1973.

Two shafts are shown on later maps dating from 1904, located within the northern portion of the Site.

3.2 Geology

3.2.1 Made Ground

Geological mapping indicates that made ground is present beneath the northern portion of the Site, an area which was formerly occupied by the colliery railway, infrastructure and engineering works.

3.2.2 Superficial Deposits

Superficial deposits of glacio-fluvial sand and gravel are shown to underlie an area to the north of the Site. No superficial deposits are shown directly beneath the Site.

3.2.3 Solid Geology

The Site is underlain by the Pennine Middle Coal Measures Formation, comprising mudstone, siltstone and sandstone with occasional coal seams. Three mapped beds of sandstone are shown outcropping beneath the south, centre and north of the Site.

Three separate named coal seams are shown to outcrop on Site; the Two Foot, Abdy (also called the Winter) and the Top Beamshaw seams. The Two Foot Coal seam is associated with a marine band (fossil marker horizon) and outcrops in three different locations on Site due to faulting.

3.2.4 Structure

Three normal faults are shown on Site. Two faults trend west-northwest through the centre of the Site and one trends northwest along the northern boundary. The coal bearing strata dip 5-10° to the northeast.

3.3 Coal Mining

The Site is located in an area affected by coal mining activities, therefore a Coal Authority Mining Risk Assessment (CMRA) was undertaken by RLE in May 2017.

In summary the report states:

'From historical mapping, the Site and immediate surrounding area has a long history of coal mining due to the presence of economically viable coal outcrops on Site and at shallow depth. The northwest of the Site is shown as part of East Gawber Colliery, and Primrose Main Colliery and Wharncliffe Carlton Colliery are shown between 50m and 250m south of the Site up until 1904.

Localised recorded workings are shown in the north western extents at c.5m depth in the Abdy Seam. Also, roadways leading to likely collapsed longwall workings (off Site) are also shown in the Kent's Thick seam at c.50m depth. The risk of void migration to the surface is considered high from the Abdy seam, and low from the Kent's Thick. There is a high risk of unrecorded shallow workings on Site which are likely to be present in areas down-dip of the three named coal seams on Site. Nine mine entries (five shafts and four adits) are recorded on or within 20m of the Site, all of which are shown in the west and northwest of the Site or off-Site to the northwest. No treatment details are recorded for any of the mine entries, and further unrecorded mine entries may be present in other areas of the Site.'

3.4 Ground Workings

There are sixteen records of historical surface ground working features on Site. These relate to unspecified heaps, refuse heaps, ponds and collieries.

A further twenty eight records exist surrounding the Site relating to unspecified ground working, unspecified heaps, collieries, refuse heaps, unspecified disused pits and unspecified drift.

3.5 Hydrogeology

3.5.1 Groundwater Vulnerability and Soil Leaching Potential

The northern most extent of the Site is classified as a minor aquifer with soils of high leaching potential with a soil vulnerability category of '**HU'**. This is defined by the Environment Agency as;

Soils in urban areas and restored mineral workings. These soils are therefore assumed to be highly permeable in the absence of Site-specific information'.

The wider Site area where superficial and artificial deposits are absent is classified as a minor aquifer with soils of low leaching potential with a soil vulnerability category of '**L**'. This is defined by the Environment Agency as:

'Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants'.

3.5.2 Aquifer Designation

The underlying Glacial Fluvial Deposits and Pennine Middle Coal Measures and Woolley Edge Sandstone bedrock are classified by the Environment Agency as Secondary A aquifers.

Secondary A aquifers are defined as:

'Permeable layers capable of supporting waste supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers'.

The Site is not within 500m of a groundwater or surface water Source Protection Zone (SPZ).

3.6 Hydrology

There are six recorded detailed river networks located within the Site boundary. This includes four tertiary rivers, one secondary river and one culvert. The culvert is indicated to run beneath the central portion of the eastern half of the Site.

There are 26 No. other recorded detailed river networks recorded off Site between 1m and 500m from the Site.

3.7 Environmental Regulatory data

A summary of the environmental database information contained within the Phase 1 DTS is presented below:

- 27 No potentially contaminative uses are identified from historically mapping in the northern portion of the site.
- 3 No historical tanks related to maps dated 1892 to 1906 are recorded in the northern portion of the site.
- A historic garage is recorded adjacent to the eastern boundary.
- 3 No electrical sub-stations are recorded on maps dated 1977-1982.
- There are no records of permits or registers for the Site itself or within 50m of the Site.
- There are no recorded National Incident Recording System List 1 incidents within 500m of the Site.

- There are no records of COMAH and NIHHS Sites, no records of radioactive substances being used and no records of the Site being determined as Contaminated Land under Part IIA of the Environmental Protection Act (1990) on-Site or within 500m of the Site.

- There are six records of an operational waste treatment Site within 500m of the Site. There is one public waste disposal Site 375m south, four scrap yards 407m and 446m southeast and one recycling centre 420m southeast.

- There are two records of Environment Agency historic landfill Sites within 250m of the Site. One record is 105m southeast of the site, with first recorded dated being 01st June 1997 and last recorded date being 30th November 1997, no other information is recorded. The second is 193m south of the site, no further details are recorded.

- There are no fuel station entries for the Site itself or within 500m of the Site.

- The property is located within a Radon affected area as defined by the Health Protection Agency (HPA) as between 3 and 5% of properties are above the action level. Basic radon protection measures will be required for the Site.

- There are no potable groundwater or abstraction licenses within 2000m of the Site. There are three surface water abstraction licences within 2000m of the Site, all of which are in the same location 1962m southeast, one being active and owned by Barnsley Metropolitan Borough Council.

- The Site is not located within a groundwater protection zone (SPZ).

- The Site is not recorded as being within a floodplain as recorded by the Environment Agency.

4.0 Site Conceptual Model

This section presents the qualitative risk assessment of the risk posed from potential on and off-Site contamination sources, identified by the desk study.

The conceptual model below has been developed based on the commonly adopted source-pathway-receptor model as recommended within CLR11 Model Procedures for the Management of Land Contamination.'

4.1 Proposed Development

A residential development with gardens and public open spaces is proposed for the Site. Therefore a residential end-use with plant uptake scenario will be used for contaminant screening for those areas proposed for residential dwellings shown on the Masterplan. In proposed landscaped areas, a public open space near residential housing scenario is considered appropriate.

4.2 Potential Sources of Soil Contamination Related to the Sites Past and Current Use

4.2.1 On-Site

Historical records and the Site walkover show that the majority of the Site, with the exception of the northern extents, has been open grassland and scrubland and has been mainly used for animal grazing up until the present day.

The northern portion of the Site was occupied by infrastructure associated with the East Gawber Hall Colliery and railway lines which served the colliery from circa~1890 to the 1920s/30s. At least 3 No historical tanks are known to have been located within this area. A number of mineshafts associated with the colliery are also shown to be present within the northern area of the Site.

It has been identified that the past uses of the Site have included coal mining and agricultural.

Based on the past agricultural use of the Site, the likelihood of a significant source of contamination presenting a significant risk is considered low. However, it is not uncommon for unrecorded deleterious materials to be found buried on agricultural land.

Based on part of the Site being occupied by railways, colliery infrastructure and mineshafts, the risk of a significant source of contamination presenting a significant risk is considered moderate. Made ground comprising predominantly reworked natural materials is likely to be present.

Based on the past and historic uses of the Site, it is recommended that the following chemical contaminants be tested for across the Site.

Inorganic Contaminants	Organic Contaminants
Heavy metals - Barium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Vanadium Zinc, Semi metals and Non metals - Arsenic, Sulphate, Sulphide, Sulphur, Nitrate, Asbestos, pH, Free Cyanide	Phenol, Oil/fuel hydrocarbons, Aromatic Hydrocarbons, PAHs, Chlorinated Aliphatic and Aromatic Hydrocarbons and PCBs

Consideration of the presence of the above contaminants in soil, liquid and vapour phase may be required.

4.2.2 Off Site

The area surrounding the Site is shown to have an industrial heritage from historical mapping. The following potential sources of contamination in the local vicinity of the Site have been identified:

- East Gawber Hall Colliery was located adjacent to the northern Site boundary;
- The 'Primrose Main Colliery' was located approximately 150m south of the Site;
- The 'Wharncliff Carlton Colliery' was located approximately 300m to the south of the Site;
- A railway embankment bounds the Site to the west. The materials used within the construction of the embankment are unknown and could contain contaminated materials associated with colliery spoil/working;
- An electricity substation is located 13m east of the Site; this dates back to the 1970's and may be a source of PCB's but this risk of migration onto site would be low.
- Various 'works' including a bus depot/maintenance yard, transportation business, car sales business (historically recorded as a garage) are all located within close proximity to the south and east of the Site; and
- A local council depot for road maintenance is located approximately 60m south of the Site. The depot contained the facilities for storing road salt.

Based on the surrounding land use, it is considered unlikely that any additional chemical contaminants, other than those identified for the Site itself, have a potential to affect the Site.

4.3 Ground Gassing

4.3.1 On-Site

The Site has been subjected to some colliery spoil tipping and placement of made ground which has the potential to generate ground gas, however unless this material has significant coal or organic waste content, it is unlikely to be gassing significantly.

Historic mineshafts, in the north of the Site, are a potential pathway for ground gas. Gas can be generated in underlying coal workings/seams and migrates to the

ground surface via the shafts and adits. These shafts are however historic and the workings are likely to be flooded and/or collapsed, which reduces this risk. Hence the likelihood of gas from abandoned workings affecting the Site is considered low to moderate.

No other potential sources of significant ground gas are shown on Site.

4.3.2 Off-Site

A colliery is located adjacent to the north/northwest of the Site and made ground with high coal and ash content may be present.

Made ground with a high coal and ash content may be associated with the former railway line and embankment located along the western Site boundary and beneath the industrial areas to the south of the Site.

A historic landfill Site is recorded 105m southeast of the Site which operated between the 1st June and the 30th November 2007. The waste types deposited at the Site are unknown.

Industries in the wider Site area are potential sources of ground gas, however it is highly unlikely ground gas will migrate the significant distance onto the Site.

4.4 Potential Pathways

With regard to the assessment of risk to human health, the following pathways are considered to be potential exposure routes based on the proposed residential end-use, in accordance with the CLEA Documentation:

- Dermal contact;
- Direct ingestion of soil;
- Inhalation and ingestion of soil dust;
- Inhalation of gases;
- Ingestion of contaminated water via plastic pipes; and
- Consumption of home grown produce.

With regard to Controlled Waters, the following pathways are considered applicable:

- Downward infiltration to the underlying Secondary A Aquifer through soils and bedrock;
- Lateral migration through soils and bedrock towards the nearest surface features; and
- Newly created preferential pathways associated with the redevelopment of the Site e.g. deep boreholes/piles/sewers.

4.5 Potential Receptors

The following are considered to be potential receptors for contamination:

Receptor		Additional information
Human Health	Future Site users	A female child aged 1-6 is used within current regulatory guidance (CLEA) to derive assessment criteria
Controlled Waters	Secondary A Aquifer	Low sensitivity. The Site is not within 500m of a groundwater or surface water Source Protection Zone (SPZ).
	Tertiary and secondary river networks on Site	Moderate to low sensitivity. The water features located on-Site comprises a series of drainage ditches which discharge into a pond located in the southern portion of the site. The outfall of the pond discharges to open drainage ditches the south.
Other	Neighbouring buildings	
	Underground structures	
	Flora and fauna	

4.6 Pollutant linkages

Based on the information above, the following potential pollutant linkages are considered applicable to the Site. The risk classification has been qualitatively derived in accordance with CLR 11 Model Procedures for the Management of Land Contamination. The terminology used is taken from CLR 11, and a summary of the principal terms are provided in Appendix D.

Pollutant Linkage	Source	Pathway	Receptor	Probability	Consequence	Risk
1	Contaminated Soils arising from imported made ground and historical activities on Site.	Ingestion of soil, dermal contact, inhalation of dust	Humans – end users	Low likelihood	Medium	Moderate / Low
2	Asbestos Containing Material in soil arising from imported made ground and historical activities on Site.	Inhalation of dust and fibres	Construction workers, service personnel and end users	Low likelihood	Severe	Moderate
3	Contaminated soils arising from imported made ground and historical activities on Site.	Ingestion of soil, Dermal contact; Inhalation of dust.	Construction workers	Likely	Mild	Moderate / Low
4	Contaminated soils arising from imported made ground and historical activities on Site.	Inhalation of soil dust	Members of the public adjacent to the Site during construction	Low likelihood	Medium	Moderate / Low
5	Contaminated Water Supplies	Ingestion of water, migration of organic contaminants via plastic pipes	Humans – end users	Low likelihood	Medium	Moderate / Low
6	Ground gases (methane and carbon dioxide) from coal seams / workings / made ground / historic landfill to south	Mineshafts Migration into trenches and dwellings	Human – end users, proposed buildings and infrastructure	Unlikely	Severe	Moderate/Low
7	Contaminated Soils and Groundwater	Leaching and groundwater flow to surface water	Drainage ditches / pond	Low likelihood	Mild	Low
8	Contaminated soils and Groundwater	Downward infiltration into underlying aquifer	Secondary A aquifer	Low likelihood	Mild	Low
9	Contaminated Soils	Leaching of sulphate and corrosive contaminants	Buried concrete structures and services	Low likelihood	Mild	Low
10	Contaminated Soils	Uptake of available phytotoxic contaminants	Flora & Fauna	Low likelihood	Minor	Very Low
Risk Classification Matrix - CIRIA C552 (2001).						

Schematics of the conceptual Site model are presented in Appendix E.

The above Conceptual Site Model (CSM) was used to design the subsequent Site investigation which is detailed in the following section.

5.0 Ground Investigation Works

5.1 Intrusive Works

The following intrusive works were undertaken between 19th July 2017 and 27th July 2017:

- 23 No. machine excavated trial pits (TP's).
- 5 No. machine excavated trial trenches (TT's).
- 18 No. window sampled boreholes (BH's).

The locations of TPs, TT's and BH's are indicated on RLE Drawing No.17176-RLE-17-XX-DR-O-004 contained in Appendix F. Exploratory points have been positioned on approximate 50m centres.

TP's, TT's and BH's were positioned to provide a general coverage of the Site in conjunction with providing the following targeted investigation.

TP and BH reference	Rationale
WS01, WS02, WS03, WS04, WS07, TP02, TP03	Drilled/excavated to provide details of the ground conditions and groundwater depths underlying / the southern and western portions of the Site. Gas and groundwater monitoring ancillaries installed in WS01, WS02, WS03, WS04 and WS07.
TP01, TT1, WS06, WS08	Drilled/excavated to target the Top Beamshaw Coal Seam and to provide details of the ground conditions within the western area of the Site. WS08 installed with gas/groundwater monitoring ancillaries to provide data of gas and groundwater conditions.
TP05. TP05A, TP06, TP06A, WS07	Drilled/excavated in an area that may have been affected by the adjacent colliery.
TP04, TT2	Excavated to target the Abdy Coal Seam which outcrops across the central area of the Site.
TP08, TP08A, TP08B, TP09, WS09, WS11	Drilled/excavated to provide details of ground conditions within the central area of the Site. WS11 installed with gas/groundwater monitoring ancillaries to provide date on gas and groundwater conditions in the area.
TP07, TT3, TT4, TT5, WS10, WS12	Drilled/excavated in the vicinity of potential abandoned mineshafts and areas of potential made ground associated with historic mining activities.
TP10, TP10A	Excavated in the vicinity of areas of potential made ground associated with historic mining activities.
TP11, TP12, TP13, WS13, WS14, WS15, WS16	Drilled/excavated to provide ground conditions within the northern/north eastern areas of the Site. WS14 installed with gas and groundwater monitoring ancillaries.
TP14, TP15, WS17, WS18	Drilled/excavated to provide ground conditions within the eastern areas of the Site.WS17 installed with gas and groundwater monitoring ancillaries.
TP16 WS05.	Drilled/excavated to provide ground conditions within the southern area of the Site.

WS = Window sample borehole, TP = Trial Pit, TT = Trial Trench

TP's, TT's and BH's were logged in accordance with BS 5930 'Code of Practice for Site Investigations' 2015. A copy of the logs is contained in Appendix G.

5.2 Trial Pits

A series of 23 No. and 5 No. machine excavated TP's and TT's were undertaken between the 19th and 25th July 2017 by means of a tracked 360° excavator.

TP's were excavated to depths of between 1.9m and 3.4m below ground level (bgl).

TT's were excavated to depths of between 1.2m and 2.7m bgl.

5.3 Window Sampled Boreholes

A series of 18 No. BH's, utilising a tracked window sampler drilling rig, were undertaken between 24th and 28th July 2017.

BH's were drilled to depths of between 2.0m and 4.45m bgl.

5.4 Soil Sampling

Environmental soil sampling from TP's and TT's was undertaken by an RLE Site engineer. The guidelines contained in BS10175: 2011 'Investigation of Potentially Contaminated Sites - Code of Practice' were followed during recovery of samples for chemical analysis. During sampling all reasonable effort was maintained to prevent cross contamination in the sampling strategy. All samples were collected in new clean containers, at depths given on the appropriate exploratory hole records. The samples were stored in cool boxes, with freeze packs, in order to maintain a low temperature during transportation to the laboratory.

5.5 Infiltration Testing

Infiltration tests were undertaken in TP01, TP02 and TP05 and were generally carried out in accordance with the methodology set out in BRE 365. BRE 365 requires tests to be repeated 3 times, however, due to the impermeable nature of the ground, only one fill was undertaken.

6.0 Ground Conditions

6.1 Strata Encountered

The ground conditions encountered during the fieldwork generally comprised initial topsoil or made ground overlying the Pennine Middle Coal Measures Formation.

The following table summarises the strata encountered beneath the Site in additional detail. The location and extent of the strata are shown on RLE Drawing No.17176-RLE-17-XX-DR-O-004 contained in Appendix F. The depths given are from ground level as it existed at the time of the investigation. The individual exploratory hole logs should be referred to for specific detailed information.

Strata Encountered	Mean depth to top of strata (m) [range, m]	Mean depth to base of strata (m) [range, m]	Mean thickness of strata (m) [range, m]
MADE GROUND Made Ground was encountered in five distinct areas which are as follows: **1: Made Ground topsoil (wherever MG present)** (TP02, TP04, TP05, TP05A, TP06, TP06A, TP07, TP08, TP08A, TP08B, TP09, TP10, TP10A, TP11, TP13, TP13A, TP14, TP15, TP16A, WS02, WS04, WS07, WS08, WS09, WS10, WS13, WS14, WS18) generally comprising brown ashy clayey and sandy topsoil with fragments of brick, coal, sandstone gravels and ceramic fragments. Metal pieces, glass, tarmac and wood were encountered within the topsoil matrix encountered in TP10, TP10A, TP12 and WS12.	0.00 [0.00]	0.33 [0.2-0.7]	0.33 [0.2-0.7]
2: Made ground within the northern area of the Site (within the vicinity of the former coal mining railway and associated infrastructure) (TP10, TP11, TP12, WS10, TT3, TT4, TT5, WS11, WS12, WS13, WS14) generally comprising black/grey and brown ashy gravelly clay containing varying quantities of clinker, coal, brick fragments, ceramics, glass, shale, metal pieces, tarmac and sandstone/mudstone/siltstone gravels.	0.21 [0.00-0.3]	1.30 [0.6-2.5]	1.09 [0.6-2.25]
3: Made ground within the vicinity of the historic track way located within the western half of the Site. (TP02, TP05A, TP07 WS07) generally comprising stiff reddish orange and dark brown clay containing varying quantities of coal fragments, bricks, red shale and gravels of mudstone and sandstone.	0.29 [0.2-0.4]	1.35 [0.8-1.7]	1.06 [0.55-1.5]

Strata Encountered	Mean depth to top of strata (m) [range, m]	Mean depth to base of strata (m) [range, m]	Mean thickness of strata (m) [range, m]
4: Made ground within the central area of the Site. (TP08, TP08A, TP09, WS09) generally comprising black ashy gravels of coal, red shale, whole bricks, occasional slag gravels and mudstone/sandstone gravels. Fragments of leather were encountered in TP08.	0.38 [0.2-0.6]	1.68 [0.7-2.2]	1.3 [0.3-2.0]
5: Made ground beneath scrubland within the north eastern half of the Site (TP13, TP13A, TP14, TP15, TP16A, WS17, WS18) generally comprising yellow clayey gravelly sand and grey gravelly clay containing cobbles and boulders of sandstone and ironstone and occasional fragments of ceramic, brick, coal and shale.	0.28 [0.2-0.3]	1.13 [0.6-1.5]	0.85 [0.3-1.5]
6. TOPSOIL (overlying natural strata) Generally comprising dark brown sandy gravelly clayey topsoil which was encountered in TP01, TP03, TP16, TT1, TT2, WS01, WS03, WS05, WS06, WS15, WS16 and WS17.	0.00 [0.00]	0.27 [0.15-0.4]	0.27 [0.15-0.4]
7. PENNINE MIDDLE COAL MEASURES FORMATION Encountered in all but one (WS03) exploratory positions and comprised clay, gravel (weathered bedrock), mudstone, sandstone, siltstone.	1.54 [0.15-3.7]	2.35* [0.4-4.45*]	0.8* [0.1-2.4*]
COAL SEAMS **Interpreted as the Two Foot Seam:** identified within TP12 (described as COAL) between 1.6m and 2.0m bgl and WS15 as COAL (returned as coal gravel) between 3.6 to 4.0m bgl. **Interpreted as the Abdy Seam:** identified within TP08A (described as black highly weathered clayey COAL) between 2.2m and 2.7m bgl, TP08B (described as black weather high quality fractured COAL) between 0.8m and 2.3m bgl and WS17 (described as black COAL excavated as sands and gravel) between 2.3m and 2.6m bgl. **Interpreted as the Top Beamshaw Seam:** identified in WS06 (described as black COAL excavated as gravel) between 1.2m and 1.6m bgl. **Interpreted as the Low Beamshaw Seam:** identified in WS04 (described as black brown COAL with occasional lenses of brown soft clay) between 1.8m and 2.4m bgl.			

*base of formation not determined

6.2 General Observations

The following observations were made during the excavation of the trial pits and drilling of boreholes:

- Visual or olfactory evidence of contamination was observed within TT3, TT4 and TT5 in the form of hydrocarbon contaminated clayey made ground.
- The sides of the TP's were generally stable during excavation into made ground and natural stratum with the exception of TP08. Made ground was

encountered in TP08 from 0.0m to 2.0m bgl at which point it collapsed. The base of the made ground was not determined.

- Perched groundwater strikes were encountered in TP08 at 2.0m bgl, TP09 at 1.8m bgl, TP14 at 3.4m bgl, WS04 at 3.0m bgl, WS06 at 2.0m bgl, WS16 at 3.5m bgl and WS18 at 4.0m bgl. The groundwater flows were recorded as very low with the exception of TP08 where groundwater flow was recorded as fast. This was the cause of the TP collapsing.
- No voids were evident during the excavation or drilling of TP's and BH's.

6.3 Gas Monitoring

Gas monitoring has been carried out using a Geotechnical Instruments GA2000 infra-red landfill gas analyser with integral flow measuring capability.

Six gas monitoring visits are scheduled as part of this investigation. The gas monitoring results for the first three monitoring visits are provided in Appendix H. Barometric pressure was noted to be falling but above 1000mb on all three visits. A further three visits will be undertaken.

A summary of the gas monitoring results to date are presented below:

BH Location	Maximum (%v/v) (Initial/Steady)		Maximum (%v/v) (Initial/Steady)		Minimum (%v/v) (Initial/ Steady		Max Gas Flow Rate (l/hr)
WS01	0.1	0.1	2.8	2.9	17.5	16.7	0.1
WS02	0.1	0.1	2.0	2.8	18.2	16.7	0.1
WS03	0.1	0.1	2.0	2.0	18.8	18.5	0.1
WS04	0.1	0.1	2.7	2.8	17.1	17.1	0.1
WS07	0.1	0.1	2.2	2.3	18.7	18.4	0.1
WS08	0.1	0.1	2.7	2.7	18.0	17.9	0.1
WS10	0.1	0.1	14.4	14.6	2.8	1.2	0.1
WS11	0.1	0.1	3.2	3.4	15.8	15.6	0.1
WS14	0.1	0.1	3.4	3.4	15.8	15.6	0.1
WS17	0.1	0.1	0.6	4.6	19.2	12.3	0.1

6.4 Groundwater

Groundwater levels were monitored on each gas monitoring visit. The groundwater levels are recorded in Appendix H together with the gas monitoring results as m bgl.

6.5 Mine Shaft

Surface slip trenching (referenced TT3 to TT5) was undertaken in the vicinity of the mineshafts and adits, the locations of which were determined using coordinates obtained from the Coal Authority and historical mapping. The trenches

encountered natural ground at depths of between 1.8m and 2.5m bgl. No features relating to shafts of adits were observed in the base of the TT's.

Due to the depth of made ground encountered within the TT's, a surface strip was not considered feasible as this would have involved the removal of made ground material up to a depth of >2.5m bgl and therefore movement of a considerable volume of material. Further investigation of the mineshafts and adits will be required utilising a rotary drilling rig.

6.6 Infiltration Testing

Infiltration rates recorded within TP01, TP02 and TP05 were very low to negligible. The results of the tests are presented in Appendix I.

7.0 Chemical Testing

7.1 Sampling

Disturbed samples of the strata were taken during excavation of TP's, TT's and BH's by RLE. Samples were stored in cooler boxes prior to being transported to an MCERTS accredited laboratory. A selection of these samples was tested for the presence of contaminants, for classification purposes and for combustibility assessment.

7.2 Testing

Chemical and combustibility analysis of samples was carried out at the independent laboratory, Chemtest Ltd. A copy of the results is included in Appendix J.

7.3 Risk to Human Health

7.3.1 Testing rationale

Solid (soils) contamination testing was undertaken on the following samples to enable a general spread of chemical information:

Reference	Depth (m)	Strata	PCB's WHO 12 Congeners	Rodgers Leask TPH Risk Assessment Suite	Rodgers Leask Standard Suite	Rodgers Leask CLR Suite	Asbestos Screen	Calorific Value	BRE Sulphate Suite	VOCs	SVOCs
TP01	0.1-0.2	TS			X		X				
TP01	0.3-0.4	TS						X	X		
TP01	0.5-0.6	N			X						
TP01	1.0-1.1	N							X		
TP02	0.2-0.3	MGTS		X			X				
TP02	0.6-0.7	MG		X			X		X		
TP03	0.3-0.4	N			X		X				
TP03	1.0-1.1	N			X						
TP05A	0.1-0.2	MGTS				X	X				
TP05A	0.8-0.9	MG				X	X		X		
TP05A	1.3-1.4	MG							X		
TP08	0.1-0.2	MGTS		X			X				

Reference	Depth (m)	Strata	PCB's WHO 12 Congeners	Rodgers Leask TPH Risk Assessment Suite	Rodgers Leask Standard Suite	Rodgers Leask CLR Suite	Asbestos Screen	Calorific Value	BRE Sulphate Suite	VOCs	SVOCs
TP08	0.7-0.8	MG		X			X		X		
TP08B	1.5	N						X	X		
TP08B	2.5	N							X		
TP10	0.2-0.3	MGTS				X	X				
TP10	0.5-0.6	MG				X	X				
TP11	0.4-0.5	MG				X	X		X		
TP11	0.7-0.8	MG				X	X				
TP11	1.6-1.7	N			X						
TP12	0.2-0.3	MG				X	X				
TP12	0.7-0.8	N				X	X				
TP12	1.9-2.0	N						X	X		
TP12	2.2-2.3	N							X		
TP13	0.1-0.2	MGTS			X		X				
TP13	0.4-0.5	MG			X		X				
TP13	0.8-0.9	N			X				X		
TP15	1.9-2.0	N						X			
TP16	0.2-0.3	TS			X		X				
TP16	0.5-0.6	N			X						
TT4	1.0	MG		X			X				
TT4	1.9	MG		X			X				
TT5	1.7	MG	X	X						X	X

MG = made ground; MGTS=made ground topsoil, TS = topsoil; N = natural stratum

Rodgers TPH Risk Assessment Soils Suite: As, Cd, Cu, Cr, Pb, Hg, Ni, V, Zn, Se & WSB, Elemental Sulphur, Water Soluble Sulphate (2:1), Easily Liberated Sulphide, Free Cyanide, Complex Cyanide & Free Cyanide, Thiocyanate, pH, Phenols (total of cresol+ phenol+xylenol), TPH (aliphatic/aromatic split) as TPH CWG inc. BTEX, USEPA 16 speciated PAH, Soil Organic Matter.

Rodgers Standard Soils Suite: As, Cd, Cu, Cr, Pb, Hg, Ni, V, Zn, Se & WSB, Elemental Sulphur, Water Soluble Sulphate (2:1), Easily Liberated Sulphide, Free Cyanide, Complex Cyanide & Free Cyanide, Thiocyanate, pH, Phenols total, USEPA 16 speciated PAH, Soil Organic Matter.

7.3.2 Assessment Approach

In order to assess the risk posed to the health of Site end users from long term exposure to contaminants in soil a Generic Quantitative Risk Assessment (GQRA) is undertaken. This involves the comparison of contaminant concentrations in soils to appropriate Generic Assessment Criteria (GAC).

The GAC used in this risk assessment have been derived using the Contaminated Land Exposure Assessment Model (CLEA). These include Category 4 Screening Levels (C4SL) published by the Department for Environment, Food and Rural Affairs (DEFRA) and Suitable 4 Use Level's (S4UL) published by Land Quality Management (LQM) and the Chartered Institute of Environmental Health (CIEH).

Where C4SL or S4UL are not available for a contaminant or are not considered to be appropriate for the risk assessment reference has been made to the Environment Agency Soil Guideline Values (SGV), LQM/CIEH GAC and the Environmental Industries Commission (EIC) GAC.

The C4SL and EA SGV have been derived based on the CLEA default value for Soil Organic Matter (SOM) content of 6% and a sandy loam soil type.

The LQM/CIEH S4UL and GAC and the EIC GAC are based on 1%, 2.5% and 6% SOM content and a sandy loam soil type. For this assessment a SOM of 1% is considered to be appropriate.

Where contaminants are found to exceed the GAC, there is a need for either DQRA and/or remedial action.

If the use of generic criteria is not appropriate a Detailed Quantitative Risk Assessment (DQRA) must be undertaken whereby assessment criteria are derived based on Site specific parameters using the CLEA methodology.

For this assessment where contaminant concentrations have been recorded as below the limit of detection of the analytical method a conservative assumption has been made that the limit of detection is equal to the concentration of the contaminant in the soil.

The concentrations of some contaminants (e.g. petroleum hydrocarbons) which significantly exceed their saturation limit can indicate the presence of free product. Where saturation limits are exceeded but no free product is identified the assessment of the risk posed by a contaminant is based on the toxicology of the contaminant and potential exposure pathways to the receptor.

7.3.3 Assessment Criteria

GAC are also referred to as critical concentrations (Cc) within the literature.

Prior to the comparison of soil concentrations against Cc's a suitable method of data comparison is established. This frequently involves establishing averaging areas.

Further advice on the use of Cc's is provided in the Environment Agency document 'Using Soil Guideline Values - science report: SC050021 / SGV introduction (March 2009)'.

Based on the proposed development the use of Cc's for residential use with plant uptake is considered appropriate for areas with proposed housing. In proposed landscaped areas, a public open space near residential housing scenario is considered appropriate. Should exceedances be identified, the SOM of the individual sample will be taken into consideration.

7.3.4 Assessment of data

The following tables show substances that have exceeded their relevant Cc's for the proposed end use.

Stratum / rationale	Contaminant	CC (mg/kg) Based on 1%SOM	No. samples exceeding CC within stratum	Concentration of exceedance mg/kg	Sample Ref:
MADE GROUND					
1: Made Ground topsoil (covering the majority of the site).	Arsenic	37	1 of 5	49	TP05A 0.1m-0.2m
	Lead	200	2 of 5	320 and 560	TP02 0.2m-0.3m and TP10 0.2m-0.3m
	Benzo [b] fluoranthene	2.6	1 of 5	3.8	TP08 0.1m-0.2m
	Dibenz (a,h) Anthracene	0.24	1 of 5	0.42	
2: Made ground within the northern area of the Site (within the vicinity of the former coal mining railway and associated infrastructure)	Arsenic	37	1 of 6	67	TP11 0.4m-0.5m
	Ali C8-C10	27	2 of 3	92 and 120	TT4 1.9m and TT5 1.7m
	Ali C10-C12	130	2 of 3	390 and 190	
	Ali C12-C16	1100	1 of 3	1400	TT4 1.9m
	Aro C8-C10	34	2 of 3	36 and 610	TT4 1.9m and TT5 1.7m
	Aro C10-C12	74	2 of 3	180 and 2000	
	Aro C12-C16	140	2 of 3	1000 and 5500	
	Aro C16-C21	260	2 of 3	840 and 6300	
	Aro C21-C35	1100	1 of 3	8900	TT5 1.7m
	Naphthalene	2.3	1 of 3	57	
	Phenanthrene	95	1 of 3	210	
	Benzo [a] anthracene	7.2	1 of 3	49	
	Chrysene	15	1 of 3	53	
	Benzo [b] fluoranthene	2.6	1 of 3	25	
	Benzo [a] pyrene	2.2	1 of 3	25	
	Dibenz (a,h) Anthracene	0.24	2 of 3	5.4 and 16	TT5 1.7m and TT4 1.0m
	Benzene	0.087	1 of 3	0.28	TT5 1.7m
	m&p -Xylene	56	1 of 3	64	
	Vinyl Chloride	0.00064	1 of 1	0.0041	

Stratum / rationale	Contaminant	CC (mg/kg) Based on 1%SOM	No. samples exceeding CC within stratum	Concentration of exceedance mg/kg	Sample Ref:
3: Made ground within the vicinity of the historic track way located within the western half of the Site.	Benzo [b] fluoranthene	2.6	1 of 1	3.1	TP02 0.6m-0.7m
4: Made ground within the central area of the Site.	Arsenic	37	1 of 1	46	TP08 0.7m-0.8m
	Aro C12-C16	140	1 of 1	350	
	Aro C16-C21	260	1 of 1	830	
	Naphthalene	2.3	1 of 1	4.8	
5. Natural Topsoil	Arsenic	37	1 of 3	65	TP01 0.3m-0.4m
6. Natural Stratum (Pennine Middle Coal Measures)	Naphthalene	2.3	1 of 6	5.7	TP12 0.7m-0.8m

Concentrations of contaminants identified in made ground samples taken from the eastern half of the site (made ground stratum 5) did not exceed the relevant CC.

A suite of PCBs testing was also undertaken on sample TT5 (1.7m). None of the PCB concentrations were found to exceeded the laboratory limits of detection (0.01 mg/kg).

15No. samples of made ground were screened for asbestos containing materials (ACM) as part of the testing regime. Amosite and chrysotile clumps/fibres were identified in sample TT4 1.0m.

7.3.5 Data Analysis

Where individual samples in a larger sample population exceed the respective critical concentrations (Cc's) statistical testing can be applied to data sets in order to make a meaningful comparison with Cc's.

The following assessment of contamination has been undertaken in accordance with the CL:AIRE/CIEH guidance 'Guidance on Comparing Soil Contamination Data with a Critical Concentration' (May 2008) which requires consideration of a null hypothesis as follows:

- The true mean (μ) of the sample population is ≥ than the Cc.

Statistical analysis will establish whether the null hypothesis is correct. The alternative hypothesis considers the following:

- The μ of the sample population is < Cc.

In accordance with the CL:AIRE/CIEH guidance consideration of the 95% Upper Confidence Level (UCL) is required to confirm the null/alternative hypothesis'.

An appropriate dataset is required to perform the statistical analysis and an assessment of the following is required:

- The presence of non detects i.e. < laboratory detection limit;
- The presence of potential outliers, and
- Checking the normality of the data.

Non Detects

Where data is shown as < detection, it has been assumed that the actual concentration is half the limit of detection.

Outliers

Outliers are data that do not appear to be part of the main data set and could be present as the result of an error in the data or are clearly indicative of a different dataset (e.g. natural soil or different type of Made Ground). Any outliers have been calculated in accordance with the Grubbs test as shown in I B of the CL:AIRE/CIEH guidance.

Any outliers have been removed from the dataset in accordance with the above guidance prior to undertaking the following analysis.

Normal Distribution

The choice of statistical test is dependent on whether the data is normally or non-normally distributed and therefore an assessment has been made to establish the normality of the dataset.

Once the above factors have been considered the following statistical test is undertaken calculate the 95% UCL value:

- **The one-sample t-test** is applied to the data shows evidence of normality; or
- **The one-sided Chebychev Theorem** is applied if the data is shown to be non-normally distributed.

Based on the proposals for the Site, the following averaging areas are considered appropriate to be used for the data analysis:

Averaging Area ref:	Strata / Area Definition	Rationale
1	Made ground topsoil	Material similar in all areas of made ground
2	Made Ground within the area of the historic mine railway/infrastructure.	Made ground containing visual and olfactory evidence of contamination is specific and isolated to the area of the former coal mine railway/infrastructure.
3	Made ground beneath former track way running through the western half of the Site.	Made ground was identified within the vicinity of the track way and is generally isolated along this route.
4	Made ground within the central area of the Site.	Deeper made ground encountered.

Averaging Area ref:	Strata / Area Definition	Rationale
5	Natural Topsoil	In southern areas of the site
6	Natural Strata (Site Wide)	The natural strata were generally consistent across the Site, albeit with coal seam outcrops which were identified in a number of TP locations.

Due to the number of samples tested as part of this investigation from each averaging area, statistical tests have only been applied to Areas 1 and 2.

Statistical tests have been applied to those contaminants in which individual exceedances were identified. The following is a summary of the findings:

No. of samples analysed	Strata	Contaminant	95% UCL	Assessment criteria mg/kg	95% UCL exceed criteria?	Outliers?
5	1. Made ground topsoil	Arsenic	43	37	Yes	None
		Lead	429	200	Yes	None
		Benzo [b] fluoranthene	4.9	2.6	Yes	None
		Dibenzo (a,h) anthracene	0.67	0.24	Yes	TP8 No
7	2. Made Ground within the area of the historic mine railway / infrastructure.	Arsenic	42	37	Yes	Yes - TP11 0.4-0.5.
3		Ali C8-C10	175.9	27	Yes	No
		Ali C10-C12	517.6	130	Yes	No
		Ali C12-C16	1817.4	1100	Yes	No
		Aro C8-C10	792.1	34	Yes	TT5 1.7m
		Aro C10-C12	2591.7	74	Yes	No
		Aro C12-C16	8145.5	140	Yes	No
		Aro C16-C21	11,507	260	Yes	No
7		Naphthalene	43.9	2.3	Yes	TT5 1.7m
		Phenanthrene	161.3	95	Yes	TT5 1.7m
		Benzo [a] anthracene	37.7	7.2	Yes	TT5 1.7m
		Chrysene	40.7	37	Yes	TT5 1.7m
		Benzo [b] fluoranthene	19.4	2.6	Yes	TT5 1.7m
		Benzo(a)pyrene	19.3	2.2	Yes	TT5 1.7m
		Dibenzo (a,h) anthracene	13.0	0.24	Yes	TT4 1.0m
3	5. Natural topsoil	Arsenic	80.4	37	No	No

Removal of the outliers from TT4 and TT5 leaves the following contaminants in excess of the CCs:

No. of samples analysed	Strata	Contaminant	95% UCL	Assessment criteria mg/kg	95% UCL exceed criteria?	Outliers?
4	2. Made Ground within the area of the historic mine railway / infrastructure.	Arsenic	60	37	Yes	Yes - TP11 0.4-0.5.
		Naphthalene	2.6	2.3	Yes	TT5 1.7m
		Phenanthrene	5.0	95	No	TT5 1.7m
		Benzo [a] anthracene	1.6	7.2	No	TT5 1.7m
		Chrysene	1.6	37	No	TT5 1.7m
		Benzo [b] fluoranthene	1.9	2.6	No	TT5 1.7m
		Benzo(a)pyrene	1.4	2.2	No	TT5 1.7m
		Dibenzo (a,h) anthracene	0.1	0.24	No	TT4 1.0m

7.4 Risk to Plant Growth

Results for contaminants known to inhibit plant growth have been compared with research from John Moores University (JMU) - 'Planting Trees on Contaminated Soils: Issues and Guidelines', Land Contaminations and Reclamation 8 (2) 2000.

None of the samples tested were found to exceed the assessment criteria.

7.5 Risk to Convention Water Pipes

It is recommended that the contamination test results are made available to the appropriate water company for design of any required water mains supply. It is however, expected that conventional water pipes will be suitable where laid within natural stratum.

7.6 Risk to Controlled Waters

7.6.1 Assessment Approach

At present, there are no UK specific guidelines for assessing the risk to Controlled Waters from Brownfield Sites. In the absence of such criteria, reference has been made to the following documents:

- Water Supply Regulations.
- Water Framework Directive.

The Water Supply Regulations provide concentrations for a range of chemical parameters which must not be exceeded at consumers' taps.

The Water Framework Directive provides Environmental Quality Standard (EQS) for a range of different substances, used to classify the grade or quality of surface waters.

The underlying Secondary A Aquifer, the open drainage ditches and the pond are regarded as the most sensitive receptors. The UK DWS have been used as the assessment criteria for the Secondary A Aquifers with the EQS values used to assess the risk to the open drainage ditches and pond.

The above guidelines have been used as the target concentrations, above which remedial targets may need to be derived, in accordance with R & D Publication 20 'Methodology for the derivation of remedial targets for soil and groundwater to protect water resources'.

7.6.2 Leachates

Leachate testing has been undertaken to assist in the assessment of risks to the Controlled Waters (being the Secondary A, open drainage ditches and pond). Leachate contamination testing was undertaken as follows:

Reference	Depth (m)	Strata	Rodgers Leask TPH Leachate Suite	Rodgers Leask Organic Leachate Suite
TP02	0.6-0.7	MG	X	
TP08	0.7-0.8	MG	X	
TP10	0.5-0.6	MG		X
TP11	0.4-0.5	MG		X
TP12	0.2-0.3	MG		X
TT4	1.9	MG	X	

Rodgers Leask TPH Leachate Suite: As, Pb, Cd, Hg, Cr, Se, Cu & Zn, Total and Free Cyanide, Soluble Sulphate, pH, Hardness, Phenols (total of cresol+ phenol+xylenol), Speciated PAH USEPA 16, TPH (aliphatic/aromatic split) as TPH CWG inc. BTEX.

Rodgers Leask Organic Leachate Suite: As, Cd, Cu, Cr, Pb, Hg, Zn, Se, Total and Free Cyanide, Soluble Sulphate, pH, Hardness, Phenols (total of cresol+ phenol+xylenol), USEPA 16 speciated PAH by GC MS.

A Tier 1 assessment has been carried out whereby the leachate results are considered to represent groundwater with no consideration of dilution, dispersion or natural attenuation. Should any of these criteria be exceeded, it may be necessary to consider Tier 2, 3 or 4 risk assessments.

The following samples tested exceeded UK DWS.

Stratum/rationale	Contaminant	DWS (µg/l)	No. samples exceeding within stratum	Concentration of exceedance mg/kg	Sample Ref:
Made Ground	Manganese	50	2 from 6	56 and 1200	TP08 0.7m-0.8m and TT4 1.9m
	Benzene	1	1 from 6	3.1	TP02 0.6m-0.7m

The following samples tested exceeded EQS values.

Stratum/rationale	Contaminant	DWS (µg/l)	No. samples exceeding within stratum	Concentration of exceedance mg/kg	Sample Ref:
Made Ground	Manganese	30	2 from 6	56 and 1200	TP08 0.7m-0.8m and TT4 1.9m

7.6.3 Groundwater

Groundwater sampling was not undertaken as part of the investigation due to the absence or limited quantity of groundwater encountered.

7.7 Risk to Underground Structures

Water soluble sulphate 2:1 extract tests and acid soluble sulphate tests have been carried out to assess the potential for chemical attack on structures from sulphate.

The laboratory results have been assessed against the BRE Special Digest 1 2005: 3rd Edition Aggressive Chemical Environment for Concrete (ACEC) Site classification. Areas of made ground have been designated as Brownfield with mobile groundwater. Areas of natural ground have been designated as Greenfield with static groundwater given the low permeability clays and mudstones observed.

The results are summarised in the following tables:

Stratum Location and Rationale	Number of samples tested	Maximum Water Soluble Sulphate Concentration	Soil pH Range	Design Sulphate Classification	ACEC classification
1: Made Ground topsoil.	5	1100	4.9 to 6.4	DS-2	AC-4z
2: Made ground within the northern area of the Site.	7	740	7.1.to 8.8	DS-2	AC-2
3: Made ground within the vicinity of the historic track way.	3	860	4.9.to 6.0	DS-2	AC-4z
4: Made ground within the central area of the Site.	1	10	4.2	DS-1	AC-4z
Pennine Middle Coal Measures	12	120	4.7 to 7.1	DS-1	AC-3z

Due to the presence of coal bearing strata beneath the site, and the potential for oxidation of pyritic ground, an extended suite of analysis including total sulphur was undertaken. The results have been assessed and are presented below:

Stratum Location and Rationale	Number of samples tested	Maximum TS (%)	Range of OS (%)	Range of TPS (%)	Design Sulphate Classification (taking TPS into account) *	ACEC classification *
1: Made Ground topsoil.	5	0.52	4.9 to 6.4	0.84 to 1.56	DS-3	AC-5
2: Made ground within the northern area of the Site.	7	0.70	1.26 to 2.1	1.26 to 2.1	DS-4	AC-4
3: Made ground within the vicinity of the historic track way.	3	0.22	0.01 to 0.11	0.14 to 0.66	Non pyritic	
4: Made ground within the central area of the Site.	1	0.1	-0.09	0.3	Non pyritic	
Pennine Middle Coal Measures	12	0.43	0.0 to 1.24	1.14 to 1.29	DS-3	AC-5

* Based on characteristic values

8.0 Contamination Risk Assessment

The results of the contamination testing are considered below in relation to the potential pollutant linkages identified within the conceptual model. Appropriate remedial measures to break the pollutant linkages are also discussed.

8.1 Pollutant Linkage 1 and 2 - Risk to end users from contaminated soils

8.1.1 1: Made Ground Topsoil

Made ground topsoil was observed across the majority of the Site to depths of between 0.2m and 0.7m bgl and generally consisted of brown ashy clayey and sandy topsoil with fragments of brick, coal, sandstone gravels and ceramic fragments. Metal pieces, glass, tarmac fragments and wood were encountered within the topsoil matrix within TP10, TP10A, TP12 and WS12.

Laboratory analysis was undertaken on 5 No. samples of the made ground topsoil, the results of which identified elevated concentrations of arsenic in one sample taken from TP05A (0.1m-0.2m) at a concentration of 49 mg/kg. Concentrations of lead were also encountered greater than the CC in two samples, TP02 (0.2m-0.3m) and TP10 (0.2m-0.3m) at concentrations of 320 mg/kg and 560 mg/kg respectively. Concentrations of PAH's greater than the CCs, specifically benzo[b]fluoranthene and dibenz(a,h)anthracene were identified in sample TP08 (0.1m-0.2m).

The results obtained as part of this investigation suggest that this material is a potential risk to end users and therefore would not be suitable for re-use as topsoil.

8.1.2 2: Made ground within the northern area of the Site (within the vicinity of the former coal mining railway and associated infrastructure)

Made ground was observed within the northern area of the Site (within the area of the historic mine railway and infrastructure) to depths of between 0.6m and 2.25m bgl. It generally consisted of black/grey and brown ashy gravelly clay containing varying quantities of clinker, coal, brick fragments, ceramics, glass, shale, metal pieces, tarmac and sandstone/mudstone and siltstone gravels.

Laboratory analysis was undertaken on 7 No. samples the results of which identified elevated concentrations of arsenic, PAH's and hydrocarbons.

3 No. samples were analysed for TPH's, the results of which identified aliphatic hydrocarbon fractions C_8-C_{10}, C_{10}-C_{12} and C_{12}-C_{16} and aromatic hydrocarbon fractions C_8-C_{10}, C_{10}-C_{12}, C_{12}-C_{16}, C_{16}-C_{21} and C_{21}-C_{35} at concentrations greater than the CCs in samples taken from TT4 (1.9m) and TT5 (1.7m). A suite of Volatile and semi Volatile Organic Compounds (VOC and SVOC) testing was also undertaken on sample TT5 (1.7m). The results of analysis indicated that a number of compounds exceeded the CCs including Vinyl Chloride. Concentrations of PAH's greater than the CCs were also identified in sample TT5 1.7m including naphthalene, phenanthrene, benzo[a]anthracene, chrysene, benzo[b]flouranthene, benzo[a]pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene, suggesting the

hydrocarbons are coal/diesel derived. These results coincide with visual and olfactory evidence of hydrocarbon impact noted within TT4 and TT5 during the site investigation.

Asbestos containing materials in the form of amosite and chrysotile fibres/clumps were also identified in sample taken from TT4 at 1.0m bgl.

It is recommended that further site investigation works are undertaken to delineate the extent of the contamination around TT4 and TT5. This material is considered potentially hazardous and is likely to require removal from site.

The made ground would appear to have pervasive contamination by arsenic and PAH, specifically naphthalene. The data suggests the risk to end users could be mitigated by capping in garden and landscaped areas with 400mm of suitable cover. It is recommended that further testing of the made ground be undertaken to confirm that the potentially risk can be mitigated in this manner. The capping layer thickness may need to be increased, at this stage, it would be considered prudent to allow for a minimum 600mm clean cover with break layer at the base given the contamination identified at TT4 and TT5.

8.1.3 3: Made ground within the vicinity of the historic track way.

Made ground was observed along the route of the historic track way which ran from north to south through the western half of the site. The made ground, which was encountered to depths of between 0.8 and 1.7m bgl, generally consisted of stiff reddish orange and dark brown clay containing varying quantities of coal, bricks, red shale and gravels of mudstone and sandstone.

Chemical analysis was undertaken on 3 No. samples which identified a concentration of benzo[b]fluoranthene which was marginally above the CC in TP02 (0.6m-0.7m bgl). No other samples contained concentrations of contaminants above the CCs.

The elevated concentration of benzo[b]flouranthene fell within the concentrations where capping in accordance with BRE 465 (which is based on dilution through mixing of 600mm thickness) is deemed viable.

BRE 465 indicated the risk from the benzo[b]fluoranthene could be mitigated by placement of 170mm of clean cover in garden and landscaped areas. At this stage, it would be prudent to allow for 600mm of clean, however further testing may allow for this thickness to be reduced.

8.1.4 4: Made ground within the central area of the Site.

Made ground was observed beneath the central area of the site in the vicinity of TP08, TP08A, TP09 and WS09 to a depth of between 0.7m and 2.2m bgl. The made ground generally consisted of black ashy gravels of coal, red shale, whole bricks, occasional slag gravels and mudstone/sandstone gravels. Fragments of leather were encountered in TP08 between 0.3m and 2.0m bgl.

Chemical analysis was undertaken on 1 No. sample (TP8 0.7m-0.8m) which identified at concentrations of arsenic, aromatic hydrocarbons C_{12}-C_{21} and naphthalene which were above the CC.

The elevated concentrations of contaminants fell within the concentrations where capping in accordance with BRE 465 (which is based on dilution through mixing of 600mm thickness) is deemed viable. BRE 465 indicates the risk could be mitigated through placement of 500mm of clean cover in garden and landscaped areas.

Fragments of leather were encountered within the made ground in TP08. The leather is likely to be remnants of boots/clothing and not raw hides. In this instance, the leather fragments are not considered a cause for concern.

8.1.5 5: Made ground within the eastern half of the site.

Made ground was observed beneath the eastern half of the site in the vicinity of TP13, TP13A, TP14, TP15, TP16A, WS17 and WS18 to depths of between 0.6m - 1.5m bgl. The made ground generally consisted of yellow clayey gravelly sand and grey gravelly clay containing cobbles and boulders of sandstone and ironstone with occasional fragments of ceramics, bricks and shale.

Chemical analysis was undertaken on 1 No. sample (TP13 0.4-0.5m) which identified that the concentrations of all contaminants tested fell below the relevant CCs.

8.1.6 Topsoil

3 No. samples of natural topsoil were submitted to the laboratory for analysis which identified elevated arsenic. The arsenic may be naturally occurring associated with coal strata. Bioavailiability testing could be undertaken to assess potentially risk further. At this stage it is recommended an allowance be made for removal from site.

8.1.7 Natural Stratum (Pennine Middle Coal Measures)

6 No. samples of the Pennine Middle Coal Measures were submitted for analysis. The samples generally comprised clay and weather mudstone, siltstone and sandstone and ranged in depth from 0.3m to 1.7m bgl. A single exceedance of naphthalene was identified in sample TP12 (0.7-0.8m bgl). This result is considered an anomaly. It is likely that the elevated concentration is due to cross contamination resulting from fragments of made ground falling into the TP during sampling. Given that all other samples of natural ground returned contaminants concentrations below the CCs, the risk to human health from the natural stratum can be considered negligible and as such no further assessment or remedial action is warranted in this regard.

8.2 Pollutant Linkage 3 - Risk to Site workers from contaminated soils

The principal identified risk to construction works is considered to be associated with asbestos containing soils. It is recommended that appropriate health and safety precautions, to include the wearing of overalls and gloves, and the

provision of appropriate welfare facilities be provided during construction stage. More specifically, appropriate CAR 2012 risk assessments will be required with respect to the disturbance of ACM identified on-Site. The hydrocarbon impacted soils at TT4 and TT5 are potentially hazardous however it is considered that the risk could be mitigated through adoption of appropriate health and safety precautions, to include the wearing of overalls and gloves, and the provision of appropriate hand cleansing facilities. The Contractor should undertake their own risk assessments.

8.3 Pollutant Linkage 4 - Risk to human health in adjacent areas

The principal risk to adjacent Site users is the presence of asbestos containing soils and the potential for release of airborne fibre during construction.

As part of this investigation, 12 No samples have been screened for asbestos containing materials and asbestos (amosite and chrysotile fibres/clumps) was encountered in one sample taken from TT4 at 1.0m bgl. Further site investigation works will be required to delineate the extent of asbestos in soil in the vicinity of TT4.

At this stage, the risk posed to humans in adjacent areas through the inhalation of airborne contaminants is considered low, however, given the positive identification of asbestos at TT4, it is recommended that further testing on a tighter grid spacing be undertaken to confirm ACM's are not widespread in soil. Should further evidence of ACM's be identified, appropriate mitigation and precautions will be necessary.

8.4 Pollutant Linkage 5 - Risk to end users from contaminated water supplies

It is recommended that the contamination test results are made available to the appropriate water company for design of any required water mains supply. It is however, expected that protective water pipes will be required.

8.5 Pollutant Linkage 6 – Ground Gas Risk to Site workers from contaminated soils

The intrusive works have confirmed that colliery spoil which contains coal fragments has been placed over parts of the Site. Timber and other materials likely to give rise to gas were generally absent with the exception of some wood in the near surface materials in TP10.

Historic mineshafts, in the north of the Site, are a potential pathway for ground gas. Gas can be generated in underlying coal workings/seams and migrates to the ground surface via the shafts and adits. These shafts are however historic and the workings are likely to be flooded and/or collapsed, which reduces this risk.

No other potential sources of significant ground gas are shown on Site.

Based upon the above, the site is classified as follows in accordance with CIRIA C665: Assessing Risks Posed by Hazardous Ground Gas to Buildings, 2007.

- Low to moderate generation potential of gassing.

- The residential end usage is regarded as a high sensitivity end use.

The above classification requires twelve visits over a six month period.

10 No. gas/groundwater monitoring wells were installed in BH's across the site, and 6 gas monitoring visits over a minimum period of 3 months are proposed as part of this investigation, noting further monitoring may be required.

The monitoring wells were installed in areas of the site where the potential risk of ground gas generation was considered the highest (i.e. within the area of the mineshafts, areas of made ground and the off-site railway embankment).

A provisional assessment has been undertaken based on the results of the first three monitoring visits.

On completion of monitoring, reassessment should be undertaken accordingly.

Both the above documents require the calculation of a Gas Screening Value (GSV). This is calculated as the maximum recorded percentage gas concentrations multiplied by the maximum gas flow rate. Where concentrations of flow rates less than the limit of detection on the analyser have been recorded, the limit of detection has been used (0.1% for gas concentration, 0.1 l/hr for gas flow rates).

Max Methane Conc (% v/v)	Max Carbon Dioxide Conc (% v/v)	Gas Flow Rate (l/hr)	Methane Gas Screening Value (l/hr)	Carbon Dioxide Gas Screening Value (l/hr)
0.1	14.6 (steady)	0.1	0.0001	0.0146

Based on the GSV's the Site would be classified as Characteristic Situation 1 (CS1) in accordance with CIRIA C665 Wilson and Card, for all low rise housing except those with ventilated subfloor void. However the concentrations of carbon dioxide increase the classification to CS2 which would typically comprise:

- Reinforced concrete cast in situ floor slab (suspended, non-suspended or raft) with at least 1200 g DPM2 and underfloor venting.
- Beam and block or pre-cast concrete and 2000 g DPM/ reinforced gas membrane and underfloor venting. All joints and penetrations sealed

In accordance with the NHBC Traffic Light System, the Site would be classified as Amber 1. This requires the following:

- Low to intermediate gas regime identified, which requires low-level gas protection measures, comprising a membrane and ventilated sub-floor void to create a permeability contrast to limit the ingress of gas into buildings. Gas protection measures should be as prescribed in BRE Report 414 (Johnson, 2001). Ventilation of the sub-floor void should facilitate a minimum of one complete volume change per 24 hours.

The final requirement for gas protection measures or the need for further monitoring will be made on completion of the scheduled monitoring program.

It should be noted that the Site is located within a Radon Affected Area as defined by the Health Protection Agency (HPA), as between 3 and 5% of properties are above the action level. Basic radon protection measures will be required in new dwellings for the Site comprising fully lapped and sealed 1200 gauge membrane.

8.6 Pollutant Linkage 7 and 8 - Risk to Secondary (A) and surface waters

It is considered the Secondary (A) aquifer, the open drainage ditches and the pond located within the south of the Site are considered the primary receptors for assessment purposes.

Exceedances of leachable manganese have been identified in two samples of made ground taken TP08 (0.7m-0.8m bgl) and TT4 (1.9m bgl) and a single exceedance of benzene in sample TP02 (0.6m-0.7m bgl).

The risks posed to the Secondary (A) aquifer and surface water features are considered generally low for the following reasons:

- The Site is not located with an SPZ and there are no drinking water abstractions within 2km of the Site.
- There are no potable water abstraction licenses within 2km of the Site.
- No continuous groundwater table was encountered at shallow depth across the Site.
- The manganese is considered likely to be naturally occurring.
- Generally, no elevated leachable contamination was identified.
- Water bearing horizons within the Coal Measure strata are likely to be at depth and not in continuity with perched water on site.

On this basis, the soils are generally considered suitable for retention on the Site without presenting a significant risk to the aquifer or surface water feature. Nevertheless, it is recommended that any gross or significantly impacted contamination (e.g. that identified at TT4/TT5) is removed to reduce risk to controlled waters.

8.7 Pollutant Linkage 9 - Risk to buried building materials

The laboratory results (summarised in section 7.6) have been assessed against the BRE Special Digest 1 2005: 3rd Edition Aggressive Chemical Environment for Concrete (ACEC) Site classification.

Areas of made ground have been designated as Brownfield with mobile groundwater. Areas of natural ground have been designated as Greenfield with static groundwater given the low permeability clays and mudstones observed.

The natural ground (Pennine Middle Coal Measures) has been classified as DS1 AC5.

The made ground within the northern area of the site has been classified as DS-4 AC-4.

The made ground within the vicinity of the historic track way has been classified as DS-2 AC-4z.

The made ground within the central area of the site has been classified as DS-1 AC4z.

Overall, it is recommended buried concrete complies with DS4 AC5.

8.8 Pollutant Linkage 10 - Risk to Flora and Fauna

No elevated contaminant concentrations have been encountered with respect to phytotoxicity. As such the risk to flora and fauna is considered negligible.

9.0 Geotechnical and Combustibility Testing

Geotechnical classification testing has been undertaken on a selection samples for classification purposes and to assist in determining the geotechnical properties of soils across the Site. Tests were undertaken by the independent laboratory i2 Analytical Ltd.

A copy of the geotechnical laboratory testing results is included in Appendix K.

9.1 Plasticity Index and Volume Change Potential Assessment

A total of seven Plasticity Index (PI) tests were undertaken on cohesive soil samples to determine the Volume Change Potential (VCP) and for classification.

Results of the PI tests and the related volume change potential are summarised below:

Sample Reference	Depth (m)	Modified Plasticity Index (%)	Moisture Content (%)	VCP
TP01	1.0-1.5	35	22	Medium
TP03	1.1-1.6	18	22	Low
TP06A	1.0	20	21	Medium
TP07	1.0	19	16	Low
TP08B	2.5	22	20	Medium
TP13A	1.0	13.4	21	Low
TP13A	2.0	11.8	4.7	Low

9.2 Particle Size Distribution

A total of one Particle Size Distribution test was undertaken on soils, in accordance with BS1377: 1990 Part 2: Clause 9.2.

Results of the Particle Size Distribution test is summarised below:

Sample Reference	Depth (m)	Made Ground / Natural	Classification
TP16	0.7	Natural	Yellowish brown very sandy very clayey GRAVEL

9.3 Moisture Content/Dry Density Relationship

Compaction tests were undertaken on six soil samples taken from natural strata where levels may require reducing for the proposed development scheme. A 2.5kg rammer was utilised in order to determine the moisture content/dry density relationship to assist with future earthwork design.

A summary of the test results are presented in the following table.

	Natural Moisture Content (%)	Maximum Dry Density (%)	Optimum Moisture Content (%)
Minimum	13	1.66	9.6
Maximum	23	1.95	20
Mean	16.7	1.85	14.1

9.4 Combustibility Testing

4 No. calorific value tests were undertaken on coal containing strata, encountered within TPs, in order to assess the risk of combustion within areas of gardens and landscaping. The samples tested and results are given in table below:

Reference	Depth (m)	Strata	Gross CV (MJ/kg)
TP01	0.5	Mudstone with frequent finely laminated coal fragments.	15
TP08B	1.5	Black weathered high quality coal.	24
TP12	1.9	Coal	14
TP15	1.9	Grey clay, overlying coal	17

10.0 Conclusions and Recommendations

10.1 Contamination risk assessment

RLE were commissioned to undertake a Phase 2 ground investigation to assess the suitability of the site for a proposed residential development.

Samples of soil were obtained from across the site and subject chemical analysis for a range potential contaminants identified by the conceptual model.

The findings of the investigation would suggest a low to moderate risk to human from the soils on the site in their current condition. It is considered the site would be suitable for residential use following implementation of some conventional remedial techniques. The risk to human health could be mitigated by placement of clean cover in garden and landscaped areas, with any areas of gross or hazardous contamination removed or remediated.

The recommendations made here are subject to further testing on a tighter grid spacing and development of a remediation strategy.

Made ground has been found in the north of the site in the vicinity of former colliery infrastructure, in the west of site in the vicinity of a former trackway, and in the central and eastern areas of the site in areas not known to have undergone previous development. In the areas of made ground, a strata comprising topsoil mixed with anthropogenic materials had either been placed or had accumulated from vegetative decay over time. Undisturbed ground with evidence o made ground was encountered in the southern portion of the site. The locations of the principal strata identified are shown on RLE Drawing No.17176-RLE-17-XX-DR-O-004 contained in Appendix F.

Each of these strata and their contaminative status is discussed in further detail below.

1: Made Ground Topsoil

The made ground topsoil which is situated across the site overlying other made ground deposits has been found to contain heavy metals and PAH compounds at concentrations which may pose a risk to human health and therefore at present this materials is considered suitable for re-use.

Further testing and possible screening to remove deleterious matter may allow the volume of material to be removed to be reduced, and may allow some suitable material to be identified.

2: Made ground within the northern area of the Site (within the vicinity of the former coal mining railway and associated infrastructure)

This testing of this strata suggests pervasive levels of arsenic and naphthalene which may pose a risk to the health of end users.

Two exploratory locations in the western portion of the site identified evidence of petroleum hydrocarbons considered to be diesel, oil, or coal derived and may be associated with leaks from historic plant or tanks, which may pose a risk to end users. These results coincide with visual and olfactory evidence of hydrocarbons. Asbestos containing materials in the form of amosite and chrysotile fibres/clumps were also identified in a sample taken from TT4 at 1.0m bgl. Further investigation will be needed to delineate the extent of this contamination. It is recommended that this material be delineated and removed from site. Appropriate risk assessments will have to be developed by the remedial contractor.

3: Made ground within the vicinity of the historic track way.

This material has been found to contain elevated PAH which may pose a risk to human health of end users. The risk from the benzo[b]fluoranthene could be mitigated by placement of 170mm of clean cover in garden and landscaped areas. At this stage, it would be prudent to allow for 600mm of clean, however further testing may allow for this thickness to be reduced.

4: Made ground within the central area of the Site.

Testing of this strata identified arsenic, aromatic hydrocarbons C_{12}-C_{21} and naphthalene above preliminary assessment criteria indicating a potential risk to end users.

The risk could be mitigated through placement of a minimum of 500mm of clean cover in garden and landscaped areas.

5: Made ground within the eastern half of the site.

Testing indicated this material is not likely to pose a risk to end users. Further testing should be undertaken to confirm remedial measures are not required.

6. Topsoil

The natural topsoil has been found to contain elevated arsenic and further testing, to include bioavailability testing, is recommended to assess whether this material can be retained and re-used.

7. Natural Stratum

The laboratory testing indicates that the risk to human health from the natural clay, gravel and siltstone/mudstone/sandstone can be considered negligible and as such no further assessment or remedial action is warranted in this regard.

10.1.1 Radon

The Site is located within a Radon Affected Area as defined by the Health Protection Agency (HPA), as between 3 and 5% of properties are above the action level. Basic radon protection measures will be required in new dwellings for the Site comprising fully lapped and sealed 1200 gauge membranes.

10.1.2 Ground Gas

Preliminary gas monitoring results indicate that gas protection measures will be required for proposed housing. At this stage Amber 1 gas protection shall be necessary. The final requirements for gas protection measures and any remedial proposals will be made on completion of the scheduled monitoring program, which shall include low and falling barometric pressure. Further gas monitoring may be required to include consideration of the need for continuous monitoring.

10.1.3 Controlled Waters

The soils across the majority of the Site are considered suitable for retention on the Site without presenting a significant risk to aquifers or surface waters with the exception of made ground within the northern area of the site. It has been recommended the significantly impacted material be removed off site or remediated which shall mitigate risk to controlled waters.

10.1.4 Asbestos within Soil

15 No. samples of made ground were screened for asbestos. Asbestos / asbestos fibres were identified in the form of amosite and chrysotile clumps/fibres in sample TT4 1.0m. It is recommended that appropriate health and safety precautions, to include the wearing of overalls and gloves, and the provision of appropriate welfare facilities be provided during construction stage. More specifically, appropriate CAR 2012 risk assessments will be required with respect to the disturbance of ACM identified on-Site.

10.1.5 Importation of Materials

Testing should be undertaken on any material imported onto the Site in order that it can be confirmed as suitable for use.

10.1.6 Disposal of Waste Material

It is recommended that the laboratory test results and TP and BH logs be made available to a waste disposal contractor to allow waste classification of the Site materials.

Additional Waste Acceptance Criteria (WAC) tests may be required to satisfy the requirement of any licensed landfill facility.

The topsoil and made ground are likely to be classified as non hazardous. Where asbestos containing material and material grossly impacted by hydrocarbons (TT4 and T5) has been identified, this material will be classed as hazardous waste.

The natural soils are likely to be classified as inert.

It is recommended that made ground topsoil, made ground, topsoil and natural subsoil are stockpiled separately.

10.1.7 Unidentified Contamination

An environmental engineer should be contacted immediately if areas of potential contamination are identified during Site works.

10.2 Mining Issues

10.2.1 Shallow workings

A desk based assessment identified that the Coal Authority has records of known underground workings within the Abdy and Kent's Thick seams at relatively shallow depths (~5m to 50m bgl).

Recorded old workings in the Abdy seam are shown to be at approximately 5m bgl in the northwest of Site. Given that the thickness of the seam is between 1.22m and 1.42m thick, it is considered that these workings would not have sufficient rockhead cover to mitigate the risk of void migration to the surface. Hence, the risk of these recorded underground workings impacting the proposed residential development is deemed high in the northwest of the Site.

Recorded old workings within the Kent's Thick seam are anticipated at between 50m and 78m depth. Longwall workings in this seam (off Site to the north and northwest) will likely have collapsed, however roadways possibly remain as these were typically permanently propped. However, at a thickness of between 0.91m to 1.22m, these roadways should have sufficient rockhead cover to mitigate the risk of void migration to the surface. The risk of deeper recorded workings within the Kent's Thick seam impacting the proposed residential development is deemed low.

Given the anticipated thickness of the Two Foot, Abdy and Top Beamshaw seams which outcrop on Site (0.63m and 1.84m), and nearby BGS borehole records and BGS information for shallow coal working in the Barnsley area, it is likely that unrecorded working has occurred on Site and in the surrounding area. These workings are likely to be small scale local workings from shallow shafts and adits, however at this stage larger scale working cannot be discounted.

The risk of unrecorded workings at shallow depth impacting the proposed development is therefore considered high. There is potential for workings to be present and influence the proposed development across the majority of the Site, given that coal is anticipated at a shallow depth across the entire Site.

Coal seams were encountered in a number of TP's and BH's. These were interpreted as the Two Foot Seam identified in TP12 (1.6m and 2.0m bgl) and WS15 (3.6m and 4.0m bgl); the Abdy Seam identified in TP08A (2.2m and 2.7m bgl), TP08B (0.8m and 2.3m bgl) and WS17 (2.3m and 2.6m bgl); the Top Beamshaw Seam identified in WS06 (1.2m and 1.6m bgl) and the Low Beamshaw Seam identified in WS04 (1.8m and 2.4m bgl). No evidence of shallow workings was observed in any of the TP's or BH's. Intrusive investigation to assess the depth and presence of possible workings in the Two Foot, Abdy, Top and Low Beamshaw Seams was outside the scope of this investigation. Further investigation involving rotary probe drilling will be required to prove/disprove the presence of shallow workings beneath the Site.

10.2.2 Historic Mineshaft

Nine mine entries are shown on or within 20m of the Site, five of which are mine shafts and four are adits.

Two mine shafts and three adits are shown within the north-western extents of the Site.

A Site strip was proposed with a view to locating the position of the shafts, however, due to the depth of made ground encountered within the area of the mine entries the location of the mine entries could not be determined.

Further investigations will be required utilising a rotary drilling rig to confirm the locations of the mine entries and to assess where / if any workings (radiating from the shaft) are present. Subsequent remedial drilling and grouting may therefore be required if workings are identified. It is considered that the likelihood of localised workings being present around the mine entries is high.

Treatment of the shafts will likely be required and likely comprise initial drilling and grouting followed by construction of a reinforced concrete shaft cap founding onto suitable rock head.

Subject to detailed design it is anticipated that a no build zone of ~10m radiating around the shafts will be required.

10.3 Risk from combustible material

Where near surface coal is present there is considered to be a risk that the coal seam may be ignited by a heat source (e.g. a bonfire in the garden) and prolonged underground burning may occur within the seam. Such underground burning can prove problematic to extinguish and result in damage to adjoining/adjacent properties. The likelihood that prolonged burning may occur is subject to the seam thickness (seams over 450mm are considered susceptible) and the calorific value of the coal (values over 7MJ are generally considered to be certainly combustible) as well as other factors such as availability of air ingress.

Calorific value testing undertaken on samples of coal and coal containing strata, taken from outcropping coal seams on the Site, identified the coal to be potentially combustible and thus at risk of burning if ignited.

If coal exceeds 450mm thickness in the top 1m from existing or reduced levels or is encountered at 450mm or greater thickness within excavations precautions to mitigate the risk of spontaneous combustion are required.

Coal seams shown to outcrop on geological mapping, specifically the Abdy Seam and Two Foot Seam were encountered in this investigation at TP08B (Abdy Seam at 0.8m-2.3m bgl), TP12 (Two Foot Seam at 1.6m -1.8m bgl) and TP15 (Two Foot Seam at 2.0-2.1m bgl). All the seams may be found to outcrop following site strip.

The following table presents the special precautions that are required in the vicinity of shallow outcropping coal:

Receptor	Coal within 1m of the surface beneath gardens and landscaped areas.	Beneath House	Foundation Trench	Service Trench	POS / Landscaping
Remedial Measure	1m clean capping (850mm clay, 150mm topsoil) or remove.	Remove where exposed or seal off with clay.	Seal with concrete.	Backfill above pipe bedding / service material with clay.	If within 600mm of finished level in POS, excavate or cap with 600mm clean cover (450mm clay, 150mm topsoil)

Excavated material can be either removed off Site or (subject to approval from regulators and/or as part of an approved Materials Management Plan) be used to raise site levels at depths of >1m bgl provided the risk of combustion is considered negligible.

Further testing of samples of near surface made ground is currently being undertaken and shall be reported within the final report.

10.4 Foundations and Floor Slabs

The following recommendations are based on the assumption that abandoned workings associated with coal or minerals do not affect the Site. The findings of this investigation are inconclusive and further investigation, particularly in the vicinity of the mineshafts and adits is recommended. Should these further investigations identify unrecorded workings within the zone of influence of the surface, remedial works and amendment/alternative foundation designs may be required.

10.4.1 Founding Stratum

The natural firm to stiff sandy gravelly clay is considered a suitable bearing stratum where an allowable design bearing pressure of 125 kN/m^2 is considered appropriate for foundation design for a maximum estimated settlement of 25mm and for uniform loading with no eccentricity.

10.4.2 Foundations

Ground conditions suggest/indicate that traditional strip/trenchfill foundations are appropriate for proposed new dwellings.

Where both contrasting cohesive clay stratum and granular siltstone/mudstone bedrock is encountered at founding level it is recommended that foundations are locally deepened to found on common stratum or reinforcement be added as appropriate.

Foundation depths should be a minimum of 900mm below existing or reduced levels and where cohesive CLAY stratum is present and foundations are located within tree influence (foundation depths should be designed based on NHBC guidelines Chapter 4.2 (Building Near Trees) with medium volume change

potential used for design purposes. Where foundations need to be deepened to depths greater than 2.5m below existing ground levels, piled foundations are likely to be required. For guidance and subject to detailed design any foundations within ~6m of trees/hedgerows are likely to need piling due to tree influence.

Foundations will need to be deepened to reach suitable bearing strata where made ground exceeds the minimum founding depth. This will apply to plots in the area of the Site which coincides with the historic mine railway where made ground was encountered at depths of up to 2.7m bgl.

Red shale was encountered within made ground at two locations. It is recommended this material not be re-used on site or placed beneath floor slabs.

10.4.3 Fault

Three normal faults are shown on Site. Two faults trend west-northwest through the centre of the Site and one trends northwest along the northern boundary.

Mine abandonment plans for workings within the Kent's Thick Seam show two faults within workings in the northwest of the Site, which may correspond to mapped surface faults. This plan also shows the northwest trending fault along the northern Site boundary, with longwall workings along the north side of the fault (off-Site to the north).

In areas of significant coal mining there is an increased risk of fault reactivation and subsequent ground movements, although this is generally considered rare in the UK. If shallow workings exist adjacent to the faults, these may be at increased risk of collapse in the event of an earthquake or fault reactivation.

No visual evidence of weak ground associated with faulting and shallow workings was identified during the site investigation, however it was not within the scope of this investigation to determine the presence of shallow workings or the position of the fault. Further site investigation using rotary drilled boreholes will be required.

The risk has been discussed within our coal mining risk assessment. Should workings and evidence of faulting be identified, precautionary measures such drilling and grouting, raft foundations and possibly planning the layout around high risk areas may be required.

10.5 Floor Construction

Topsoil should be removed from beneath plot footprints.

Given that radon protection will be required at the Site, suspended beam and block ground floor construction for proposed dwellings is considered appropriate for the proposed development.

10.6 Risk to buried building materials

The laboratory results (summarised in section 7.6) have been assessed against the BRE Special Digest 1 2005: 3rd Edition Aggressive Chemical Environment for Concrete (ACEC) Site classification.

Generally, low concentrations of water soluble sulphate have been identified, however the made ground and natural strata indicate a potential for liberation of additional water soluble sulphate through oxidation of pyritic containing materials associated with the colliery spoil and coal measure strata.

Overall, it is recommended buried concrete complies with DS4 AC5.

10.7 Excavations

Foundation trenches are expected to remain generally stable during excavation within the natural stratum allowing trench fill foundations to be cast, on the same day of excavating, without support. Localised dewatering of excavations (particularly where deepened due to tree influence) may be required.

10.8 Drainage

Based on the negligible infiltration rate recorded during infiltration testing in TP01, TP02 and TP05, it is not considered likely that soakaway drainage would be feasible and it is recommended that an alternative positive outfall be sourced.

10.9 Roads and Hardstandings

CBR testing should be undertaken at formation to facilitate detailed design of roads and hardstandings. It is anticipated that the natural firm to stiff cohesive near surface clays will have CBR values of 2% to 5%. CBR testing will be required on areas of made ground/earthworks to determine CBR values on the made ground, although values of 1-5% are anticipated.

Topsoil shall require strip prior to construction of roads and hardstandings.

10.10 Fly tipped material

No evidence of significant fly tipping was noted at the time of the Site works.

10.11 Recommended Further Works

The following further works are recommended:

- Further chemical testing on a tighter grid spacing to confirm capping layers requirements, check for the presence of hotspots.
- To delineate hydrocarbon, PAH and asbestos contamination within the made ground in the northern area of the site, specifically in the vicinity of TT4 and TT5.

- Further investigation to investigate the possible presence of shallow mine workings and to determine the position of recorded mine shafts/adits on Site.
- Gas monitoring should be completed as proposed and the requirement for further monitoring reviewed.
- A remediation strategy and method statement may be required to satisfy the requirement of planning.
- A CL:AIRE approved Material Management Plan (MMP) may be required.
- Approval to recommendations from the regulatory bodies should be sought.
- Further geotechnical testing is recommended of any cut materials prior to earthworks.

Appendices

Appendix A: Illustrative Masterplan

PLAN SHOWS EXISTING CONTOURS AT 1m INTERVALS FOR REFERENCE. PROPOSED LEVELS TO BE CONFIRMED.

NORTH

1:1250 SCALE
10m 100m

jrp ARCHITECTURE | PLANNING | LANDSCAPE

CLIENT: HARWORTH ESTATES	**DRAWING NUMBER:** P17 5091 03
PROJECT: ATHERSLEY	**SCALE @ A1:** 1:1250
DRAWING: ILLUSTRATIVE MASTERPLAN	**DRAWN:** LB **DATE:** 05.09.17
	CHECKED: **DATE:**

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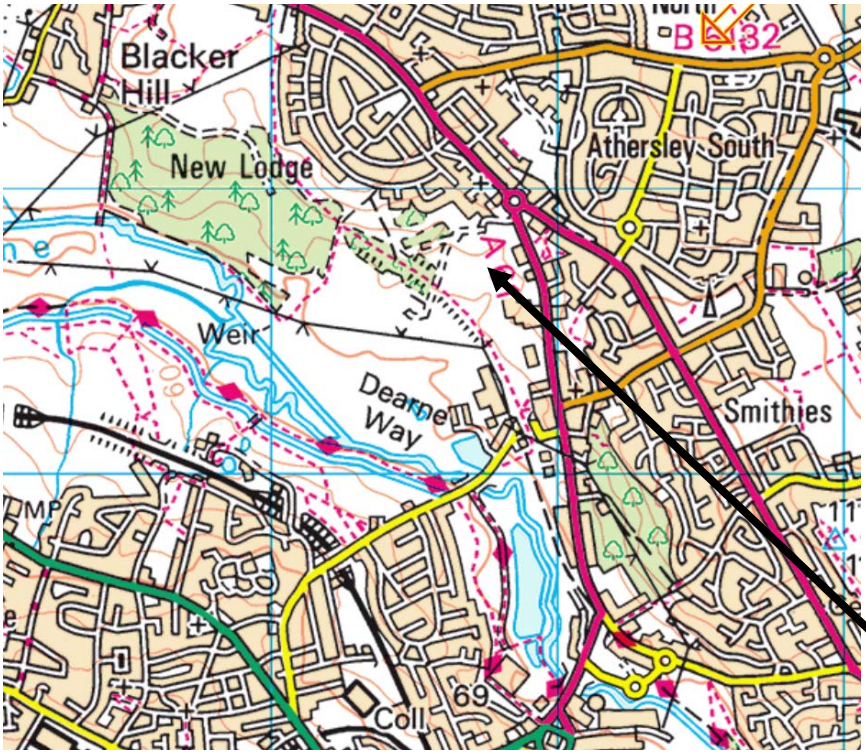
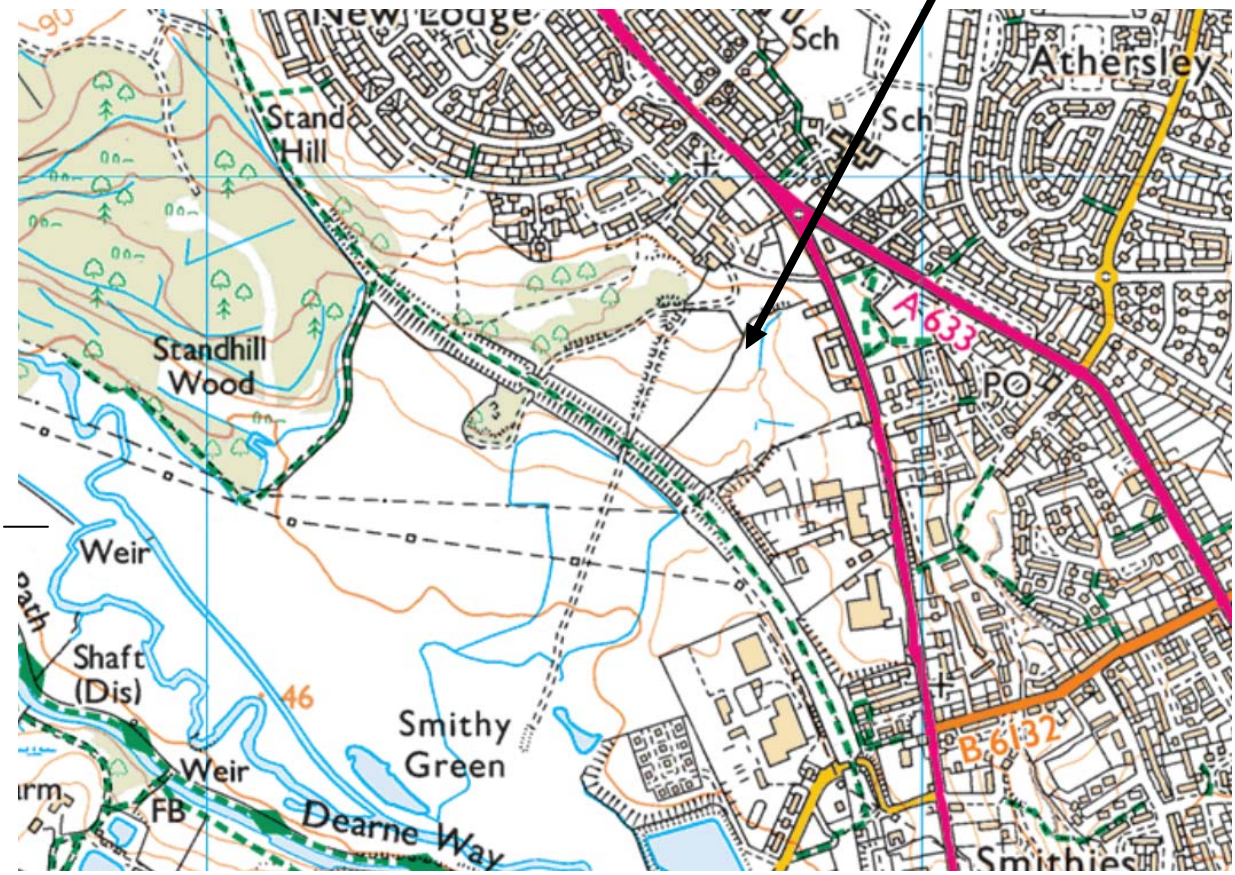
03 / ILLUSTRATIVE MASTERPLAN

Appendix B: Site Location Plan



Site Location



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Tel: 01332 285000
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Client: Harworth Estates Ltd

Project: Land off Wakefield Road, Athersley

Title: **Site Location Plan**

Scale: **NTS**

Project ref: P17-176

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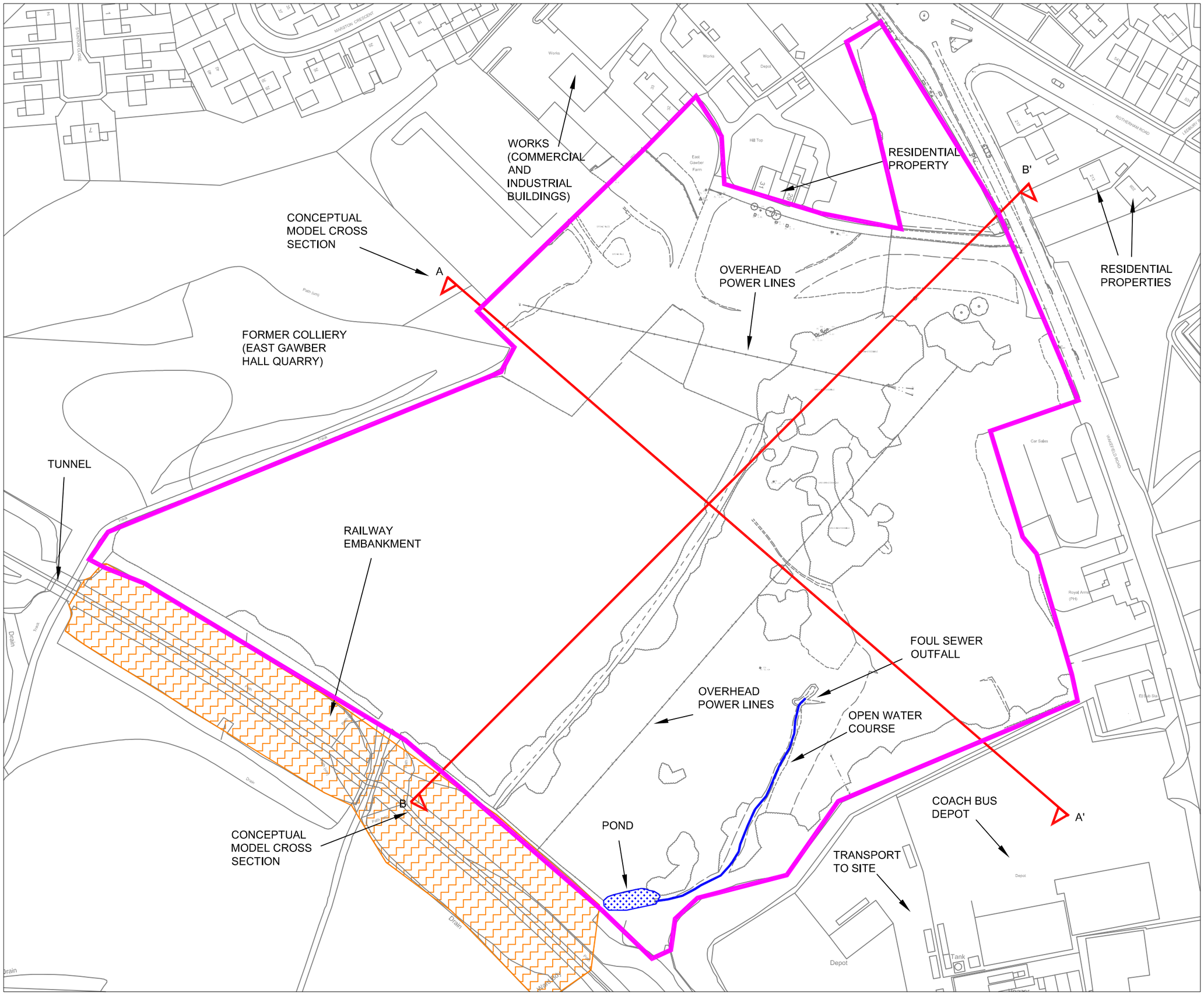
Appendix C: Site Features Plan



GENERAL NOTES

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ALL LEVELS ARE IN METRES UNLESS NOTED OTHERWISE.

ANY DISCREPANCIES NOTED ON SITE ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

KEY

- APPROXIMATE LOCATION OF RAILWAY EMBANKMENT
- APPROXIMATE LOCATION OF SURFACE WATERCOURSE
- APPROXIMATE LOCATION OF ON-SITE POND
- LOCATION OF CONCEPTUAL MODEL CROSS SECTION

Rev.	Date	Amendments	By	Chk. by

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Client

HARWORTH ESTATES

Project

ATHERSLEY, BARNSLEY

Drawing Title

SITE FEATURES PLAN

Status

INFORMATION

Scale	Drawn	Checked	Date
A3 @ NTS	AG	MC	19.05.17

Drawing Ref.

17176-RLE-17-XX-DR-O-001

File Path:

2017 \ P17-176 \ Dwgs \ - 17176-RLE-17-XX-DR-O-001

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Appendix D: CLR 11 Terminology

The likelihood of an event can be classified on a four-point system using the following terms and definitions based on CIRIA C552:

- Highly likely: the event appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution;

- Likely: it is probable that an event will occur or circumstances are such that the event is not inevitable, but possible in the short term and likely over the long term;

- Low likelihood; circumstances are possible under which an event could occur, but it is not certain even in the long term that an event would occur and it is less likely that in the short term; and

- Unlikely: circumstances are such that it is improbable the event would occur even in the long term

The severity can be classified using a similar system also based on CIRIA C552. The terms and definitions relating to severity are:

- Severe: short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part 11A. Short term risk of pollution of sensitive water resources. Catastrophic damage to buildings or property. Short-term risk to an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in 'Draft Circular on Contaminated Land' DETR 2000);

- Medium; chronic damage to human health ('significant harm' as defined in Draft Circular on Contaminated Land', DETR 2000), pollution of sensitive water resources, significant change in an ecosystem or organism forming part of that ecosystem (note definition of ecosystem in Draft Circular on Contaminated Land', DETR 2000);

- Mild: pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm' as defined in 'Draft Circular on Contaminated Land', DETR 2000). Damage to sensitive buildings, structures or the environment; and

- Minor: harm, not necessarily significant, but that could result in financial loss or expenditure to resolve. Non-permanent human health effects easily prevented by use of personal protective clothing. Easily repairable damage to buildings, structures and services.

Once the likelihood of an event occurring and its severity have been classified, a risk category can be assigned from the table below:

		Consequences			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**Highly likely**	Very high	high	Moderate	Moderate / low
	Likely	High	Moderate	Moderate / low	Low
	Low likelihood	Moderate	Moderate / low	Low	Very low
	Unlikely	Moderate / low	Low	Very low	Very low

Definitions of these risk categories are as shown below with an assessment of the further work that might be required:

- Very high: there is a high probability that severe harm could occur or there is evidence harm is currently happening. This risk, if realised, could result in substantial liability and urgent investigation and remediation are likely to be required;

- High: harm is likely to occur. Realisation of the risk is likely to present a substantial liability and urgent investigation is required and remedial works may be necessary in the short term and are likely over the long term;

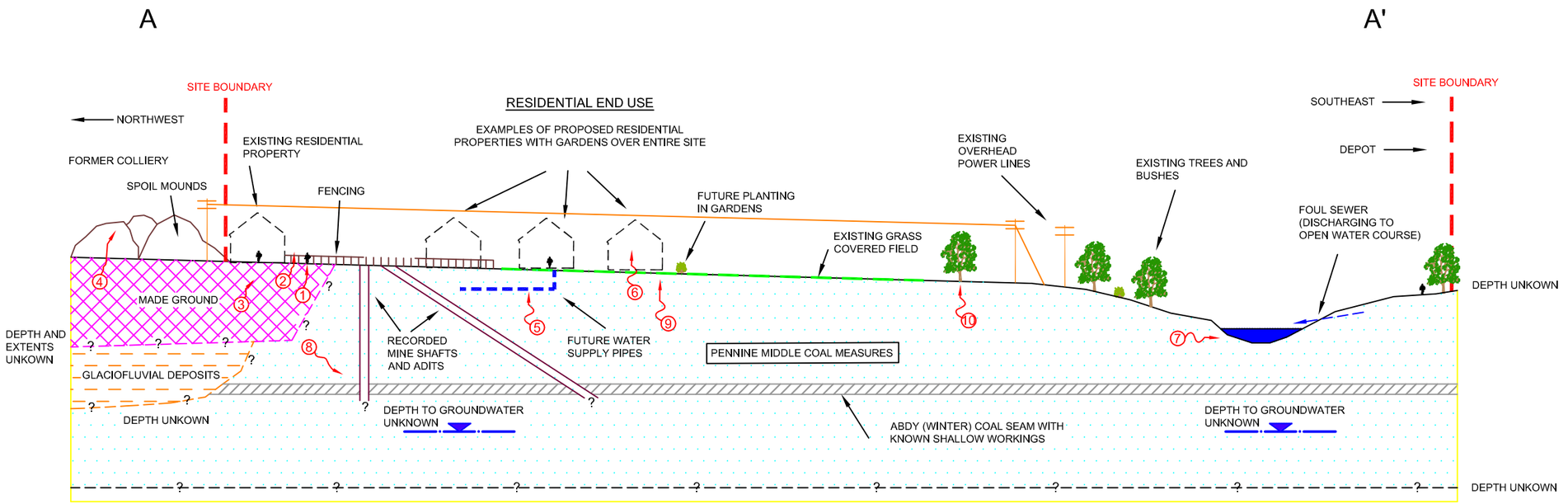
- Moderate: it is possible that harm could arise, but it is unlikely that the harm would be severe and it is more likely that harm would be relatively mild. Investigation is normally required to clarify the risk and determine the liability. Some remedial works may be required in the longer term;

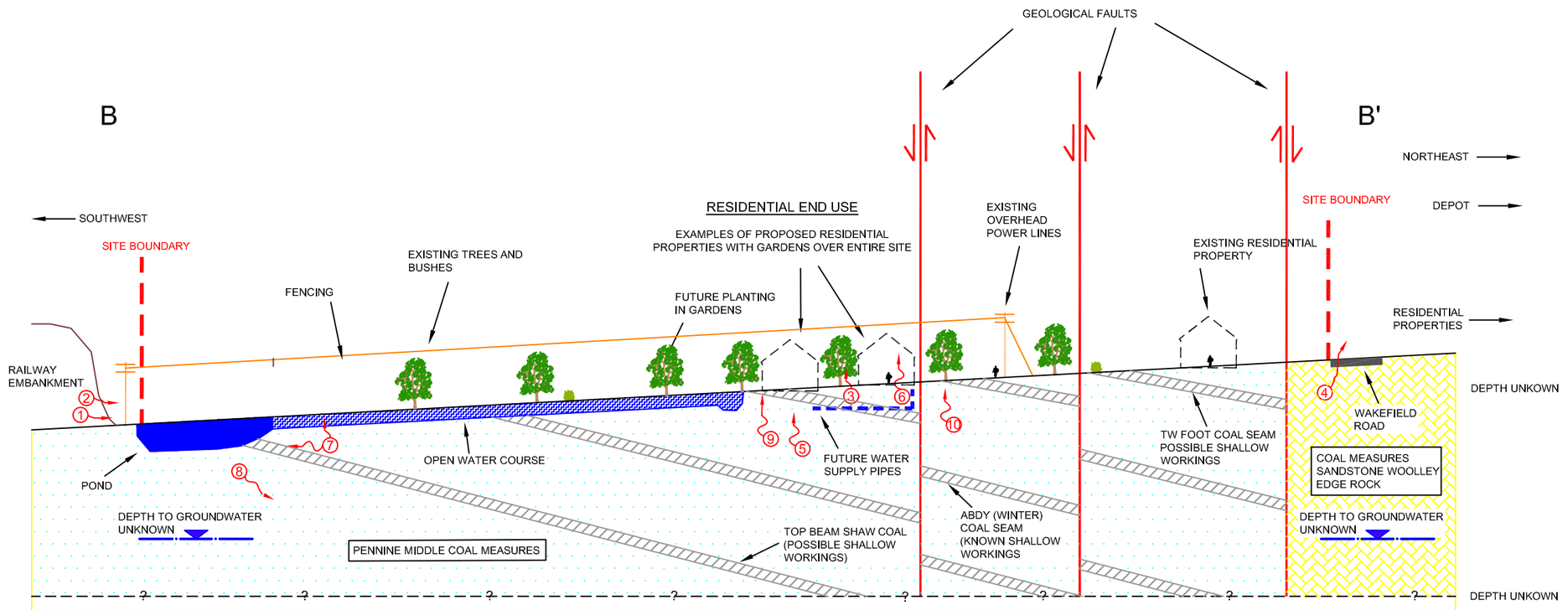
- Low: it is possible that harm could occur, but it is likely that if realised this harm would at worst normally be mild; and

- Very Low: there is a low possibility that harm could occur and if realised the harm is likely to be sever.

Appendix E: Conceptual Site Model

APPENDIX O





GENERAL NOTES

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KEY

POLLUTANT LINKAGE	SOURCE	PATHWAY	RECEPTOR
①	Contaminated Soils	Ingestion of soil, dermal contact, inhalation of dust	Humans - end users
②	Asbestos Contaminated Soils	Inhalation of dust	Construction workers Humans - end users
③	Contaminated Soils	Ingestion of soil, dermal contact, inhalation of dust	Construction workers
④	Contaminated Soils	Ingestion of soil dust	Members of the public adjacent to the site during construction
⑤	Contaminated Water Supplies	Ingestion of water, migration of organic contaminants via plastic pipes	Humans - end users
⑥	Ground Gases (methane & carbon dioxide)	Inhalation of ground gases and risk of explosion	Humans - end users, proposed buildings and infrastructure
⑦	Contaminated Soils and Groundwater	Leaching and groundwater flow to surface water	Controlled Waters
⑧	Contaminated Soils and Groundwater	Downward infiltration into underlying Aquifer	Controlled Waters
⑨	Contaminated Soils	Leaching of sulphate and corrosive contaminants	Buried concrete, structures and services
⑩	Contaminated Soils	Uptake of available phytotoxic contaminants	Flora & Fauna

Rev. Date Amendments By Chk. by

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Client

HARWORTH ESTATES

Project

WAKEFIELD ROAD, ATHERSLEY

Drawing Title

SITE CONCEPTUAL MODEL

Status

INFORMATION

Scale	Drawn	Checked	Date
A3 @ NTS	AG	MC	19.05.17

Project No. Drawing No. Rev.

17176-RLE-17-XX-DR-O-002

File Path:

2017 \ P17-176 \ Dwgs \ - 17176-RLE-17-XX-DR-O-001

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Appendix F: Exploratory Hole Location Plan

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ANY DISCREPANCIES NOTED ON SITE ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.

KEY

TP01 — APPROXIMATE LOCATION AND REFERENCE OF TRIAL PIT EXCAVATED BY RLE.

WS01 — APPROXIMATE LOCATION AND REFERENCE OF WINDOW SAMPLE SUNK BY RLE.

TT1 — APPROXIMATE LOCATION AND REFERENCE OF TRIAL TRENCH EXCAVATED BY RLE.

MADE GROUND IN VICINITY OF FORMER COAL MINE, RAILWAYS / INFRASTRUCTURE

MADE GROUND IN VICINITY OF HISTORIC TRACK

MADE GROUND BENEATH SCRUBLAND

MADE GROUND CENTRAL AREA

MADE GROUND TOPSOIL

Rev.	Date	Amendments	By	Chk. by

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Client

HARWORTH ESTATES

Project

ATHERSLEY,
BARNSLEY

Drawing Title

INTRUSIVE LOCATION PLAN

Status

INFORMATION

Scale	Drawn	Checked	Date
NTS	SJF	MC	19.09.17

Drawing Ref. — Rev.

17176-RLE-17-XX-DR-0-004

File Path:

.

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Appendix G: TP, TT and BH Logs

Trial Pit Log

TrialPit No **TP01**
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434516E - 108726N Level: 62.59	Date 19/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 2.60	Logged

Samples & In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results						
0.10 - 0.20	D1	ES					Grass overlying brown slightly sandy clayey TOPSOIL.		
0.30 - 0.40	D2	ES		62.18		0.40	Very stiff dark grey CLAY.		
0.50	B1	BLK		62.08		0.50	Extremely weak to very stiff black very organic MUDSTONE with frequent finely laminated coal fragments throughout stratum.		
1.00 - 1.10	D3	ES		61.58	1	1.00	Very stiff pale yellow mottled grey friable CLAY.		
1.00 - 1.50	B2	BLK		61.18		1.40	Extremely weak pale yellow highly weathered MUDSTONE with occasional flecks of organic clay. Ironstone nodules and fragments of medium strong sandstone encountered throughout stratum.		
				59.98	2 3 4 5	2.60	End of Pit at 2.600m		

Remarks: No groundwater encountered.

Stability: Sides stable.

AGS

Trial Pit Log

TrialPit No **TP02**

Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434602E - 408670N Level: 61.08	Date 19/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 2.50	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
0.20 - 0.30	D1	ES		60.78	0.30	Grass overlying MADE GROUND: Dark brown slightly ashy topsoil with occasional brick and coal fragments.		
0.60 - 0.70	D2	ES				MADE GROUND: Stiff red orange clay containing bricks, brick fragements and burnt shale.		
1.60 - 1.70	D3	ES		59.58	1.50	Very stiff pale yellow mottled light grey gravelly CLAY. Gravels are of mudstone. Partings of black organic clay and weathered coal within the top 300mm.		
				59.18	1.90	Extremely weak to very weak pale yellow mottled light grey MUDSTONE with frequent coal and ironstone partings.		
				58.58	2.50	End of Pit at 2.500m		

1 2 3 4 5

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP03** Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434651E - 408655N Level: 60.71	Date 19/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 3.20	Logged

Samples & In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results						
				60.41		0.30	Grass overlying dark brown clayey TOPSOIL with many rootlets.		
0.30 - 0.40	D1	ES					Very stiff yellow mottled orange mottled slightly sandy silty CLAY.		
				60.01		0.70	Very stiff grey mottled orange gravelly CLAY. Gravel is sub-angular to angular fine to coarse mudstone and orange sandstone.		
1.00 - 1.10	D2	ES			1				
1.10 - 1.60	B1	BLK							
				58.91		1.80	Very stiff dark grey/ black gravelly CLAY with ironstone nodules and coal fragments.		
				58.71	2	2.00	Extremely weak pale yellow mottled grey SILTSTONE. Ironstone nodules and coal partings encountered throughout stratum.		
					3				
				57.51		3.20	End of Pit at 3.200m		
					4				
					5				

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP04**
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434676E - 408707N Level: 64.47	Date 19/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 3.30	Logged

Samples & In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results						
				64.07		0.40	Grass overlying dark brown clayey TOPSOIL containing occasional fragments of brick.		
					1		Very stiff orange brown grey gravelly CLAY. Gravel is sub-angular to angular fine to coarse mudstone.		
				63.37		1.10	Stiff black friable CLAY with fragments of poor quality, highly weathered coal.		
				63.17		1.30	Very stiff orange brown grey gravelly CLAY.		
					2				
				62.37		2.10	Very stiff grey very gravelly CLAY with occasional cobbles of sandstone and ironstone nodules at depths of >2.6m bgl.		
				61.47	3	3.00	Extremely weak brown SILTSONE with ironstone partings.		
				61.17		3.30	End of Pit at 3.300m		
					4				
					5				

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP05**

Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434591E - 408746N Level: 65.13	Date 19/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 3.40	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
0.20 - 0.30	D1	ES		64.63	0.50	MADE GROUND: Dark brown slightly ashy gravelly topsoil with fragments of coal and brick.		
0.70 - 0.80	D2	ES				Very stiff orange brown grey silty slightly gravelly CLAY. Gravels of mudstone, siltsone with occasional cobbles of orange brown grey siltsone. Black shale and coal encountered between 0.9-1.2m bgl.		
1.00	B1	BLK		62.53	2.60	Extremely weak grey and orange brown thinly laminated SILTSTONE with ironstone nodules and iron-stained partings.		
				61.73	3.40	End of Pit at 3.400m		

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP05A** Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: / Level:	Date 19/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 3.10	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
0.10 - 0.20	D1	ES				MADE GROUND: Dark brown slightly ashy gravelly topsoil. Gravel is fragments of brick, coal and sandstone.		
					0.40	MADE GROUND: Stiff dark brown gravelly clay. Gravel is fragments of coal, brick and burnt shale.		
0.80 - 0.90	D2	ES		1				
1.30 - 1.40	D3	ES			1.40	Very stiff pale yellow mottled light grey silty gravelly CLAY. Gravels are of mudstone and siltstone and are sub-angular to sub-rounded fine to coarse.		
				2				
					2.20	Extremely weak grey thinly laminated SILTSTONE/MUDSTONE with ironstone nodules.		
				3				
					3.10	End of Pit at 3.100m		
				4				
				5				

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP06** Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434600E - 408762N Level: 66.14	Date 20/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 3.30	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
				65.64	0.50	MADE GROUND: Dark brown clayey topsoil with fragments of coal and brick.		
						Stiff becoming very stiff orange brown grey slightly gravelly CLAY. Gravels of mudstone are sub-angular to angular. Black shale gravels encountered between 1.3-1.6m bgl.		
				63.84	2.30	Extremely weak light grey MUDSTONE with iron-stained partings.		
				63.14	3.00	Extremely weak pale yellow SILTSTONE.		
				62.84	3.30	End of Pit at 3.300m		

1 2 3 4 5

Remarks: No groundwater encountered.

Stability: Sides stable.

AGS

Trial Pit Log

TrialPit No
TP06A
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: / Level:	Date 20/07/2017
Location: Barnsley		Dimensions (m): / Depth 3.00	Scale 1:25
Client: Harworth Estates			Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
0.20 - 0.30	D1	ES				MADE GROUND: Dark brown ashy topsoil with fragments of coal and brick.		
					0.70			
0.80 - 0.90	D2	ES				Stiff becoming very stiff orange brown grey gravelly CLAY. Sub-angular to angular fine to coarse gravels of mudstone.		
1.00	B1	BLK		1				
					1.30			
				2		Extremely weak orange brown grey thinly laminated MUDSTONE. Frequent coal partings encountered throughout stratum. Occasional tree root fossils encountered.		
					2.30			
				3		Extremely weak pale yellow thinly laminated SILTSTONE.		
					3.00	End of Pit at 3.000m		
				4				
				5				

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP07** Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434676E - 408811N Level: 71.04	Date 20/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 3.30	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
0.10 - 0.20	D1	ES		70.84	0.20	MADE GROUND: Grass overlying dark brown ashy topsoil with fragments of coal and brick.		
0.50 - 0.60	D2	ES		70.44	0.60	MADE GROUND: Stiff to very stiff orange brown clay with gravels of coal. Disused clay land drain encountered at 0.3m bgl.		
				69.34	1.70	Very stiff orange brown grey gravelly CLAY. Gravels are of mudstone and are sub-angular to sub-rounded and fine to coarse.		
				67.74	3.30	Extremely weak grey mottled orange and black MUDSTONE.		
						End of Pit at 3.300m		

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP08**
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434709E - 408768N Level: 69.10	Date 20/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 2.00	Logged

Samples & In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results						
0.10 - 0.20	D1	ES					Grass overlying MADE GROUND: Topsoil containing coal and brick fragments.		
				68.80		0.30			
0.50 - 0.60	D2	ES					MADE GROUND: Black gravel, cobbles and boulders of coal, black shale, whole bricks and fragments of leather. Orange/red shale encountered from 1.5m bgl.		
1.00	B1	BLK			1				
1.00	B2	BLK							
				67.10	2	2.00	End of Pit at 2.000m		
					3				
					4				
					5				

Remarks: Fast groundwater inflow at 2.0m bgl.

Stability: Immediate collapse at 2m bgl.

Trial Pit Log

TrialPit No
TP08A
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: / Level:	Date 20/07/2017
Location: Barnsley		Dimensions (m): / Depth 3.20	Scale 1:25
Client: Harworth Estates			Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
					0.20	MADE GROUND: Grass overlying brown topsoil with brick and coal fragments.		
					0.60	MADE GROUND: Red brick and red shale.		
					2.20	MADE GROUND: Black ashy gravel of coal and red shale. Occasional slag gravel and whole bricks. A layer of bricks was encountered in the north face of the trial pit between 1.3-2.2m. Pockets of soft to firm reworked grey wet gravelly clay.		
					2.70	Black highly weathered clayey coal. Recovered as gravelly CLAY		
					3.20	Extremely weak grey MUDSTONE.		
						End of Pit at 3.200m		

1 2 3 4 5

Remarks: No groundwater encountered.

Stability: Sides stable.

AGS

Trial Pit Log

TrialPit No **TP08B** Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: / Level:	Date 20/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 2.90	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
					0.20	Grass overlying brown slightly gravelly TOPSOIL containing occasional fragments of ceramics and pottery.		
					0.60	Stiff orange/brown/grey gravelly CLAY containing occasional sandstone cobbles.		
					0.80	Very stiff grey gravelly CLAY. Gravels are sub-angular to sub-rounded mudstone.		
1.50	B1	BLK			2.30	Black weathered high quality fractured wet COAL. Becoming gravel at 1.8m with occasional cobbles and boulders.		
2.50	B2	BLK			2.90	Extremely weak grey SILTSTONE with iron stained partings.		
						End of Pit at 2.900m		

1 2 3 4 5

Remarks: No groundwater encountered.

Stability: Side stable.

Trial Pit Log

TrialPit No **TP09** Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434737E - 408795N Level: 70.79	Date 20/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 3.60	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
0.20 - 0.30	D1	ES		70.19	0.60	MADE GROUND: Grass overlying stiff brown gravelly clayey topsoil containing occasional brick fragments.		
0.80 - 0.90	D2	ES		68.99	1.80	MADE GROUND: Black grey clayey gravelly cobbles of brick, coal, mudstone and sandstone.		
2.50	B1	BLK		68.49	2.30	Very stiff grey very gravelly CLAY Gravels are sub-angular to angular fine to coarse mudstone.		
				67.19	3.60	Grey clayey mudstone GRAVEL. Gravels weathered to very stiff clay in places.		
						End of Pit at 3.600m		

1 2 3 4 5

Remarks: Slow ingress of perched groundwater at 1.8m bgl. Ceased after 5 minutes.

Stability: Sides stable.

AGS

Trial Pit Log

TrialPit No **TP10**
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434743E - 408858N Level: 75.32	Date 20/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 2.90	Logged

Samples & In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results						
0.20 - 0.30	D1	ES		75.02		0.30	MADE GROUND: Turf overlying dark brown slightly ashy gravelly topsoil with brick fragments, metal pieces, coal, glass, ceramic and wood fragments.		
0.50 - 0.60	D2	ES			1		MADE GROUND: Stiff black dark brown gravelly clay containing glass, brick, coal and occasional plastic fragments.		
2.00	B1	BLK		73.72		1.60	Stiff yellow brown sandy CLAY becoming very gravelly with depth. Lenses of completely weathered thinly laminated siltsone (weathered to very stiff silty clay) encountered throughout stratum.		
					2				
				72.92		2.40	Very weak to extremely weak fine very silty fine grained SANDSTONE. Becoming sandy clayey gravel with depth.		
				72.42		2.90	End of Pit at 2.900m		
					3				
					4				
					5				

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No
TP10A
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: / Level:	Date 20/07/2017
Location: Barnsley		Dimensions (m): / Depth 2.20	Scale 1:25
Client: Harworth Estates			Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
						MADE GROUND: Turf overlying dark brown slightly ashy gravelly topsoil with brick fragments, metal pieces, coal, glass, ceramic and wood fragments.		
					0.30	MADE GROUND: Black/dark brown ashy CLAY containing coal, glass, brick, and occasional plastic.		
					1.10	Very stiff yellow sandy CLAY.		
					2.20	End of Pit at 2.200m		

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP11**
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434787E - 408718N Level: 73.13	Date 21/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 3.10	Logged

Samples & In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results						
0.10 - 0.20	D1	ES		72.82		0.30	Grass overlying MADE GROUND: Ashy gravelly topsoil containing coal, bricks and fragments of pottery.		
0.40 - 0.50	D2	ES		72.53		0.60	MADE GROUND: Black, dark grey clayey ash, clinker, coal, brick fragments, pottery and glass.		
0.70 - 0.80	D3	ES		72.12	1	1.00	MADE GROUND: Brown slightly ashy clayey gravel of coal, clinker, shale, brick. Pockets of stiff brown clay.		
1.20 - 1.30	B1	BLK		71.62		1.50	Firm orange brown friable silty CLAY.		
1.60 - 1.70	D4	ES		71.12	2	2.00	Very stiff yellow silty slightly sandy gravelly CLAY. Gravels of siltstone and sandstone are sub- angular to angular fine to coarse.		
1.80	B2	BLK		70.42		2.70	Extremely weak thinly laminated silty SANDSTONE.		
				70.03	3	3.10	Extremely weak grey SILTSTONE interbedded with very stiff silty clay.		
					4		End of Pit at 3.100m		
					5				

Remarks: No groundwater encountered.

Stability: Sides stable.

AGS

Trial Pit Log

TrialPit No **TP12**
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434841E - 408834N Level: 74.12	Date 21/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 2.80	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
0.20 - 0.30	D1	ES				Grass overlying MADE GROUND: Black gravelly ash and clinker. Gravels are of coal, brick, metal pieces and cobbles of bricks.		
0.70 - 0.80	D2	ES		73.52	0.60	Stiff becoming very stiff orange brown silty sandy CLAY.		
1.20	B1	BLK		73.11	1.00	Very stiff yellow/orange mottled grey gravelly clay. Gravels contain ironstone, shale, mudstone, quartzite and sandstone.		
1.20 - 1.30	D3	ES						
1.70	B2	BLK		72.52	1.60	COAL recovered as black shale and ironstone and clayey gravel (from 1.8m bgl).		
1.90	B3	BLK						
2.20	B4	BLK		72.11	2.00	Extremely weak yellow thinly laminated SILTSTONE. Ironstone nodules and iron stained partings encountered throughout stratum.		
				71.32	2.80	End of Pit at 2.800m		

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP13**
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434836E - 408774N Level: 71.78	Date 24/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 2.10	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
0.10 - 0.20	D1	ES		71.48	0.30	MADE GROUND: Grass overlying sandy topsoil with fragments of brick and coal.		
0.40 - 0.50	D2	ES		71.08	0.70	MADE GROUND: Yellow clayey gravelly sand with cobbles and boulders of sandstone. Gravels of sandstone. Old land drain at base.		
0.80 - 0.90	D3	ES				Stiff to very stiff orange brown grey gravelly sandy GRAVEL. Gravels are mudstone and ironstone fragments.		
1.50	B1	BLK		70.08	1.70	Very weak thinly laminated yellow SILTSTONE with coal and ironstone partings.		
				69.68	2.10	End of Pit at 2.100m		

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP13A**
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords:	Date 24/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 3.30	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
					0.30	MADE GROUND: Grass overlying sandy topsoil with fragments of brick and coal.		
					0.80	MADE GROUND: yellow very clayey sandy gravel with pockets of soft clay. Occasional cobbles of sandstone encountered. gravels are fine to medium sub angular sandstone. Ceramic fragments encountered with		
1.00	B1	BLK		1	1.30	MADE GROUND: Stiff grey gravelly clay with occasional fragments of brick and coal.		
2.00	B2	BLK		2	2.70	Orange/brown and grey very clayey GRAVEL of mudstone. Pockets of very gravelly, very stiff clay encountered throughout stratum.		
				3	3.30	Extremely weak grey MUDSTONE with very weak ironstone nodules. Returned as gravel.		
				4		End of Pit at 3.300m		
				5				

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP14** Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434845E - 408710N Level: 69.32	Date 24/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 3.40	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
				69.12	0.20	MADE GROUND: Grass overlying brown sandy topsoil.		
						MADE GROUND: Yellow clayey gravelly sand with cobbles and boulders of sandstone.		
				68.52	0.80	MADE GROUND: Very grey dark grey firm to stiff very gravelly clay/ very clayey gravel of mudstone, ironstone and coal.		
				67.82	1.50	Orange brown very clayey sandy GRAVEL of ironstone and siltstone.		
1.70	B1	BLK						
				66.62	2.70	Very stiff grey gravelly CLAY. Gravels of mudstone. Shale/coal encountered between 2.8- 2.85m.		
				65.92	3.40	End of Pit at 3.400m		

1 2 3 4 5

Remarks: Slight groundwater seepage at base of TP.

Stability: Sides stable.

AGS

Trial Pit Log

TrialPit No **TP15**

Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434828E - 408661N Level: 67.13	Date 24/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 3.00	Logged

Samples & In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results						
				66.83		0.30	MADE GROUND: Grass overlying brown sandy topsoil.		
				66.33		0.80	MADE GROUND: Stiff sandy yellow clay. Friable cobble boulders and gravels of sandstone.		
1.00	B1	BLK			1		MADE GROUND: Stiff orange brown grey gravelly clay. Gravels are of coal/black shale.		
				65.33		1.80			
1.90	B2	BLK					Very stiff grey CLAY.		
				65.13	2	2.00	COAL recovered as black very gravelly clay.		
				65.03		2.10	Extremely weak pale yellow silty fine SAND. Recovered as gravel/ cobble.		
				64.13	3	3.00	End of Pit at 3.000m		
					4				
					5				

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No **TP16**
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434711E - 408632N Level: 60.70	Date 24/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 2.80	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
0.10 - 0.20	D1	ES		60.40	0.30	Brown sandy TOPSOIL		
0.50 - 0.60	D2	ES				Yellow clayey gravelly SAND with occasional gravels and cobbles comprising of sandstone.		
0.70	D3	ES		59.80	0.90	Extremely weak orange sandy SILTSTONE.		
				58.90	1.80	Very weak orange/brown silty SAND.		
				57.90	2.80	End of Pit at 2.800m		

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No
TP16A
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: / Level:	Date 24/07/2017
Location: Barnsley		Dimensions (m): / Depth 1.90	Scale 1:25 / Logged
Client: Harworth Estates			

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
						MADE GROUND: brown sandy topsoil with occasional fragments of brick.		
					0.30	MADE GROUND: comprising reworked yellow/brown sandy clay. Gravels and cobbles of sandstone encountered throughout stratum.		
					0.60	Very stiff orange/brown/grey slightly gravelly silty CLAY. Gravels are fine to medium sub angular mudstone and coal fragments.		
					1.85	Yellow brown medium strong SANDSTONE.		
					1.90	End of Pit at 1.900m		

Remarks: No groundwater encountered.

Stability: Sides stable.

Trial Pit Log

TrialPit No
TT1
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: 434374E - 108922N Level:	Date 24/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 1.20	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
						TOPSOIL		
					0.30	Stiff orange brown grey gravelly CLAY. Gravels are sub-angular to sub- rounded fine to coarse.		
					0.70	Very stiff/ Extremely weak grey with mottle orange brown clayey MUDSTONE. Poor quality coal. Clay of black mudstone in north of trench. Old land drain at 1m.		
				1				
					1.20	End of Pit at 1.200m		
				2				
				3				
				4				
				5				

Remarks:

Stability:

Trial Pit Log

TrialPit No
TT2
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: / Level:	Date 24/07/2017
Location: Barnsley		Dimensions (m): / Depth 1.20	Scale 1:25
Client: Harworth Estates			Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
						TOPSOIL		
					0.30	Stiff to very stiff orange brown grey gravelly CLAY. Gravels are sub-rounded to sub-angular fine to coarse.		
					0.80	Very stiff orange brown gravelly cobbly CLAY. Occasional cobble of sandstone.		
					1.20	End of Pit at 1.200m		

1
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Remarks:

Stability:

Trial Pit Log

TrialPit No
TT3
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: / Level:	Date 24/07/2017
Location: Barnsley		Dimensions (m): / Depth 2.70	Scale 1:25
Client: Harworth Estates			Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
						MADE GROUND: Yellow brown and grey ashy clay, bricks and sandstone.		
				1	0.90	MADE GROUND: Black ash, burnt shale, coal, bricks. Cobbles and boulders of mudstone from 2.2m.		
				2				
					2.50	Stiff brown and grey CLAY with brick and sandstone gravel. Sewer at 2.5m.		
				3	2.70	End of Pit at 2.700m		
				4				
				5				

Remarks:

Stability:

Trial Pit Log

TrialPit No
TT4
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: / Level:	Date 24/07/2017
Location: Barnsley		Dimensions (m):	Scale 1:25
Client: Harworth Estates		Depth 2.50	Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
1.00	B1	BLK				MADE GROUND: Dark brown ashy brick fill, plastic, wood, ceramic, metal. Organic odour. Pockets of black oily clay. Fuel odour, possible landfill.		
1.90	D1	ES			2.10	Yellow stiff sandy CLAY		
					2.50	End of Pit at 2.500m		

1 2 3 4 5

Remarks:

Stability:

Trial Pit Log

TrialPit No
TT5
Sheet 1 of 1

Project Name: Athersley, Barnsley	Project No. p17-176	Co-ords: / Level:	Date 25/07/2017
Location: Barnsley		Dimensions (m): / Depth 1.90	Scale 1:25
Client: Harworth Estates			Logged

Samples & In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strike
Depth	Ref.	Type	Results					
						MADE GROUND: Black ash, coal, brick fragments, clayey as before.		
					0.50	MADE GROUND: Gravel and cobble of red pottery and brick fragments. Oil and fuels at base in eastwest.		
1.70	D1	ES						
					1.80	Natural stiff grey sandy CLAY.		
					1.90	End of Pit at 1.900m		

1
2
3
4
5

Remarks:

Stability:

Borehole Log

Borehole No. **WS01**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434589E - 408673N	Hole Type WS
Location:	Barnsley		Level:	60.66	Scale 1:25
Client:	Harworth Estates		Dates:	26/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results						
				60.41	0.25	Grass overlying dark brown sandy gravelly TOPSOIL. Gravels are sub-angular to sub-rounded fine to medium quartz, mudstone, sandstone and fine angular coal.			
				59.91	0.75	Firm yellow orange silty very sandy CLAY. Coal gravels are sub-angular fine to medium between 0.5-0.7m. Possibly reworked.			
1.00		SPT	N=14 (3,3/3,2,4,5)			Stiff orange grey silty CLAY. Occasional gravels of sub-angular fine to coarse mudstone.			
2.00		SPT	50 (11,14/50 for 100mm)	58.66	2.00	End of Borehole at 2.000m			

1 2 3 4 5

Remarks

Borehole Log

Borehole No. **WS02**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434641E - 408632N	Hole Type WS
Location:	Barnsley		Level:	59.37	Scale 1:25
Client:	Harworth Estates		Dates:	26/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results							
				59.12		0.25	MADE GROUND: Grass overlying dark brown grey gravelly sandy slightly silty topsoil. Gravels are sub-angular to sub-rounded fine to coarse concrete, brick, limestone, coal and mudstone.			
							Firm to stiff brown orange very sandy gravelly CLAY. Gravels are sub-rounded sandstone, sub-angular fine mudstone and sun-angular coal.			
				58.77		0.60	Stiff orange grey gravelly silty slightly sandy CLAY. Gravel is sub-rounded to sub-angular mudstone and sandstone with sub-angular fine coal.			
1.00		SPT	N=16 (3,3/4,3,4,5)		1					
				57.47		1.90	Stiff orange brown sandy gravelly CLAY. Gravels are sub-angular siltstone.			
2.00		SPT	N=31 (4,4/5,7,10,9)		2					
				56.77		2.60	End of Borehole at 2.600m			
					3					
					4					
					5					

Remarks

Borehole Log

Borehole No. **WS03**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434653E - 408611N	Hole Type WS
Location:	Barnsley		Level:	58.57	Scale 1:25
Client:	Harworth Estates		Dates:	27/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results							
				58.27		0.30	Grass overlying dark brown sandy gravelly TOPSOIL. Gravels are sub-angular to sub-rounded fine to coarse sandstone and mudstone.			
							Firm to stiff orange brown sandy gravelly CLAY. Gravels are sub-angular fine to medium mudstone and sandstone with occasional sub-angular fine coal.			
1.00		SPT	N=15 (4,4/3,4,4,4)	57.27	1	1.30	Stiff orange brown sandy gravelly CLAY. Gravels are sub-rounded fine to coarse quartz with fine coal. Becomes grey and friable below 2.2m.			
2.00		SPT	N=22 (5,4/3,4,5,10)		2					
				56.07		2.50	End of Borehole at 2.500m			
					3					
					4					
					5					

Remarks

AGS

Borehole Log

Borehole No. **WS04**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434689E - 408587N	Hole Type WS
Location:	Barnsley		Level:	57.78	Scale 1:25
Client:	Harworth Estates		Dates:	25/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results						
0.15	D1	ES				MADE GROUND: Brown sandy gravelly topsoil. Gravels are sub-angular fine to coarse mudstone. Fine angular coal.			
				57.48	0.30				
0.40	D2	ES				MADE GROUND: Yellow orange very clayey SAND. Gravels are sub-angular fine to coarse silty mudstone.			
				57.28	0.50				
0.70	D3	ES				Stiff yellow grey sandy slightly gravelly silty CLAY. Gravels are sub-angular fine to medium mudstone. Becomes grey yellow at 1.5m.			
1.00		SPT	N=10 (3,2/2,3,2,2,3)		1				
				55.98	1.80	Black brown COAL with occasional lense of brown soft clay.			
2.00		SPT	N=13 (4,4/4,3,3,3)		2				
				55.38	2.40	Stiff red orange very sandy gravelly silty CLAY. Gravels are sub-angular fine to medium mudstone.			
3.00		SPT	N=46 (6,7/8,11,13,14)		3				
				54.68	3.10	Grey white extremely weak SILTSTONE. End of Borehole at 3.100m			
				54.18	3.60				
					4				
					5				

Remarks

Borehole Log

Borehole No. **WS05**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434709E - 408770N	Hole Type WS
Location:	Barnsley		Level:	61.72	Scale 1:25
Client:	Harworth Estates		Dates:	25/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results							
				61.57		0.15	Grass overlying brown sandy gravelly TOPSOIL with fragments of rootlets. Gravels are sub-angular fine mudstone.			
							Very stiff orang grey sandy silty slightly gravelly CLAY. Gravels are sub-angular to sub-rounded fine to coarse mudstone, sandstone and siltstone. Becomes mottled black at 1.6m.			
1.00		SPT	N=17 (5,5/5,4,4,4)		1					
2.00		SPT	N=50 (5,7/50 for 275mm)	59.72	2	2.00	End of Borehole at 2.000m			
					3					
					4					
					5					

Remarks

Borehole Log

Borehole No. **WS06**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434558E - 408714N	Hole Type WS
Location:	Barnsley		Level:	62.63	Scale 1:25
Client:	Harworth Estates		Dates:	26/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results						
0.15	D1	ES		62.38	0.25	Grass overlying dark brown sandy gravelly TOPSOIL. Gravels are sub-angular to rounded quartz, mudstone and siltstone.			
				62.23	0.40	Firm brown orange sandy CLAY. Occasional Sub-angular fine to medium mudstone gravel.			
0.60	D2	ES				Stiff brown orange mottled black slightly gravelly sandy CLAY. Gravels are sub-angular fine to coarse mudstone and fine coal.			
1.00		SPT	N=11 (2,3/3,3,2,3)	61.43	1.20	Black coal excavated as coarse SAND and sub-angular fine to medium gravel			
				61.03	1.60	Stiff brown blak gravelly sandy CLAY. Gravel is fine to coarse sub angular mudstone.			
2.00		SPT	N=34 (4,6/11,10,8,5)	60.53	2.10	Loose black SAND. Gravels of sub-angular fine coal.			
				60.13	2.50	Very stiff grey mottled yellow gravelly CLAY. Gravels are sub-angular fine to coarse siltstone.			
3.00		SPT	50 (6,9/50 for 90mm)	59.63	3.00	End of Borehole at 3.000m			

Remarks

Borehole Log

Borehole No. **WS07**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434587E - 408745N	Hole Type WS
Location:	Barnsley		Level:	64.97	Scale 1:25
Client:	Harworth Estates		Dates:	27/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results							
				64.72		0.25	Grass overlying MADE GROUND: Dark brown sandy gravelly topsoil. Gravel is sub-angular to sub-rounded slate, quartz, brick, sandstone and mudstone.			
							MADE GROUND: Firm to stiff sandy gravelly CLAY. Gravel is sub-angular fine to coarse mudstone sandstone and fine coal.			
				64.17		0.80				
1.00		SPT	N=17 (3,2/3,3,6,5)		1		Stiff brown orange mottled grey CLAY. Occasional gravel of sub-angular fine to coarse mudstone.			
2.00		SPT	N=50 (6,11/50 for 240mm)	62.97	2	2.00	End of Borehole at 2.000m			
					3					
					4					
					5					

Remarks

Borehole Log

Borehole No. **WS08**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434559E - 408744N	Hole Type WS
Location:	Barnsley		Level:	65.13	Scale 1:25
Client:	Harworth Estates		Dates:	27/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results							
				64.92		0.20	Grass overlying MADE GROUND: Dark brown sandy gravelly topsoil. Gravel is sub-angular to sub-rounded fine to coarse quartz, brick, glass, coal, sandstone clinker and nails. MADE GROUND: Dark brown black very gravelly sandy CLAY. Gravels are sub-angular fine to coarse coal brick and mudstone.			
				64.53		0.60	Stiff orange brown slightly sandy slightly gravelly CLAY. Gravels are sub-angular fine coal. Possibly reworked.			
1.00		SPT	N=10 (3,2/2,2,3,3)		1					
				63.92		1.20	Stiff brown orange mottled grey slightly sandy slightly gravelly silty CLAY. Gravels are sub-angular fine to coarse mudstone and coal.			
2.00		SPT	N=18 (3,5/4,4,4,6)		2					
3.00		SPT	N=35 (6,7/6,9,10,10)		3					
				61.52		3.60	Extremely weak yellow grey SILTSTONE.			
				61.22		3.90	End of Borehole at 3.900m			
					4					
					5					

Remarks

Borehole Log

Borehole No. **WS09**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434687E - 408739N	Hole Type WS
Location:	Barnsley		Level:	66.67	Scale 1:25
Client:	Harworth Estates		Dates:	27/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results							
				66.27		0.40	Grass overlying MADE GROUND: Dark brown sandy gravelly topsoil. Gravels of sub-angular to sub-rounded fine to coarse brick, coal, mudstone and sandstone.			
				65.97		0.70	MADE GROUND: Stiff silty gravelly slightly sandy CLAY. Gravels are sub-angular to sub-rounded fine to coarse mudstone and coal.			
1.00		SPT	N=16 (3,2/4,4,4,4)		1		Stiff orange grey slightly sandy slightly gravelly silty CLAY. Gravels are sub-angular fine to medium mudstone. Becomes grey friable and very stiff at 2.3m.			
2.00		SPT	N=19 (5,5/4,5,5,5)		2					
				64.07		2.60	End of Borehole at 2.600m			
					3					
					4					
					5					

Remarks

Borehole Log

Borehole No. **WS10**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434650E - 408781N	Hole Type WS
Location:	Barnsley		Level:	68.67	Scale 1:25
Client:	Harworth Estates		Dates:	26/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results						
0.20	D1	ES		68.42	0.25	Grass overlying MADE GROUND: Dark brown grey slightly sandy silty gravelly topsoil. Gravels are sub-angular fine to medium brick, concrete and fine sub-angular coal.			
				68.07	0.60	MADE GROUND: Firm to stiff yellow orange brown gravelly silty slightly sandy CLAY. Gravels are sub-angular to sub-rounded fine to coarse mudstone, brick and sandstone.			
0.80	D2	ES				MADE GROUND: Firm greyish brown black sandy silty gravelly CLAY. Gravels are sub-angular fine mudstone, brick, coal, Brick cobble at 1.2m.			
1.00		SPT	N=19 (3,5/7,4,5,3)	67.37	1.30	Stiff grey orange silty slightly sandy slightly gravelly CLAY. Gravels are sub-angular fine to medium siltstone and mudstone becoming grey at 2.2m.			
1.50	D3	ES							
2.00		SPT	N=17 (3,3/3,4,5,5)						
3.00		SPT	N=22 (3,4/4,6,7,5)	65.57	3.10	Soft grey gravelly silty CLAY. Gravels are sub-angular fine to coarse siltstone. Becomes stiff and sligthly gravelly at 3.5m.			
4.00		SPT	N=24 (4,4/5,5,6,8)	64.67	4.00	End of Borehole at 4.000m			

Remarks

Borehole Log

Borehole No. **WS11**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434761E - 408825N	Hole Type WS
Location:	Barnsley		Level:	71.86	Scale 1:25
Client:	Harworth Estates		Dates:	24/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results						
				71.56	0.30	Grass overlying MADE GROUND: Red brown purple sandy gravel. Gravel is sub-angular fine to coarse brick, clinker, coal, mudstone, limestone, sandstone.			
						MADE GROUND: Stiff black mottled grey gravelly clay. Gravel of sub-angular fine to coarse coal. Cobble of brick at 0.45m.			
1.00		SPT	N=10 (3,2/3,2,2,3)	70.76	1.10	Stiff orange grey mottled black sandy silty CLAY. Becomes dark brown with coal and sub-angular fine to medium gravels from 1.8m.			
2.00		SPT	N=21 (7,8/7,5,4,5)	69.61	2.25	Stiff yellow grey friable CLAY.			
				69.26	2.60	Yellow grey SILTSTONE excavated as sub-angular fine to coarse gravel.			
3.00		SPT	50 (11,10/50 for 160mm)	68.86	3.00	End of Borehole at 3.000m			

Remarks

Borehole Log

Borehole No. **WS12**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434715E - 408837N	Hole Type WS
Location:	Barnsley		Level:	72.77	Scale 1:25
Client:	Harworth Estates		Dates:	24/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results						
0.30	D1	ES				MADE GROUND: Dark brown slightly sandy clay gravel. Gravel is sub-angular to sub-rounded fine to coarse sandstone, brick, coal, tarmac and mudstone and occasional bolts and screws. Rootlets at 0.25m.			
				71.97	0.80				
0.90	D2	ES				Very stiff grey yellow mottled black slightly gravelly CLAY. Gravel is sub-angular fine to medium coal and mudstone. Possible made ground.			
1.00		SPT	N=17 (4,3/6,5,2,4)	71.67	1.10				
						Stiff yellow orange mottled black very sandy gravelly CLAY. Gravel is sub-angular fine to medium sandstone, mudstone and coal becoming orange and grey at 1.8m.			
1.50	D3	ES							
2.00		SPT	N=16 (5,3/4,4,4,4)	70.67	2.10				
						Very stiff grey yellow slightly silty sandy gravelly CLAY. Gravels are sub-angular.			
3.00		SPT	N=18 (4,3/4,4,5,5)						
4.00		SPT	N=26 (5,6/6,6,6,8)						
				68.32	4.45	End of Borehole at 4.450m			

Remarks

Borehole Log

Borehole No. **WS13**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434820E - 408833N	Hole Type WS
Location:	Barnsley		Level:	73.44	Scale 1:25
Client:	Harworth Estates		Dates:	24/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results						
				73.19	0.25	Grass overlying MADE GROUND: Dark brown black sandy gravelly topsoil. Gravel is angular to sub-angular fine to medium mudstone and coal.			
				72.94	0.50	MADE GROUND: Black very sandy Gravel. Gravel is sub-angular fine mudstone and coal and sub-rounded fine to medium clinker (20%).			
				72.74	0.70	MADE GROUND: Firm red orange mottled black sandy gravelly CLAY. Gravel is sub-rounded to sub-angular fine to medium sandstone and sub-angular fine coal.			
1.00		SPT	N=5 (2,1/1,1,2,1)			MADE GROUND: Black slightly clayey, sandy GRAVEL. Gravel is sub-angular to angular fine to coarse siltstone coal and mudstone. Occasional dense firm grey clay.			
2.00		SPT	N=5 (2,1/1,1,1,2)						
				70.94	2.50	Soft to firm silty sandy CLAY. Possibly reworked.			
3.00		SPT	N=14 (4,3/2,3,4,5)						
				70.34	3.10	Stiff or mottled grey silty CLAY.			
				69.94	3.50	End of Borehole at 3.500m			

Remarks

Borehole Log

Borehole No. **WS14**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434863E - 408827N	Hole Type WS
Location:	Barnsley		Level:	76.61	Scale 1:25
Client:	Harworth Estates		Dates:	24/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)	Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results						
0.20	D1	ES		76.31	0.30	Grass overlying MADE GROUND: Dark brown gravelly sandy topsoil. Gravels are sub-angular fine to medium brick and mudstone.			
0.60	D2	ES		75.81	0.80	MADE GROUND: Grey brown very clayey sandy GRAVEL. Gravel is sub-angular to sub-rounded fine to coarse sandstone, clinker (5%), brick and coal.			
1.00		SPT	N=8 (3,1/2,2,2,2)	75.11	1.50	MADE GROUND: Firm red orange very sandy CLAY.			
1.80	D3	ES				Stiff grey mottled orange slightly sandy CLAY. Gravel is sub-angular fine to coarse mudstone at 2.5m.			
2.00		SPT	N=16 (4,3/3,4,4,5)						
3.00		SPT	N=24 (6,6/5,6,6,7)	73.41	3.20	Very stiff dark grey friable CLAY.			
4.00		SPT	N=23 (6,4/5,4,7,7)	72.61	4.00	End of Borehole at 4.000m			

Remarks

Borehole Log

Borehole No. **WS15**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434872E - 408792N	Hole Type WS
Location:	Barnsley		Level:	75.51	Scale 1:25
Client:	Harworth Estates		Dates:	24/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results							
				75.26		0.25	Grass overlying dark brown sandy gravelly TOPSOIL. Gravel is sub-angular fine to medium coal, mudstone and sandstone.			
				75.11		0.40	Yellow very clayey gravelly SAND. Gravel is sub-rounded fine to medium sandstone.			
1.00		SPT	N=10 (3,2/3,3,2,2)	74.51	1	1.00	Very stiff orange grey mottled black slightly sandy silty gravelly CLAY. Gravel is sub-angular fine to coarse siltstone.			
				74.21		1.30	Stiff brown mottled grey black gravelly silty CLAY. Gravel is sub-angular fine to medium mudstone and siltstone.			
				73.91		1.60	Firm stiff grey brown silty organic CLAY containing frequent wood and rootlets.			
2.00		SPT	N=13 (3,3/2,3,4,4)		2		Firm to stiff grey mottled brown friable CLAY.			
3.00		SPT	N=20 (5,5/4,6,5,5)		3					
				72.31		3.20	Stiff black brown friable CLAY. Recovered as angular fine to medium gravels.			
				71.91		3.60	Black COAL recovered as gravels. Gravel is sub-angular fine to coarse.			
4.00		SPT	N=29 (7,9/9,8,7,5)	71.51	4	4.00	End of Borehole at 4.000m			
					5					

Remarks

Borehole Log

Borehole No. **WS16**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434773E - 408772N	Hole Type WS
Location:	Barnsley		Level:	67.73	Scale 1:25
Client:	Harworth Estates		Dates:	25/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results							
				67.48		0.25	Grass overlying dark brown sandy gravelly TOPSOIL. Gravel is sub-roudned fine to medium sandstone. Contains frequent rootlets.			
							Orange brown very sandy slightly gravelly SAND. Gravel is sub-angular fine to medium sandstone and mudstone.			
				66.93		0.80	Stiff orange grey mottled black silty slightly gravelly slightly sandy CLAY. Gravel is sub-angular to angular fine coal.			
1.00		SPT	N=17 (4,3/3,4,4,6)	66.73	1	1.00	Stiff orange grey sandy gravelly CLAY. Gravel is sub-angular fine to coarse mudstone. Mottled black between 2.4-2.8.			
2.00		SPT	N=15 (5,4/4,4,3,4)		2					
3.00		SPT	N=29 (8,6/6,7,8,8)		3					
4.00		SPT	N=50 (11,11/50 for 230mm)		4					
				63.28		4.45	End of Borehole at 4.450m			
					5					

Remarks

Borehole Log

Borehole No. **WS17**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	440828E - 367951N	Hole Type WS
Location:	Barnsley		Level:	67.86	Scale 1:25
Client:	Harworth Estates		Dates:	25/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results							
				67.61		0.25	Grass overlying brown sandy slightly gravelly TOPSOIL. Gravel is sub-angular fine to medium mudstone and sub-rounded sandstone.			
							MADE GROUND: Yellow orange very clayey fine to coarse reworked SAND. Becomes mottled black with sub-angular fine to medium coal gravel from 0.75m.			
1.00		SPT	N=10 (4,3/2,3,2,3)		1					
				66.66		1.20	Stiff grey orange silty slightly gravelly CLAY. Gravel is sub-angular fine to medium mudstone and siltstone.			
2.00		SPT	N=20 (3,2/2,3,5,10)		2					
				65.56		2.30	Black COAL excavated as coarse sand and sub-angular fine to medium gravels.			
				65.26		2.60	End of Borehole at 2.600m			
					3					
					4					
					5					

Remarks

Borehole Log

Borehole No. **WS18**

Sheet 1 of 1

Project Name:	Athersley, Barnsley	Project No. p17-176	Co-ords:	434856E - 408682N	Hole Type WS
Location:	Barnsley		Level:	68.81	Scale 1:25
Client:	Harworth Estates		Dates:	25/07/2017	Logged By RW

Sample and In Situ Testing				Level (m)		Depth (m)	Stratum Description	Legend	Water Strikes	Well
Depth (m)	Ref.	Type	Results							
0.10	D1	ES					Grass overlying MADE GROUND: Dark brown black sandy gravelly topsoil. Gravel is sub-angular to sub-rounded clinker mudstone and coal.			
				68.51		0.30				
0.40	D2	ES					MADE GROUND: Firm orange grey very sandy slightly gravelly reworked clay. Gravel is sub-rounded fine to coarse mudstone.			
				68.01		0.80				
1.00		SPT	N=12 (3,2/3,3,3,3)		1		Stiff dark brown orange very gravelly silty CLAY. Gravel is sub-angular to angular medium to coarse mudstone and siltstone.			
				67.51		1.30				
2.00	D3	ES					Stiff orange red mottled grey silty sandy CLAY. Grey and friable between 2.6-2.8m.			
2.00		SPT	N=17 (3,3/3,4,4,6)		2					
3.00		SPT	N=20 (4,4/5,6,4,5)		3					
				65.31		3.50	Soft grey silty CLAY.			
				65.11		3.70	Very weak grey SILTSTONE.			
4.00		SPT	N=22 (5,5/4,6,6,6)	64.81	4	4.00	End of Borehole at 4.000m			
					5					

Remarks

AGS

Appendix H: Gas and Groundwater Monitoring Results

RODGERS LEASK ENVIRONMENTAL
Consulting Geotechnical & Environmental Engineers

Ground Gas Monitoring Form

Site Name:	Athersley, Barnsley	**RLE Engineer:**	VH
Job No.	P17-176	**Date:**	01/08/17

Atmospheric Pressure:	1005mb > 1004mb	**Weather Conditions:**	Overcast
State:	Falling	**Temperature:**	20 °C

Time	BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (Pa)	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		CO (% ppm)		H2S (% ppm)		Depth of Borehole installation (m bgl)	Depth to Water (m bgl)	Barom mb
		Initial	Steady		Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
11:06	**WS01**	<0.1	<0.1	+1	<0.1	<0.1	2.8	2.9	17.5	16.7	3	3	0	0	2.13	Dry	1004
11:13	**WS02**	<0.1	-0.1	-2	<0.1	<0.1	1.6	2.8	18.2	16.7	4	10	0	0	2.56	2.10	1004
11:28	**WS03**	<0.1	<0.1	0	<0.1	<0.1	0.3	1.0	19.0	18.5	1	0	0	0	2.40	2.39	1004
11:23	**WS04**	<0.1	<0.1	+4	<0.1	<0.1	2.5	2.5	17.1	17.1	1	0	0	0	3.54	1.60	1004
10:59	**WS07**	<0.1	<0.1	+1	<0.1	<0.1	2.2	2.3	18.7	18.4	1	0	0	0	2.16	Dry	1005
10:53	**WS08**	+0.1	+0.1	0	<0.1	<0.1	2.7	2.7	18.0	17.9	2	2	0	0	3.90	1.51	1005
10:46	**WS10**	<0.1	<0.1	0	<0.1	<0.1	8.8	9.2	14.4	12.1	7	9	0	0	4.13	3.16	1005
10:41	**WS11**	<0.1	<0.1	0	<0.1	<0.1	2.2	2.3	19.0	18.3	0	0	0	0	3.22	Dry	1005
11:37	**WS14**	<0.1	<0.1	0	<0.1	<0.1	2.1	2.2	17.8	17.7	1	0	0	0	4.43	Dry	1004
	WS17														3.50	Dry	

NOTES
Monitoring order is from **Left to Right** across this table (except when using a PID, which should be used first).
Monitoring should be for **NO less than 3 minutes**, unless there have been fluctuations between initial and steady state recorded during the 3 minutes, or high concentrations of gases are initially recorded. Monitoring should then be up to 10 minutes or steady state.

Equipment used:	Infra Red Gas Analyser	Geotechnical Instruments GA2000 Gas Analyser	**Last calibrated:**	05/04/2017
	MiniRAE PID	-	**Last calibrated:**	-
Visible signs of vegetation Stress:		-		

RODGERS LEASK ENVIRONMENTAL
Consulting Geotechnical & Environmental Engineers

Ground Gas Monitoring Form

Site Name:	Athersley, Barnsley	**RLE Engineer:**	AT
Job No.	P17-176	**Date:**	18/08/17

Atmospheric Pressure:	1001 → 1000	**Weather Conditions:**	Cloudy, patchy sun
State:	Falling	**Temperature:**	19

Time	BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (Pa)	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		CO (% ppm)		H2S (% ppm)		Depth of Borehole installation (m bgl)	Depth to Water (m bgl)	Barom mb
		Initial	Steady		Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
14:22	**WS01**	<0.1	<0.1	0	<0.1	<0.1	2.6	2.6	18.4	18.1	0	0	0	0	2.15	Dry	1001
15:53	**WS02**	<0.1	<0.1	0	<0.1	<0.1	<0.1	<0.1	19.7	19.8	0	0	0	0	2.55	1.74	1000
15:29	**WS03**	<0.1	<0.1	0	<0.1	<0.1	0.6	1.5	19.8	19.0	0	0	0	0	2.39	2.09	1000
15:20	**WS04**	<0.1	<0.1	0	<0.1	<0.1	2.7	2.8	19.3	18.2	0	0	0	0	3.48	1.45	1000
15:45	**WS07**	<0.1	<0.1	0	<0.1	<0.1	1.5	1.7	18.8	18.6	0	0	0	0	2.17	2.06	1000
14:15	**WS08**	<0.1	<0.1	0	<0.1	<0.1	0.6	1.5	19.8	19.0	0	0	0	0	2.39	2.09	1001
14:32	**WS10**	<0.1	<0.1	0	<0.1	<0.1	13.5	13.8	4.5	1.5	0	0	0	0	4.12	3.11	1001
14:38	**WS11**	<0.1	<0.1	+1	<0.1	<0.1	1.7	1.7	19.0	18.9	0	0	0	0	3.20	3.19	1001
14:48	**WS14**	<0.1	<0.1	0	<0.1	<0.1	1.7	2.3	19.1	18.6	0	0	0	0	4.16	Dry	1001
15:10	**WS17**	<0.1	<0.1	0	<0.1	<0.1	0.4	4.6	19.8	12.3	0	0	0	0	2.39	Dry	1001

NOTES
Monitoring order is from **Left to Right** across this table (except when using a PID, which should be used first).
Monitoring should be for **NO less than 3 minutes**, unless there have been fluctuations between initial and steady state recorded during the 3 minutes, or high concentrations of gases are initially recorded. Monitoring should then be up to 10 minutes or steady state.

Equipment used:	Infra Red Gas Analyser	Geotechnical Instruments GA2000 Gas Analyser	**Last calibrated:**	05/04/2017
	MiniRAE PID	-	**Last calibrated:**	-
Visible signs of vegetation Stress:		-		

RODGERS LEASK ENVIRONMENTAL
Consulting Geotechnical & Environmental Engineers

Ground Gas Monitoring Form

Site Name:	Athersley, Barnsley	**RLE Engineer:**	AT
Job No.	P17-176	**Date:**	24/08/17

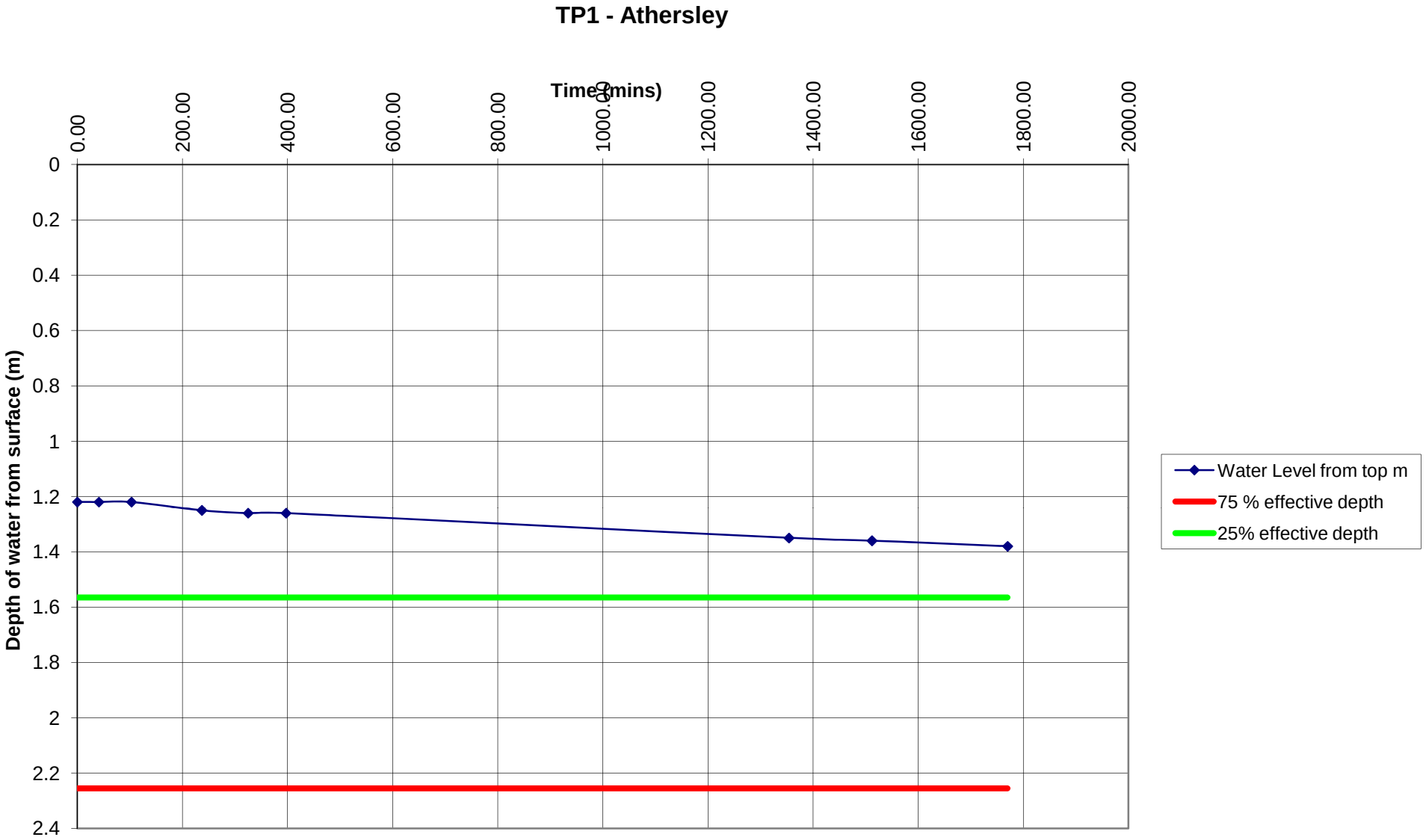
Atmospheric Pressure:	1008	**Weather Conditions:**	Cloudy
State:	Static	**Temperature:**	18

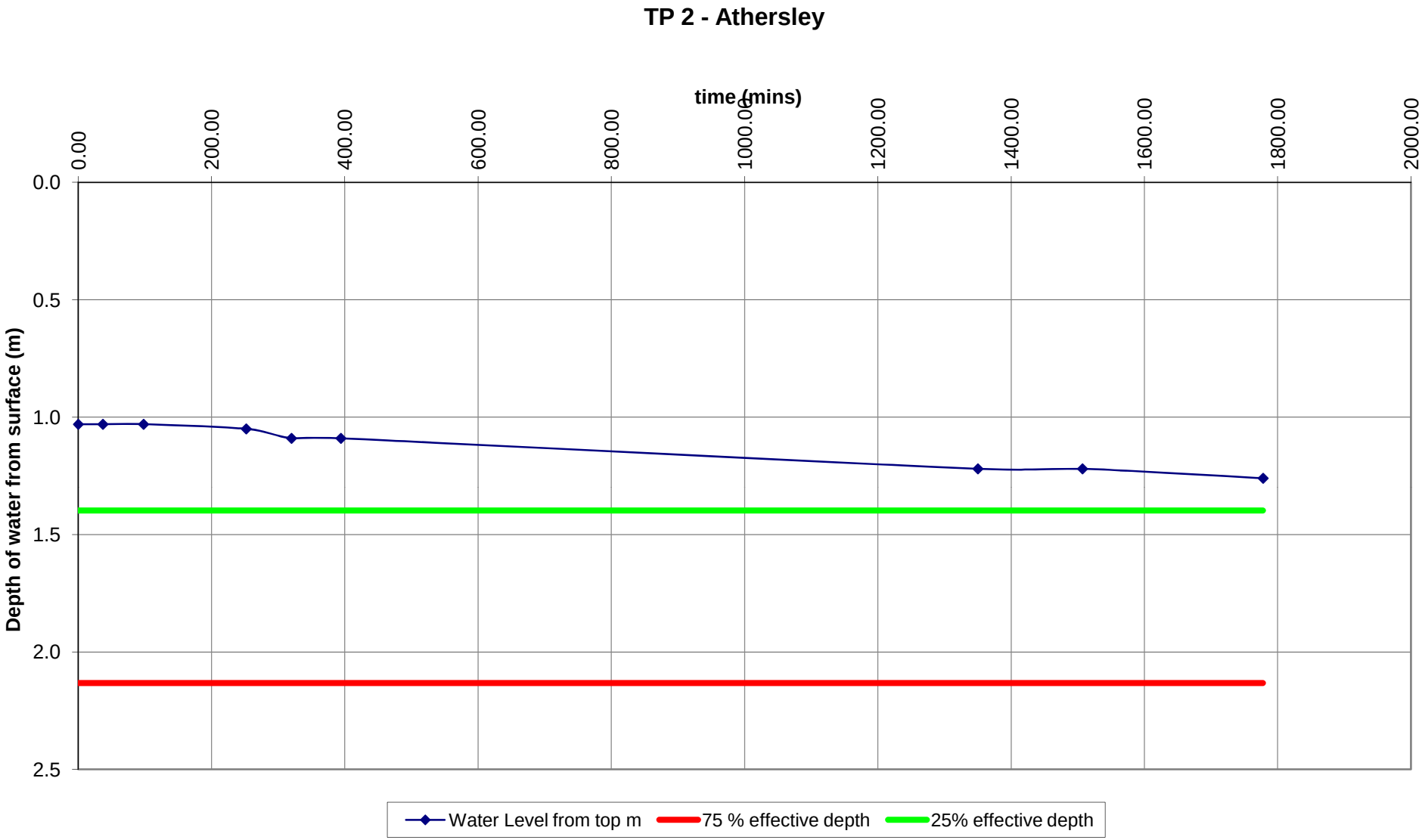
Time	BH Ref.	Gas Flow Rate (l/hr)		Borehole Pressure (Pa)	Methane (% v/v)		Carbon Dioxide (% v/v)		Oxygen (% v/v)		CO (% ppm)		H2S (% ppm)		Depth of Borehole installation (m bgl)	Depth to Water (m bgl)	Barom mb
		Initial	Steady		Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady	Initial	Steady			
13:24	**WS01**	<0.1	<0.1	0	<0.1	<0.1	2.8	2.8	18.1	17.9	0	0	0	0	2.16	Dry	1008
13:34	**WS02**	<0.1	<0.1	0	<0.1	<0.1	2.0	2.0	19.2	18.9	0	0	0	0	2.53	1.68	1008
14:40	**WS03**	<0.1	<0.1	0	<0.1	<0.1	2.0	2.0	18.8	18.8	0	0	0	0	2.40	2.07	1008
14:24	**WS04**	<0.1	<0.1	0	<0.1	<0.1	2.2	2.4	18.6	18.1	0	0	0	0	3.46	1.60	1008
13:42	**WS07**	<0.1	<0.1	0	<0.1	<0.1	1.8	1.8	19.1	19.0	0	0	0	0	2.12	2.10	1008
13:18	**WS08**	<0.1	<0.1	0	<0.1	<0.1	2.6	2.7	18.7	18.4	0	0	0	0	3.89	2.60	1008
12:51	**WS10**	<0.1	<0.1	0	<0.1	<0.1	14.4	14.6	2.8	1.2	0	0	0	0	4.13	3.16	1008
13:57	**WS11**	<0.1	<0.1	0	<0.1	<0.1	3.2	3.4	15.8	15.6	0	0	0	0	3.22	3.21	1008
14:04	**WS14**	<0.1	<0.1	0	<0.1	<0.1	3.4	3.4	15.8	15.6	0	0	0	0	4.17	4.13	1008
14:15	**WS17**				<0.1		0.6		19.2		0		0				1008

NOTES
Monitoring order is from **Left to Right** across this table (except when using a PID, which should be used first).
Monitoring should be for **NO less than 3 minutes**, unless there have been fluctuations between initial and steady state recorded during the 3 minutes, or high concentrations of gases are initially recorded. Monitoring should then be up to 10 minutes or steady state.

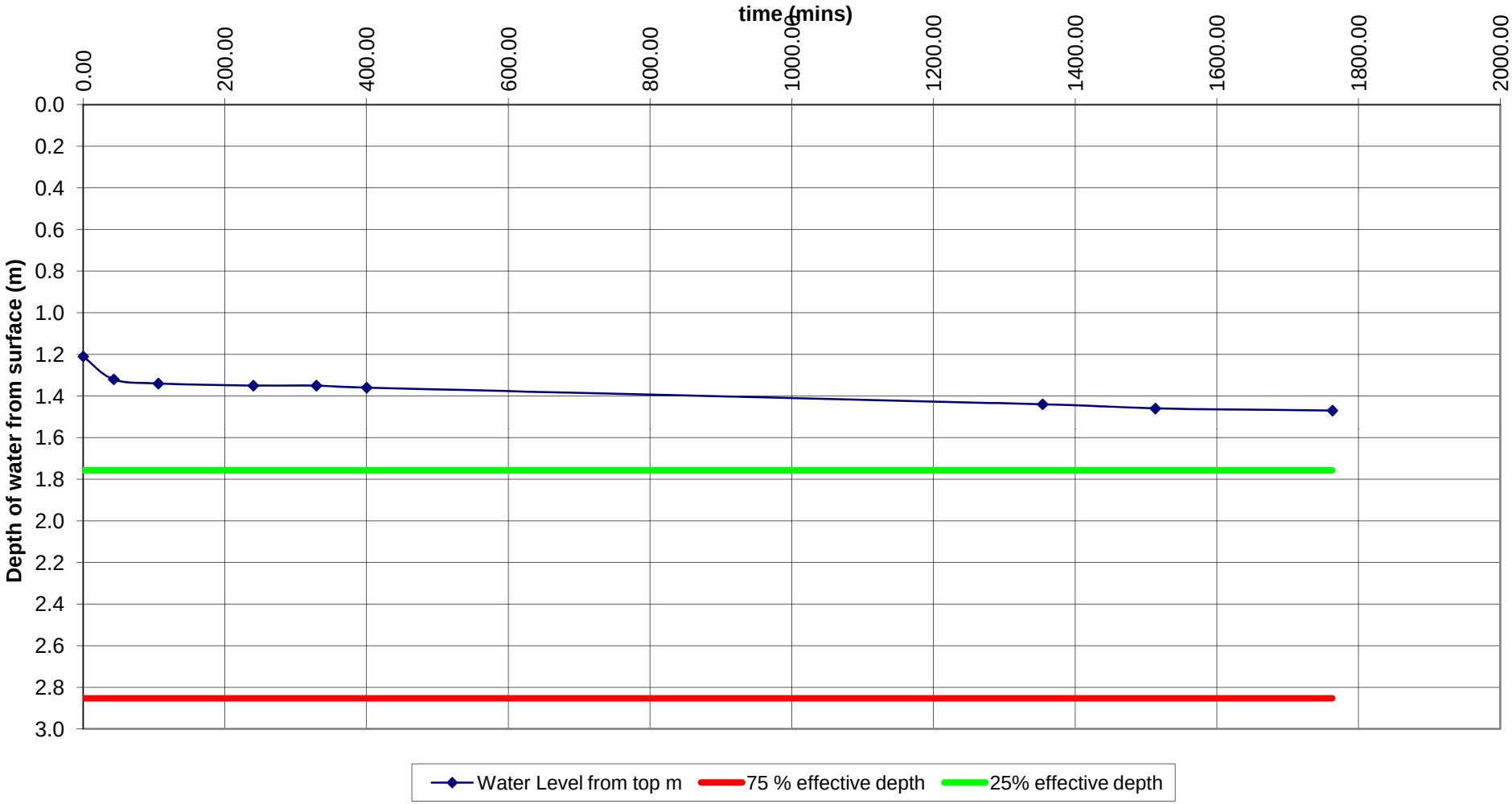
Equipment used:	Infra Red Gas Analyser	Geotechnical Instruments GA2000 Gas Analyser	**Last calibrated:**	05/04/2017
	MiniRAE PID	-	**Last calibrated:**	-
Visible signs of vegetation Stress:		WS23 – Vandalised/bung missing		

Appendix I: Soakaway Test Results


TP1 - Athersley
Time (mins)
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
1400.00
1600.00
1800.00
2000.00
Depth of water from surface (m)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
2.4
Water Level from top m
75 % effective depth
25% effective depth


TP 2 - Athersley
time (mins)
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
1400.00
1600.00
1800.00
2000.00
Depth of water from surface (m)
0.0
0.5
1.0
1.5
2.0
2.5
Water Level from top m
75 % effective depth
25% effective depth

Soakaway 3 Athersley



Appendix J: Contamination Laboratory Results

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report No.:	17-19520-1
Initial Date of Issue:	08-Aug-2017
Client	Rodgers Leask Environmental
Client Address:	St James House St Marys Wharf Mansfield Road Derby DE1 3TQ
Contact(s):	Adam Taylor Mark Churchill
Project	P17-176 - Athersley, Barnsley
Quotation No.:	Q14-02112
Order No.:	RLE 17-08-01
No. of Samples:	26
Turnaround (Wkdays):	5
Date Approved:	08-Aug-2017

Date Received:	27-Jul-2017
Date Instructed:	01-Aug-2017
Results Due:	07-Aug-2017

Approved By:

Details: Martin Dyer, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Leachate

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental					**Chemtest Job No.:**	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112					**Chemtest Sample ID.:**	489238	489252	489257	489259	489262	489270
Order No.: RLE 17-08-01					Client Sample Ref.:	TP2	TP8	TP10	TP11	TP12	TT4
					Client Sample ID.:	D2	D2	D2	D2	D1	D1
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.60	0.70	0.50	0.40	0.20	1.90
					Bottom Depth (m):	0.70	0.80	0.60	0.50	0.30	1.90
					Date Sampled:	19-Jul-2017	20-Jul-2017	20-Jul-2017	21-Jul-2017	21-Jul-2017	24-Jul-2017
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
pH	U	1010		N/A		7.8	7.0	7.7	8.0	7.7	7.5
Sulphate	U	1220	mg/l	1.0		55	24	150	27	22	350
Cyanide (Total)	U	1300	mg/l	0.050		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Cyanide (Free)	U	1300	mg/l	0.050		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Hardness	U	1415	mg/l	15		59	20	310	73	55	460
Arsenic (Dissolved)	U	1450	µg/l	1.0		< 1.0	< 1.0	1.8	1.0	1.1	1.4
Boron (Dissolved)	U	1450	µg/l	20		54	36	250	87	42	280
Cadmium (Dissolved)	U	1450	µg/l	0.080		< 0.080	< 0.080	< 0.080	< 0.080	< 0.080	< 0.080
Chromium (Dissolved)	U	1450	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper (Dissolved)	U	1450	µg/l	1.0		1.5	< 1.0	4.5	3.0	3.4	< 1.0
Mercury (Dissolved)	U	1450	µg/l	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Manganese (Dissolved)	U	1450	µg/l	1.0		2.8	56	6.2	1.6	6.5	1200
Nickel (Dissolved)	U	1450	µg/l	1.0		< 1.0	3.3	1.5	< 1.0	1.1	8.7
Lead (Dissolved)	U	1450	µg/l	1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Selenium (Dissolved)	U	1450	µg/l	1.0		< 1.0	< 1.0	1.4	< 1.0	< 1.0	2.2
Zinc (Dissolved)	U	1450	µg/l	1.0		< 1.0	14	5.5	< 1.0	< 1.0	10
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0		< 5.0	< 5.0				< 5.0
Aromatic TPH >C5-C7	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10		< 0.10	< 0.10				< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0		< 5.0	< 5.0				< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10		< 10	< 10				< 10
Naphthalene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1700	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Chemtest
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Results - Leachate

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489238	489252	489257	489259	489262	489270
Order No.: RLE 17-08-01			Client Sample Ref.:		TP2	TP8	TP10	TP11	TP12	TT4
			Client Sample ID.:		D2	D2	D2	D2	D1	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.60	0.70	0.50	0.40	0.20	1.90
			Bottom Depth (m):		0.70	0.80	0.60	0.50	0.30	1.90
			Date Sampled:		19-Jul-2017	20-Jul-2017	20-Jul-2017	21-Jul-2017	21-Jul-2017	24-Jul-2017
Determinand	**Accred.**	**SOP**	**Units**	**LOD**						
Fluorene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1700	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1700	µg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Benzene	U	1760	µg/l	1.0	3.1	< 1.0				< 1.0
Toluene	U	1760	µg/l	1.0	5.7	< 1.0				< 1.0
Ethylbenzene	U	1760	µg/l	1.0	1.4	< 1.0				< 1.0
m & p-Xylene	U	1760	µg/l	1.0	2.9	< 1.0				< 1.0
o-Xylene	U	1760	µg/l	1.0	1.7	< 1.0				< 1.0
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

Chemtest
The right chemistry to deliver results

Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489234	489235	489236	489237	489238	489240	489241	489244	489245
Order No.: RLE 17-08-01			Client Sample Ref.:		TP1	TP1	TP1	TP2	TP2	TP3	TP3	TP5A	TP5A
			Client Sample ID.:		D1	D2	D3	D1	D2	D1	D2	D1	D2
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.10	0.30	1.00	0.20	0.60	0.30	1.00	0.10	0.80
			Bottom Depth (m):		0.20	0.40	1.10	0.30	0.70	0.40	1.10	0.20	0.90
			Date Sampled:		19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017
			Asbestos Lab:		COVENTRY			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	No Asbestos Detected
Moisture	N	2030	%	0.020	18	16	11	11	20	12	12	11	14
pH	U	2010		N/A	5.9	5.6	5.7	7.5	6.0	5.9	6.4	7.0	4.9
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.87	0.65		0.53	1.1	< 0.40	< 0.40	0.99	1.3
Magnesium (Water Soluble)	N	2120	g/l	0.010			< 0.010		0.018				0.091
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.016	0.057	0.021	0.040	0.21	0.040	< 0.010	1.1	0.86
Total Sulphur	U	2175	%	0.010	0.093	0.15	0.040	0.24	0.10	0.032	0.010	0.52	0.22
Chloride (Water Soluble)	U	2220	g/l	0.010			< 0.010		< 0.010				0.012
Nitrate (Water Soluble)	N	2220	g/l	0.010			< 0.010		< 0.010			< 0.010	< 0.010
Cyanide (Complex)	U	2300	mg/kg	0.50				< 0.50	< 0.50			< 0.50	< 0.50
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50		
Thiocyanate	U	2300	mg/kg	5.0				6.6	< 5.0				
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50	4.4	8.4		6.2	4.1	4.9	3.9	7.0	3.9
Ammonium (Water Soluble)	U	2120	g/l	0.01			< 0.01		< 0.01				< 0.01
Sulphate (Acid Soluble)	U	2430	%	0.010	0.098	0.12	0.076	0.31	0.31	0.048	< 0.010	0.69	0.55
Arsenic	U	2450	mg/kg	1.0	18	65		28	19	7.3	< 1.0	49	14
Barium	U	2450	mg/kg	10								170	85
Beryllium	U	2450	mg/kg	1.0								1.5	1.1
Cadmium	U	2450	mg/kg	0.10	0.24	< 0.10		0.21	0.10	0.11	< 0.10	0.21	0.16
Chromium	U	2450	mg/kg	1.0	21	21		26	26	17	24	20	20
Copper	U	2450	mg/kg	0.50	37	61		56	29	21	23	60	21
Mercury	U	2450	mg/kg	0.10	< 0.10	0.20		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	23	14		29	52	34	32	36	31
Lead	U	2450	mg/kg	0.50	56	40		320	38	23	14	62	35
Selenium	U	2450	mg/kg	0.20	0.34	1.0		0.26	< 0.20	< 0.20	< 0.20	0.70	< 0.20
Vanadium	U	2450	mg/kg	5.0				24	25			31	23
Zinc	U	2450	mg/kg	0.50	64	18		86	72	73	75	76	70
Organic Matter	U	2625	%	0.40	10	17		16	0.50	1.4	< 0.40	17	4.3
Total TPH >C6-C40	U	2670	mg/kg	10								140	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0				< 1.0	< 1.0				
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0				< 1.0	< 1.0				
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0				< 1.0	< 1.0				
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0				< 1.0	< 1.0				

Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			Chemtest Job No.:		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			Chemtest Sample ID.:		489234	489235	489236	489237	489238	489240	489241	489244	489245
Order No.: RLE 17-08-01			Client Sample Ref.:		TP1	TP1	TP1	TP2	TP2	TP3	TP3	TP5A	TP5A
			Client Sample ID.:		D1	D2	D3	D1	D2	D1	D2	D1	D2
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.10	0.30	1.00	0.20	0.60	0.30	1.00	0.10	0.80
			Bottom Depth (m):		0.20	0.40	1.10	0.30	0.70	0.40	1.10	0.20	0.90
			Date Sampled:		19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017
			Asbestos Lab:		COVENTRY			COVENTRY	COVENTRY	COVENTRY		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0				< 1.0	< 1.0				
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0				10	< 1.0				
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0				58	< 1.0				
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0				< 1.0	< 1.0				
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0				68	< 5.0				
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0				< 1.0	< 1.0				
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0				< 1.0	< 1.0				
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0				< 1.0	< 1.0				
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0				< 1.0	< 1.0				
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0				< 1.0	< 1.0				
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0				38	< 1.0				
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0				190	< 1.0				
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0				< 1.0	< 1.0				
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0				230	< 5.0				
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0				300	< 10				
Naphthalene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	1.4	< 0.10	< 0.10		
Acenaphthylene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	0.69	< 0.10	< 0.10		
Acenaphthene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	0.56	< 0.10	< 0.10		
Fluorene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	1.9	< 0.10	< 0.10		
Phenanthrene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	2.7	< 0.10	< 0.10		
Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	0.69	< 0.10	< 0.10		
Fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	3.0	< 0.10	< 0.10		
Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	3.4	< 0.10	< 0.10		
Benzo[a]anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	0.74	< 0.10	< 0.10		
Chrysene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	1.1	< 0.10	< 0.10		
Benzo[b]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	3.1	< 0.10	< 0.10		
Benzo[k]fluoranthene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	0.91	< 0.10	< 0.10		
Benzo[a]pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	1.5	< 0.10	< 0.10		
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	1.5	< 0.10	< 0.10		
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	0.18	< 0.10	< 0.10		
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10	< 0.10	< 0.10		< 0.10	1.0	< 0.10	< 0.10		
Total Of 16 PAH's	U	2700	mg/kg	2.0	< 2.0	< 2.0		< 2.0	24	< 2.0	< 2.0		
Dichlorodifluoromethane	U	2760	µg/kg	1.0									
Chloromethane	U	2760	µg/kg	1.0									
Vinyl Chloride	U	2760	µg/kg	1.0									
Bromomethane	U	2760	µg/kg	20									

Chemtest
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Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489234	489235	489236	489237	489238	489240	489241	489244	489245
Order No.: RLE 17-08-01			Client Sample Ref.:		TP1	TP1	TP1	TP2	TP2	TP3	TP3	TP5A	TP5A
			Client Sample ID.:		D1	D2	D3	D1	D2	D1	D2	D1	D2
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.10	0.30	1.00	0.20	0.60	0.30	1.00	0.10	0.80
			Bottom Depth (m):		0.20	0.40	1.10	0.30	0.70	0.40	1.10	0.20	0.90
			Date Sampled:		19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017
			Asbestos Lab:		COVENTRY			COVENTRY	COVENTRY	COVENTRY		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Chloroethane	U	2760	µg/kg	2.0									
Trichlorofluoromethane	U	2760	µg/kg	1.0									
1,1-Dichloroethene	U	2760	µg/kg	1.0									
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0									
1,1-Dichloroethane	U	2760	µg/kg	1.0									
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0									
Bromochloromethane	U	2760	µg/kg	5.0									
Trichloromethane	U	2760	µg/kg	1.0									
1,1,1-Trichloroethane	U	2760	µg/kg	1.0									
Tetrachloromethane	U	2760	µg/kg	1.0									
1,1-Dichloropropene	U	2760	µg/kg	1.0									
Benzene	U	2760	µg/kg	1.0				< 1.0	< 1.0				
1,2-Dichloroethane	U	2760	µg/kg	2.0									
Trichloroethene	U	2760	µg/kg	1.0									
1,2-Dichloropropane	U	2760	µg/kg	1.0									
Dibromomethane	U	2760	µg/kg	1.0									
Bromodichloromethane	U	2760	µg/kg	5.0									
cis-1,3-Dichloropropene	N	2760	µg/kg	10									
Toluene	U	2760	µg/kg	1.0				< 1.0	< 1.0				
Trans-1,3-Dichloropropene	N	2760	µg/kg	10									
1,1,2-Trichloroethane	U	2760	µg/kg	10									
Tetrachloroethene	U	2760	µg/kg	1.0									
1,3-Dichloropropane	U	2760	µg/kg	2.0									
Dibromochloromethane	U	2760	µg/kg	10									
1,2-Dibromoethane	U	2760	µg/kg	5.0									
Chlorobenzene	U	2760	µg/kg	1.0									
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0									
Ethylbenzene	U	2760	µg/kg	1.0				< 1.0	< 1.0				
m & p-Xylene	U	2760	µg/kg	1.0				< 1.0	< 1.0				
o-Xylene	U	2760	µg/kg	1.0				< 1.0	< 1.0				
Styrene	U	2760	µg/kg	1.0									
Tribromomethane	U	2760	µg/kg	1.0									
Isopropylbenzene	U	2760	µg/kg	1.0									
Bromobenzene	U	2760	µg/kg	1.0									
1,2,3-Trichloropropane	N	2760	µg/kg	50									
N-Propylbenzene	U	2760	µg/kg	1.0									

Chemtest
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Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489234	489235	489236	489237	489238	489240	489241	489244	489245
Order No.: RLE 17-08-01			Client Sample Ref.:		TP1	TP1	TP1	TP2	TP2	TP3	TP3	TP5A	TP5A
			Client Sample ID.:		D1	D2	D3	D1	D2	D1	D2	D1	D2
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.10	0.30	1.00	0.20	0.60	0.30	1.00	0.10	0.80
			Bottom Depth (m):		0.20	0.40	1.10	0.30	0.70	0.40	1.10	0.20	0.90
			Date Sampled:		19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017
			Asbestos Lab:		COVENTRY			COVENTRY	COVENTRY	COVENTRY		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
2-Chlorotoluene	U	2760	µg/kg	1.0									
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0									
4-Chlorotoluene	U	2760	µg/kg	1.0									
Tert-Butylbenzene	U	2760	µg/kg	1.0									
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0									
Sec-Butylbenzene	U	2760	µg/kg	1.0									
1,3-Dichlorobenzene	U	2760	µg/kg	1.0									
4-Isopropyltoluene	U	2760	µg/kg	1.0									
1,4-Dichlorobenzene	U	2760	µg/kg	1.0									
N-Butylbenzene	U	2760	µg/kg	1.0									
1,2-Dichlorobenzene	U	2760	µg/kg	1.0									
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50									
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0									
Hexachlorobutadiene	U	2760	µg/kg	1.0									
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0									
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0									
N-Nitrosodimethylamine	U	2790	mg/kg	0.50									
Phenol	U	2790	mg/kg	0.50									
2-Chlorophenol	U	2790	mg/kg	0.50									
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50									
1,3-Dichlorobenzene	U	2790	mg/kg	0.50									
1,4-Dichlorobenzene	N	2790	mg/kg	0.50									
1,2-Dichlorobenzene	U	2790	mg/kg	0.50									
2-Methylphenol	U	2790	mg/kg	0.50									
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50									
Hexachloroethane	N	2790	mg/kg	0.50									
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50									
4-Methylphenol	U	2790	mg/kg	0.50									
Nitrobenzene	U	2790	mg/kg	0.50									
Isophorone	U	2790	mg/kg	0.50									
2-Nitrophenol	N	2790	mg/kg	0.50									
2,4-Dimethylphenol	N	2790	mg/kg	0.50									
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50									
2,4-Dichlorophenol	U	2790	mg/kg	0.50									
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50									
Naphthalene	U	2790	mg/kg	0.50									

Chemtest
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Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489234	489235	489236	489237	489238	489240	489241	489244	489245
Order No.: RLE 17-08-01			Client Sample Ref.:		TP1	TP1	TP1	TP2	TP2	TP3	TP3	TP5A	TP5A
			Client Sample ID.:		D1	D2	D3	D1	D2	D1	D2	D1	D2
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.10	0.30	1.00	0.20	0.60	0.30	1.00	0.10	0.80
			Bottom Depth (m):		0.20	0.40	1.10	0.30	0.70	0.40	1.10	0.20	0.90
			Date Sampled:		19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017
			Asbestos Lab:		COVENTRY			COVENTRY	COVENTRY	COVENTRY		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
4-Chloroaniline	N	2790	mg/kg	0.50									
Hexachlorobutadiene	U	2790	mg/kg	0.50									
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50									
2-Methylnaphthalene	U	2790	mg/kg	0.50									
4-Nitrophenol	N	2790	mg/kg	0.50									
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50									
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50									
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50									
2-Chloronaphthalene	U	2790	mg/kg	0.50									
2-Nitroaniline	U	2790	mg/kg	0.50									
Acenaphthylene	U	2790	mg/kg	0.50									
Dimethylphthalate	U	2790	mg/kg	0.50									
2,6-Dinitrotoluene	U	2790	mg/kg	0.50									
Acenaphthene	U	2790	mg/kg	0.50									
3-Nitroaniline	N	2790	mg/kg	0.50									
Dibenzofuran	U	2790	mg/kg	0.50									
4-Chlorophenylphenylether	U	2790	mg/kg	0.50									
2,4-Dinitrotoluene	U	2790	mg/kg	0.50									
Fluorene	U	2790	mg/kg	0.50									
Diethyl Phthalate	U	2790	mg/kg	0.50									
4-Nitroaniline	U	2790	mg/kg	0.50									
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50									
Azobenzene	U	2790	mg/kg	0.50									
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50									
Hexachlorobenzene	U	2790	mg/kg	0.50									
Pentachlorophenol	N	2790	mg/kg	0.50									
Phenanthrene	U	2790	mg/kg	0.50									
Anthracene	U	2790	mg/kg	0.50									
Carbazole	U	2790	mg/kg	0.50									
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50									
Fluoranthene	U	2790	mg/kg	0.50									
Pyrene	U	2790	mg/kg	0.50									
Butylbenzyl Phthalate	U	2790	mg/kg	0.50									
Benzo[a]anthracene	U	2790	mg/kg	0.50									
Chrysene	U	2790	mg/kg	0.50									
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50									

Chemtest
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Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489234	489235	489236	489237	489238	489240	489241	489244	489245
Order No.: RLE 17-08-01			Client Sample Ref.:		TP1	TP1	TP1	TP2	TP2	TP3	TP3	TP5A	TP5A
			Client Sample ID.:		D1	D2	D3	D1	D2	D1	D2	D1	D2
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.10	0.30	1.00	0.20	0.60	0.30	1.00	0.10	0.80
			Bottom Depth (m):		0.20	0.40	1.10	0.30	0.70	0.40	1.10	0.20	0.90
			Date Sampled:		19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017
			Asbestos Lab:		COVENTRY			COVENTRY	COVENTRY	COVENTRY		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50									
Benzo[b]fluoranthene	U	2790	mg/kg	0.50									
Benzo[k]fluoranthene	U	2790	mg/kg	0.50									
Benzo[a]pyrene	U	2790	mg/kg	0.50									
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50									
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50									
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50									
Naphthalene	U	2800	mg/kg	0.10								1.0	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10								< 0.10	< 0.10
Acenaphthene	U	2800	mg/kg	0.10								< 0.10	< 0.10
Fluorene	U	2800	mg/kg	0.10								< 0.10	< 0.10
Phenanthrene	U	2800	mg/kg	0.10								2.3	< 0.10
Anthracene	U	2800	mg/kg	0.10								0.34	< 0.10
Fluoranthene	U	2800	mg/kg	0.10								1.3	< 0.10
Pyrene	U	2800	mg/kg	0.10								1.1	< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10								0.67	< 0.10
Chrysene	U	2800	mg/kg	0.10								0.60	< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10								0.54	< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10								0.15	< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10								0.44	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	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	U	2800	mg/kg	0.10								< 0.10	< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0								8.4	< 2.0
PCB 81	N	2815	mg/kg	0.010									
PCB 77	N	2815	mg/kg	0.010									
PCB 105	N	2815	mg/kg	0.010									
PCB 114	N	2815	mg/kg	0.010									
PCB 118	N	2815	mg/kg	0.010									
PCB 123	N	2815	mg/kg	0.010									
PCB 126	N	2815	mg/kg	0.010									
PCB 156	N	2815	mg/kg	0.010									
PCB 157	N	2815	mg/kg	0.010									
PCB 167	N	2815	mg/kg	0.010									
PCB 169	N	2815	mg/kg	0.010									
PCB 189	N	2815	mg/kg	0.010									

Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental					**Chemtest Job No.:**	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112					**Chemtest Sample ID.:**	489234	489235	489236	489237	489238	489240	489241	489244	489245
Order No.: RLE 17-08-01					Client Sample Ref.:	TP1	TP1	TP1	TP2	TP2	TP3	TP3	TP5A	TP5A
					Client Sample ID.:	D1	D2	D3	D1	D2	D1	D2	D1	D2
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.10	0.30	1.00	0.20	0.60	0.30	1.00	0.10	0.80
					Bottom Depth (m):	0.20	0.40	1.10	0.30	0.70	0.40	1.10	0.20	0.90
					Date Sampled:	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017	19-Jul-2017
					Asbestos Lab:	COVENTRY			COVENTRY	COVENTRY	COVENTRY		COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Total PCBs (12 Congeners)	N	2815	mg/kg	0.12										
Total Phenols	U	2920	mg/kg	0.30		< 0.30	< 0.30		< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

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Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental				**Chemtest Job No.:**	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112				**Chemtest Sample ID.:**	489246	489251	489252	489256	489257	489259	489260	489261	489262
Order No.: RLE 17-08-01				Client Sample Ref.:	TP5A	TP8	TP8	TP10	TP10	TP11	TP11	TP11	TP12
				Client Sample ID.:	D3	D1	D2	D1	D2	D2	D3	D4	D1
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.30	0.10	0.70	0.20	0.50	0.40	0.70	1.60	0.20
				Bottom Depth (m):	1.40	0.20	0.80	0.30	0.60	0.50	0.80	1.70	0.30
				Date Sampled:	19-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017
				Asbestos Lab:		COVENTRY	COVENTRY	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	No Asbestos Detected		No Asbestos Detected
Moisture	N	2030	%	0.020	14	9.8	15	13	17	14	16	12	12
pH	U	2010		N/A	5.3	7.3	4.2	10.1	7.9	7.6	7.2	7.1	7.1
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40		0.55	0.86	0.80	2.3	1.2	0.95	0.40	1.4
Magnesium (Water Soluble)	N	2120	g/l	0.010	0.067		0.014			< 0.010			
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.40	0.026	0.10	0.91	0.45	0.080	0.057	0.060	< 0.010
Total Sulphur	U	2175	%	0.010	0.047	0.24	0.72	0.28	0.27	0.29	0.12	0.022	0.39
Chloride (Water Soluble)	U	2220	g/l	0.010	0.012		< 0.010			< 0.010			
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010		< 0.010	< 0.010	< 0.010	< 0.010	< 0.010		< 0.010
Cyanide (Complex)	U	2300	mg/kg	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50
Cyanide (Free)	U	2300	mg/kg	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50		< 0.50	< 0.50					< 0.50	
Thiocyanate	U	2300	mg/kg	5.0		6.6	< 5.0						
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50		11	4.1	49	15	26	8.0	5.3	10
Ammonium (Water Soluble)	U	2120	g/l	0.01	< 0.01		< 0.01			< 0.01			
Sulphate (Acid Soluble)	U	2430	%	0.010	0.13	0.31	0.39	0.47	0.21	0.28	0.11	0.028	0.13
Arsenic	U	2450	mg/kg	1.0		35	46	26	28	67	19	6.6	29
Barium	U	2450	mg/kg	10				180	160	180	100		140
Beryllium	U	2450	mg/kg	1.0				1.1	1.0	1.6	< 1.0		1.4
Cadmium	U	2450	mg/kg	0.10		0.30	< 0.10	0.77	0.53	0.36	0.20	< 0.10	0.20
Chromium	U	2450	mg/kg	1.0		24	6.4	130	78	30	15	20	15
Copper	U	2450	mg/kg	0.50		60	32	240	220	140	28	25	75
Mercury	U	2450	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	0.42	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50		31	9.5	83	58	48	24	32	33
Lead	U	2450	mg/kg	0.50		110	24	560	120	95	37	10	71
Selenium	U	2450	mg/kg	0.20		0.46	1.2	1.8	1.6	1.2	0.36	< 0.20	0.82
Vanadium	U	2450	mg/kg	5.0		27	11	27	28	37	20		27
Zinc	U	2450	mg/kg	0.50		130	19	220	250	130	70	54	76
Organic Matter	U	2625	%	0.40		26	79	15	28	38	9.7	1.2	57
Total TPH >C6-C40	U	2670	mg/kg	10				220	440	73	< 10		1400
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0		7.6	12						
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0		3.5	7.4						
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0		21	14						
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0		6.8	8.6						

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Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental					**Chemtest Job No.:**	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112					**Chemtest Sample ID.:**	489246	489251	489252	489256	489257	489259	489260	489261	489262
Order No.: RLE 17-08-01					Client Sample Ref.:	TP5A	TP8	TP8	TP10	TP10	TP11	TP11	TP11	TP12
					Client Sample ID.:	D3	D1	D2	D1	D2	D2	D3	D4	D1
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	1.30	0.10	0.70	0.20	0.50	0.40	0.70	1.60	0.20
					Bottom Depth (m):	1.40	0.20	0.80	0.30	0.60	0.50	0.80	1.70	0.30
					Date Sampled:	19-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017
					Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**										
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0		25	42							
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0		29	120							
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0		75	330							
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0		< 1.0	< 1.0							
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0		170	530							
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0		< 1.0	< 1.0							
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0		< 1.0	6.3							
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0		3.4	28							
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0		< 1.0	51							
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0		< 1.0	350							
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0		11	830							
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0		6.7	590							
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		< 1.0	< 1.0							
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0		21	1800							
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		190	2400							
Naphthalene	U	2700	mg/kg	0.10		2.0	4.8						< 0.10	
Acenaphthylene	U	2700	mg/kg	0.10		1.2	4.2						< 0.10	
Acenaphthene	U	2700	mg/kg	0.10		0.98	1.5						< 0.10	
Fluorene	U	2700	mg/kg	0.10		3.1	4.5						< 0.10	
Phenanthrene	U	2700	mg/kg	0.10		5.0	4.9						< 0.10	
Anthracene	U	2700	mg/kg	0.10		1.0	2.1						< 0.10	
Fluoranthene	U	2700	mg/kg	0.10		3.5	1.0						0.23	
Pyrene	U	2700	mg/kg	0.10		4.3	1.3						0.37	
Benzo[a]anthracene	U	2700	mg/kg	0.10		0.86	4.3						< 0.10	
Chrysene	U	2700	mg/kg	0.10		1.5	< 0.10						< 0.10	
Benzo[b]fluoranthene	U	2700	mg/kg	0.10		3.8	2.5						< 0.10	
Benzo[k]fluoranthene	U	2700	mg/kg	0.10		1.3	< 0.10						< 0.10	
Benzo[a]pyrene	U	2700	mg/kg	0.10		1.6	< 0.10						< 0.10	
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10		1.5	< 0.10						< 0.10	
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10		0.42	< 0.10						< 0.10	
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10		1.0	2.0						< 0.10	
Total Of 16 PAH's	U	2700	mg/kg	2.0		33	33						< 2.0	
Dichlorodifluoromethane	U	2760	µg/kg	1.0										
Chloromethane	U	2760	µg/kg	1.0										
Vinyl Chloride	U	2760	µg/kg	1.0										
Bromomethane	U	2760	µg/kg	20										

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Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489246	489251	489252	489256	489257	489259	489260	489261	489262
Order No.: RLE 17-08-01			Client Sample Ref.:		TP5A	TP8	TP8	TP10	TP10	TP11	TP11	TP11	TP12
			Client Sample ID.:		D3	D1	D2	D1	D2	D2	D3	D4	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.30	0.10	0.70	0.20	0.50	0.40	0.70	1.60	0.20
			Bottom Depth (m):		1.40	0.20	0.80	0.30	0.60	0.50	0.80	1.70	0.30
			Date Sampled:		19-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017
			Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Chloroethane	U	2760	µg/kg	2.0									
Trichlorofluoromethane	U	2760	µg/kg	1.0									
1,1-Dichloroethene	U	2760	µg/kg	1.0									
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0									
1,1-Dichloroethane	U	2760	µg/kg	1.0									
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0									
Bromochloromethane	U	2760	µg/kg	5.0									
Trichloromethane	U	2760	µg/kg	1.0									
1,1,1-Trichloroethane	U	2760	µg/kg	1.0									
Tetrachloromethane	U	2760	µg/kg	1.0									
1,1-Dichloropropene	U	2760	µg/kg	1.0									
Benzene	U	2760	µg/kg	1.0		< 1.0	< 1.0						
1,2-Dichloroethane	U	2760	µg/kg	2.0									
Trichloroethene	U	2760	µg/kg	1.0									
1,2-Dichloropropane	U	2760	µg/kg	1.0									
Dibromomethane	U	2760	µg/kg	1.0									
Bromodichloromethane	U	2760	µg/kg	5.0									
cis-1,3-Dichloropropene	N	2760	µg/kg	10									
Toluene	U	2760	µg/kg	1.0		< 1.0	< 1.0						
Trans-1,3-Dichloropropene	N	2760	µg/kg	10									
1,1,2-Trichloroethane	U	2760	µg/kg	10									
Tetrachloroethene	U	2760	µg/kg	1.0									
1,3-Dichloropropane	U	2760	µg/kg	2.0									
Dibromochloromethane	U	2760	µg/kg	10									
1,2-Dibromoethane	U	2760	µg/kg	5.0									
Chlorobenzene	U	2760	µg/kg	1.0									
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0									
Ethylbenzene	U	2760	µg/kg	1.0		< 1.0	< 1.0						
m & p-Xylene	U	2760	µg/kg	1.0		< 1.0	< 1.0						
o-Xylene	U	2760	µg/kg	1.0		< 1.0	< 1.0						
Styrene	U	2760	µg/kg	1.0									
Tribromomethane	U	2760	µg/kg	1.0									
Isopropylbenzene	U	2760	µg/kg	1.0									
Bromobenzene	U	2760	µg/kg	1.0									
1,2,3-Trichloropropane	N	2760	µg/kg	50									
N-Propylbenzene	U	2760	µg/kg	1.0									

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Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489246	489251	489252	489256	489257	489259	489260	489261	489262
Order No.: RLE 17-08-01			Client Sample Ref.:		TP5A	TP8	TP8	TP10	TP10	TP11	TP11	TP11	TP12
			Client Sample ID.:		D3	D1	D2	D1	D2	D2	D3	D4	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.30	0.10	0.70	0.20	0.50	0.40	0.70	1.60	0.20
			Bottom Depth (m):		1.40	0.20	0.80	0.30	0.60	0.50	0.80	1.70	0.30
			Date Sampled:		19-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017
			Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
2-Chlorotoluene	U	2760	µg/kg	1.0									
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0									
4-Chlorotoluene	U	2760	µg/kg	1.0									
Tert-Butylbenzene	U	2760	µg/kg	1.0									
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0									
Sec-Butylbenzene	U	2760	µg/kg	1.0									
1,3-Dichlorobenzene	U	2760	µg/kg	1.0									
4-Isopropyltoluene	U	2760	µg/kg	1.0									
1,4-Dichlorobenzene	U	2760	µg/kg	1.0									
N-Butylbenzene	U	2760	µg/kg	1.0									
1,2-Dichlorobenzene	U	2760	µg/kg	1.0									
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50									
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0									
Hexachlorobutadiene	U	2760	µg/kg	1.0									
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0									
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0									
N-Nitrosodimethylamine	U	2790	mg/kg	0.50									
Phenol	U	2790	mg/kg	0.50									
2-Chlorophenol	U	2790	mg/kg	0.50									
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50									
1,3-Dichlorobenzene	U	2790	mg/kg	0.50									
1,4-Dichlorobenzene	N	2790	mg/kg	0.50									
1,2-Dichlorobenzene	U	2790	mg/kg	0.50									
2-Methylphenol	U	2790	mg/kg	0.50									
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50									
Hexachloroethane	N	2790	mg/kg	0.50									
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50									
4-Methylphenol	U	2790	mg/kg	0.50									
Nitrobenzene	U	2790	mg/kg	0.50									
Isophorone	U	2790	mg/kg	0.50									
2-Nitrophenol	N	2790	mg/kg	0.50									
2,4-Dimethylphenol	N	2790	mg/kg	0.50									
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50									
2,4-Dichlorophenol	U	2790	mg/kg	0.50									
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50									
Naphthalene	U	2790	mg/kg	0.50									

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Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489246	489251	489252	489256	489257	489259	489260	489261	489262
Order No.: RLE 17-08-01			Client Sample Ref.:		TP5A	TP8	TP8	TP10	TP10	TP11	TP11	TP11	TP12
			Client Sample ID.:		D3	D1	D2	D1	D2	D2	D3	D4	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.30	0.10	0.70	0.20	0.50	0.40	0.70	1.60	0.20
			Bottom Depth (m):		1.40	0.20	0.80	0.30	0.60	0.50	0.80	1.70	0.30
			Date Sampled:		19-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017
			Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
4-Chloroaniline	N	2790	mg/kg	0.50									
Hexachlorobutadiene	U	2790	mg/kg	0.50									
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50									
2-Methylnaphthalene	U	2790	mg/kg	0.50									
4-Nitrophenol	N	2790	mg/kg	0.50									
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50									
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50									
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50									
2-Chloronaphthalene	U	2790	mg/kg	0.50									
2-Nitroaniline	U	2790	mg/kg	0.50									
Acenaphthylene	U	2790	mg/kg	0.50									
Dimethylphthalate	U	2790	mg/kg	0.50									
2,6-Dinitrotoluene	U	2790	mg/kg	0.50									
Acenaphthene	U	2790	mg/kg	0.50									
3-Nitroaniline	N	2790	mg/kg	0.50									
Dibenzofuran	U	2790	mg/kg	0.50									
4-Chlorophenylphenylether	U	2790	mg/kg	0.50									
2,4-Dinitrotoluene	U	2790	mg/kg	0.50									
Fluorene	U	2790	mg/kg	0.50									
Diethyl Phthalate	U	2790	mg/kg	0.50									
4-Nitroaniline	U	2790	mg/kg	0.50									
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50									
Azobenzene	U	2790	mg/kg	0.50									
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50									
Hexachlorobenzene	U	2790	mg/kg	0.50									
Pentachlorophenol	N	2790	mg/kg	0.50									
Phenanthrene	U	2790	mg/kg	0.50									
Anthracene	U	2790	mg/kg	0.50									
Carbazole	U	2790	mg/kg	0.50									
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50									
Fluoranthene	U	2790	mg/kg	0.50									
Pyrene	U	2790	mg/kg	0.50									
Butylbenzyl Phthalate	U	2790	mg/kg	0.50									
Benzo[a]anthracene	U	2790	mg/kg	0.50									
Chrysene	U	2790	mg/kg	0.50									
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50									

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Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489246	489251	489252	489256	489257	489259	489260	489261	489262
Order No.: RLE 17-08-01			Client Sample Ref.:		TP5A	TP8	TP8	TP10	TP10	TP11	TP11	TP11	TP12
			Client Sample ID.:		D3	D1	D2	D1	D2	D2	D3	D4	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.30	0.10	0.70	0.20	0.50	0.40	0.70	1.60	0.20
			Bottom Depth (m):		1.40	0.20	0.80	0.30	0.60	0.50	0.80	1.70	0.30
			Date Sampled:		19-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017
			Asbestos Lab:			COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50									
Benzo[b]fluoranthene	U	2790	mg/kg	0.50									
Benzo[k]fluoranthene	U	2790	mg/kg	0.50									
Benzo[a]pyrene	U	2790	mg/kg	0.50									
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50									
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50									
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50									
Naphthalene	U	2800	mg/kg	0.10				0.69	1.4	2.5	1.8		< 0.10
Acenaphthylene	N	2800	mg/kg	0.10				0.23	0.17	0.19	< 0.10		< 0.10
Acenaphthene	U	2800	mg/kg	0.10				< 0.10	0.12	0.14	0.15		< 0.10
Fluorene	U	2800	mg/kg	0.10				0.21	0.15	0.18	< 0.10		< 0.10
Phenanthrene	U	2800	mg/kg	0.10				3.7	2.8	4.6	3.6		< 0.10
Anthracene	U	2800	mg/kg	0.10				0.76	0.56	0.83	0.52		< 0.10
Fluoranthene	U	2800	mg/kg	0.10				5.2	2.1	3.1	1.4		< 0.10
Pyrene	U	2800	mg/kg	0.10				4.4	1.8	2.8	1.2		< 0.10
Benzo[a]anthracene	U	2800	mg/kg	0.10				2.3	1.1	1.6	0.56		< 0.10
Chrysene	U	2800	mg/kg	0.10				2.2	1.2	1.6	0.55		< 0.10
Benzo[b]fluoranthene	U	2800	mg/kg	0.10				2.8	1.4	1.9	0.48		< 0.10
Benzo[k]fluoranthene	U	2800	mg/kg	0.10				0.77	0.49	0.49	0.12		< 0.10
Benzo[a]pyrene	U	2800	mg/kg	0.10				2.3	0.99	1.4	0.31		< 0.10
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10				1.2	0.64	0.77	< 0.10		< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10				< 0.10	0.10	< 0.10	< 0.10		< 0.10
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10				0.90	0.60	0.60	< 0.10		< 0.10
Total Of 16 PAH's	N	2800	mg/kg	2.0				28	16	23	11		< 2.0
PCB 81	N	2815	mg/kg	0.010									
PCB 77	N	2815	mg/kg	0.010									
PCB 105	N	2815	mg/kg	0.010									
PCB 114	N	2815	mg/kg	0.010									
PCB 118	N	2815	mg/kg	0.010									
PCB 123	N	2815	mg/kg	0.010									
PCB 126	N	2815	mg/kg	0.010									
PCB 156	N	2815	mg/kg	0.010									
PCB 157	N	2815	mg/kg	0.010									
PCB 167	N	2815	mg/kg	0.010									
PCB 169	N	2815	mg/kg	0.010									
PCB 189	N	2815	mg/kg	0.010									

Chemtest
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Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental				**Chemtest Job No.:**	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112				**Chemtest Sample ID.:**	489246	489251	489252	489256	489257	489259	489260	489261	489262
Order No.: RLE 17-08-01				Client Sample Ref.:	TP5A	TP8	TP8	TP10	TP10	TP11	TP11	TP11	TP12
				Client Sample ID.:	D3	D1	D2	D1	D2	D2	D3	D4	D1
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.30	0.10	0.70	0.20	0.50	0.40	0.70	1.60	0.20
				Bottom Depth (m):	1.40	0.20	0.80	0.30	0.60	0.50	0.80	1.70	0.30
				Date Sampled:	19-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	20-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017
				Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Total PCBs (12 Congeners)	N	2815	mg/kg	0.12									
Total Phenols	U	2920	mg/kg	0.30		< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Chemtest
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Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental		**Chemtest Job No.:**			17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112		**Chemtest Sample ID.:**			489263	489265	489266	489267	489268	489269	489270	489271
Order No.: RLE 17-08-01		Client Sample Ref.:			TP12	TP13	TP13	TP13	TP16	TP16	TT4	TT5
		Client Sample ID.:			D2	D1	D2	D3	D1	D2	D1	D1
		Sample Type:			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Top Depth (m):			0.70	0.10	0.40	0.80	0.20	0.50	1.90	1.70
		Bottom Depth (m):			0.80	0.20	0.50	0.90	0.30	0.60	1.90	1.70
		Date Sampled:			21-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-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	14	11	12	12	14	10	18	15
pH	U	2010		N/A	7.0	5.7	6.2	5.7	6.3	5.3	7.2	7.6
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	< 0.40	0.53	< 0.40	0.40	0.88	< 0.40	3.4	0.60
Magnesium (Water Soluble)	N	2120	g/l	0.010				< 0.010				
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.021	< 0.010	< 0.010	0.015	< 0.010	< 0.010	0.74	< 0.010
Total Sulphur	U	2175	%	0.010	0.024	0.044	0.020	0.014	0.043	0.024	0.42	0.70
Chloride (Water Soluble)	U	2220	g/l	0.010				< 0.010				
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010			< 0.010				
Cyanide (Complex)	U	2300	mg/kg	0.50	0.50						2.6	0.50
Cyanide (Free)	U	2300	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.6	0.50
Thiocyanate	U	2300	mg/kg	5.0							< 5.0	< 5.0
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50	3.9	5.8	3.9	3.9	3.8	3.9	34	9.9
Ammonium (Water Soluble)	U	2120	g/l	0.01				< 0.01				
Sulphate (Acid Soluble)	U	2430	%	0.010	0.021	0.026	0.025	0.028	0.072	0.053	0.22	0.063
Arsenic	U	2450	mg/kg	1.0	4.9	15	6.3	4.8	13	4.6	30	5.4
Barium	U	2450	mg/kg	10	29							
Beryllium	U	2450	mg/kg	1.0	< 1.0							
Cadmium	U	2450	mg/kg	0.10	< 0.10	0.15	0.11	< 0.10	0.25	0.16	0.27	< 0.10
Chromium	U	2450	mg/kg	1.0	14	16	15	20	17	15	64	18
Copper	U	2450	mg/kg	0.50	15	33	18	21	24	18	57	50
Mercury	U	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Nickel	U	2450	mg/kg	0.50	13	15	22	31	18	22	71	39
Lead	U	2450	mg/kg	0.50	15	61	29	14	63	26	110	47
Selenium	U	2450	mg/kg	0.20	< 0.20	0.31	< 0.20	< 0.20	0.35	< 0.20	6.8	1.4
Vanadium	U	2450	mg/kg	5.0	15						26	< 5.0
Zinc	U	2450	mg/kg	0.50	46	76	68	84	90	72	120	57
Organic Matter	U	2625	%	0.40	1.6	5.5	2.8	0.55	5.7	1.2	19	88
Total TPH >C6-C40	U	2670	mg/kg	10	< 10							
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0							< 1.0	< 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0							< 1.0	< 1.0
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0							92	120
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0							390	190

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Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			Chemtest Job No.:		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			Chemtest Sample ID.:		489263	489265	489266	489267	489268	489269	489270	489271
Order No.: RLE 17-08-01			Client Sample Ref.:		TP12	TP13	TP13	TP13	TP16	TP16	TT4	TT5
			Client Sample ID.:		D2	D1	D2	D3	D1	D2	D1	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.70	0.10	0.40	0.80	0.20	0.50	1.90	1.70
			Bottom Depth (m):		0.80	0.20	0.50	0.90	0.30	0.60	1.90	1.70
			Date Sampled:		21-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0							1400	420
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0							2400	280
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0							4200	710
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0							32	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0							8500	1700
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0							< 1.0	< 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0							< 1.0	< 1.0
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0							36	610
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0							180	2000
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0							1000	5500
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0							840	6300
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0							900	8900
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0							36	< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0							3000	23000
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0							12000	25000
Naphthalene	U	2700	mg/kg	0.10		0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	57
Acenaphthylene	U	2700	mg/kg	0.10		0.15	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	71
Acenaphthene	U	2700	mg/kg	0.10		0.19	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	19
Fluorene	U	2700	mg/kg	0.10		0.27	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	110
Phenanthrene	U	2700	mg/kg	0.10		1.0	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	210
Anthracene	U	2700	mg/kg	0.10		0.30	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	100
Fluoranthene	U	2700	mg/kg	0.10		1.5	0.34	< 0.10	< 0.10	< 0.10	2.7	96
Pyrene	U	2700	mg/kg	0.10		1.4	0.34	< 0.10	< 0.10	< 0.10	2.7	99
Benzo[a]anthracene	U	2700	mg/kg	0.10		0.58	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	49
Chrysene	U	2700	mg/kg	0.10		0.57	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	53
Benzo[b]fluoranthene	U	2700	mg/kg	0.10		0.82	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	25
Benzo[k]fluoranthene	U	2700	mg/kg	0.10		0.80	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	12
Benzo[a]pyrene	U	2700	mg/kg	0.10		0.43	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	25
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10		0.33	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	8.9
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	5.4
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10		0.16	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	7.9
Total Of 16 PAH's	U	2700	mg/kg	2.0		8.6	< 2.0	< 2.0	< 2.0	< 2.0	5.4	960
Dichlorodifluoromethane	U	2760	µg/kg	1.0								< 1.0
Chloromethane	U	2760	µg/kg	1.0								< 1.0
Vinyl Chloride	U	2760	µg/kg	1.0								4.1
Bromomethane	U	2760	µg/kg	20								< 20

Chemtest
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Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			Chemtest Job No.:		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			Chemtest Sample ID.:		489263	489265	489266	489267	489268	489269	489270	489271
Order No.: RLE 17-08-01			Client Sample Ref.:		TP12	TP13	TP13	TP13	TP16	TP16	TT4	TT5
			Client Sample ID.:		D2	D1	D2	D3	D1	D2	D1	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.70	0.10	0.40	0.80	0.20	0.50	1.90	1.70
			Bottom Depth (m):		0.80	0.20	0.50	0.90	0.30	0.60	1.90	1.70
			Date Sampled:		21-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Chloroethane	U	2760	µg/kg	2.0								< 2.0
Trichlorofluoromethane	U	2760	µg/kg	1.0								3.8
1,1-Dichloroethene	U	2760	µg/kg	1.0								7.7
Trans 1,2-Dichloroethene	U	2760	µg/kg	1.0								7.6
1,1-Dichloroethane	U	2760	µg/kg	1.0								2.8
cis 1,2-Dichloroethene	U	2760	µg/kg	1.0								2.0
Bromochloromethane	U	2760	µg/kg	5.0								< 5.0
Trichloromethane	U	2760	µg/kg	1.0								1.6
1,1,1-Trichloroethane	U	2760	µg/kg	1.0								< 1.0
Tetrachloromethane	U	2760	µg/kg	1.0								1.8
1,1-Dichloropropene	U	2760	µg/kg	1.0								6.6
Benzene	U	2760	µg/kg	1.0							< 1.0	280
1,2-Dichloroethane	U	2760	µg/kg	2.0								12
Trichloroethene	U	2760	µg/kg	1.0								6.6
1,2-Dichloropropane	U	2760	µg/kg	1.0								2.6
Dibromomethane	U	2760	µg/kg	1.0								21
Bromodichloromethane	U	2760	µg/kg	5.0								10
cis-1,3-Dichloropropene	N	2760	µg/kg	10								19
Toluene	U	2760	µg/kg	1.0							< 1.0	2900
Trans-1,3-Dichloropropene	N	2760	µg/kg	10								67
1,1,2-Trichloroethane	U	2760	µg/kg	10								760
Tetrachloroethene	U	2760	µg/kg	1.0								< 1.0
1,3-Dichloropropane	U	2760	µg/kg	2.0								5.6
Dibromochloromethane	U	2760	µg/kg	10								< 10
1,2-Dibromoethane	U	2760	µg/kg	5.0								< 5.0
Chlorobenzene	U	2760	µg/kg	1.0								2.3
1,1,1,2-Tetrachloroethane	U	2760	µg/kg	2.0								< 2.0
Ethylbenzene	U	2760	µg/kg	1.0							6.1	4000
m & p-Xylene	U	2760	µg/kg	1.0							7.6	64000
o-Xylene	U	2760	µg/kg	1.0							3.9	34000
Styrene	U	2760	µg/kg	1.0								7600
Tribromomethane	U	2760	µg/kg	1.0								16
Isopropylbenzene	U	2760	µg/kg	1.0								830
Bromobenzene	U	2760	µg/kg	1.0								5.9
1,2,3-Trichloropropane	N	2760	µg/kg	50								620
N-Propylbenzene	U	2760	µg/kg	1.0								< 1.0

Chemtest
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Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			Chemtest Job No.:		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			Chemtest Sample ID.:		489263	489265	489266	489267	489268	489269	489270	489271
Order No.: RLE 17-08-01			Client Sample Ref.:		TP12	TP13	TP13	TP13	TP16	TP16	TT4	TT5
			Client Sample ID.:		D2	D1	D2	D3	D1	D2	D1	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.70	0.10	0.40	0.80	0.20	0.50	1.90	1.70
			Bottom Depth (m):		0.80	0.20	0.50	0.90	0.30	0.60	1.90	1.70
			Date Sampled:		21-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
2-Chlorotoluene	U	2760	µg/kg	1.0								1300
1,3,5-Trimethylbenzene	U	2760	µg/kg	1.0								41000
4-Chlorotoluene	U	2760	µg/kg	1.0								< 1.0
Tert-Butylbenzene	U	2760	µg/kg	1.0								< 1.0
1,2,4-Trimethylbenzene	U	2760	µg/kg	1.0								68000
Sec-Butylbenzene	U	2760	µg/kg	1.0								< 1.0
1,3-Dichlorobenzene	U	2760	µg/kg	1.0								< 1.0
4-Isopropyltoluene	U	2760	µg/kg	1.0								< 1.0
1,4-Dichlorobenzene	U	2760	µg/kg	1.0								< 1.0
N-Butylbenzene	U	2760	µg/kg	1.0								< 1.0
1,2-Dichlorobenzene	U	2760	µg/kg	1.0								< 1.0
1,2-Dibromo-3-Chloropropane	U	2760	µg/kg	50								< 50
1,2,4-Trichlorobenzene	U	2760	µg/kg	1.0								< 1.0
Hexachlorobutadiene	U	2760	µg/kg	1.0								< 1.0
1,2,3-Trichlorobenzene	U	2760	µg/kg	2.0								< 2.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0								< 1.0
N-Nitrosodimethylamine	U	2790	mg/kg	0.50								< 0.50
Phenol	U	2790	mg/kg	0.50								< 0.50
2-Chlorophenol	U	2790	mg/kg	0.50								< 0.50
Bis-(2-Chloroethyl)Ether	U	2790	mg/kg	0.50								< 0.50
1,3-Dichlorobenzene	U	2790	mg/kg	0.50								< 0.50
1,4-Dichlorobenzene	N	2790	mg/kg	0.50								< 0.50
1,2-Dichlorobenzene	U	2790	mg/kg	0.50								< 0.50
2-Methylphenol	U	2790	mg/kg	0.50								< 0.50
Bis(2-Chloroisopropyl)Ether	U	2790	mg/kg	0.50								< 0.50
Hexachloroethane	N	2790	mg/kg	0.50								< 0.50
N-Nitrosodi-n-propylamine	U	2790	mg/kg	0.50								< 0.50
4-Methylphenol	U	2790	mg/kg	0.50								< 0.50
Nitrobenzene	U	2790	mg/kg	0.50								< 0.50
Isophorone	U	2790	mg/kg	0.50								< 0.50
2-Nitrophenol	N	2790	mg/kg	0.50								< 0.50
2,4-Dimethylphenol	N	2790	mg/kg	0.50								< 0.50
Bis(2-Chloroethoxy)Methane	U	2790	mg/kg	0.50								< 0.50
2,4-Dichlorophenol	U	2790	mg/kg	0.50								< 0.50
1,2,4-Trichlorobenzene	U	2790	mg/kg	0.50								< 0.50
Naphthalene	U	2790	mg/kg	0.50								580

Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental					Chemtest Job No.:	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112					Chemtest Sample ID.:	489263	489265	489266	489267	489268	489269	489270	489271
Order No.: RLE 17-08-01					Client Sample Ref.:	TP12	TP13	TP13	TP13	TP16	TP16	TT4	TT5
					Client Sample ID.:	D2	D1	D2	D3	D1	D2	D1	D1
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.70	0.10	0.40	0.80	0.20	0.50	1.90	1.70
					Bottom Depth (m):	0.80	0.20	0.50	0.90	0.30	0.60	1.90	1.70
					Date Sampled:	21-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
4-Chloroaniline	N	2790	mg/kg	0.50									< 0.50
Hexachlorobutadiene	U	2790	mg/kg	0.50									< 0.50
4-Chloro-3-Methylphenol	U	2790	mg/kg	0.50									< 0.50
2-Methylnaphthalene	U	2790	mg/kg	0.50									510
4-Nitrophenol	N	2790	mg/kg	0.50									< 0.50
Hexachlorocyclopentadiene	N	2790	mg/kg	0.50									< 0.50
2,4,6-Trichlorophenol	U	2790	mg/kg	0.50									< 0.50
2,4,5-Trichlorophenol	U	2790	mg/kg	0.50									< 0.50
2-Chloronaphthalene	U	2790	mg/kg	0.50									< 0.50
2-Nitroaniline	U	2790	mg/kg	0.50									< 0.50
Acenaphthylene	U	2790	mg/kg	0.50									< 0.50
Dimethylphthalate	U	2790	mg/kg	0.50									< 0.50
2,6-Dinitrotoluene	U	2790	mg/kg	0.50									< 0.50
Acenaphthene	U	2790	mg/kg	0.50									69
3-Nitroaniline	N	2790	mg/kg	0.50									< 0.50
Dibenzofuran	U	2790	mg/kg	0.50									260
4-Chlorophenylphenylether	U	2790	mg/kg	0.50									< 0.50
2,4-Dinitrotoluene	U	2790	mg/kg	0.50									< 0.50
Fluorene	U	2790	mg/kg	0.50									330
Diethyl Phthalate	U	2790	mg/kg	0.50									< 0.50
4-Nitroaniline	U	2790	mg/kg	0.50									< 0.50
2-Methyl-4,6-Dinitrophenol	N	2790	mg/kg	0.50									< 0.50
Azobenzene	U	2790	mg/kg	0.50									< 0.50
4-Bromophenylphenyl Ether	U	2790	mg/kg	0.50									< 0.50
Hexachlorobenzene	U	2790	mg/kg	0.50									< 0.50
Pentachlorophenol	N	2790	mg/kg	0.50									< 0.50
Phenanthrene	U	2790	mg/kg	0.50									540
Anthracene	U	2790	mg/kg	0.50									300
Carbazole	U	2790	mg/kg	0.50									37
Di-N-Butyl Phthalate	U	2790	mg/kg	0.50									< 0.50
Fluoranthene	U	2790	mg/kg	0.50									290
Pyrene	U	2790	mg/kg	0.50									240
Butylbenzyl Phthalate	U	2790	mg/kg	0.50									< 0.50
Benzo[a]anthracene	U	2790	mg/kg	0.50									200
Chrysene	U	2790	mg/kg	0.50									120
Bis(2-Ethylhexyl)Phthalate	N	2790	mg/kg	0.50									< 0.50

Chemtest
The right chemistry to deliver results

Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489263	489265	489266	489267	489268	489269	489270	489271
Order No.: RLE 17-08-01			Client Sample Ref.:		TP12	TP13	TP13	TP13	TP16	TP16	TT4	TT5
			Client Sample ID.:		D2	D1	D2	D3	D1	D2	D1	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.70	0.10	0.40	0.80	0.20	0.50	1.90	1.70
			Bottom Depth (m):		0.80	0.20	0.50	0.90	0.30	0.60	1.90	1.70
			Date Sampled:		21-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Di-N-Octyl Phthalate	U	2790	mg/kg	0.50								< 0.50
Benzo[b]fluoranthene	U	2790	mg/kg	0.50								140
Benzo[k]fluoranthene	U	2790	mg/kg	0.50								43
Benzo[a]pyrene	U	2790	mg/kg	0.50								95
Indeno(1,2,3-c,d)Pyrene	U	2790	mg/kg	0.50								40
Dibenz(a,h)Anthracene	U	2790	mg/kg	0.50								19
Benzo[g,h,i]perylene	U	2790	mg/kg	0.50								32
Naphthalene	U	2800	mg/kg	0.10	5.7							
Acenaphthylene	N	2800	mg/kg	0.10	0.27							
Acenaphthene	U	2800	mg/kg	0.10	0.35							
Fluorene	U	2800	mg/kg	0.10	0.39							
Phenanthrene	U	2800	mg/kg	0.10	9.0							
Anthracene	U	2800	mg/kg	0.10	1.5							
Fluoranthene	U	2800	mg/kg	0.10	3.3							
Pyrene	U	2800	mg/kg	0.10	2.8							
Benzo[a]anthracene	U	2800	mg/kg	0.10	1.6							
Chrysene	U	2800	mg/kg	0.10	1.8							
Benzo[b]fluoranthene	U	2800	mg/kg	0.10	1.9							
Benzo[k]fluoranthene	U	2800	mg/kg	0.10	0.48							
Benzo[a]pyrene	U	2800	mg/kg	0.10	1.3							
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10	0.50							
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10							
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10	0.52							
Total Of 16 PAH's	N	2800	mg/kg	2.0	31							
PCB 81	N	2815	mg/kg	0.010								< 0.010
PCB 77	N	2815	mg/kg	0.010								< 0.010
PCB 105	N	2815	mg/kg	0.010								< 0.010
PCB 114	N	2815	mg/kg	0.010								< 0.010
PCB 118	N	2815	mg/kg	0.010								< 0.010
PCB 123	N	2815	mg/kg	0.010								< 0.010
PCB 126	N	2815	mg/kg	0.010								< 0.010
PCB 156	N	2815	mg/kg	0.010								< 0.010
PCB 157	N	2815	mg/kg	0.010								< 0.010
PCB 167	N	2815	mg/kg	0.010								< 0.010
PCB 169	N	2815	mg/kg	0.010								< 0.010
PCB 189	N	2815	mg/kg	0.010								< 0.010

Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental			**Chemtest Job No.:**		17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520	17-19520
Quotation No.: Q14-02112			**Chemtest Sample ID.:**		489263	489265	489266	489267	489268	489269	489270	489271
Order No.: RLE 17-08-01			Client Sample Ref.:		TP12	TP13	TP13	TP13	TP16	TP16	TT4	TT5
			Client Sample ID.:		D2	D1	D2	D3	D1	D2	D1	D1
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.70	0.10	0.40	0.80	0.20	0.50	1.90	1.70
			Bottom Depth (m):		0.80	0.20	0.50	0.90	0.30	0.60	1.90	1.70
			Date Sampled:		21-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017	24-Jul-2017
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY		COVENTRY		COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Total PCBs (12 Congeners)	N	2815	mg/kg	0.12								< 0.12
Total Phenols	U	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1300	Cyanides & Thiocyanate in Waters	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Continuous Flow Analysis.
1415	Cations in Waters by ICP-MS	Sodium; Potassium; Calcium; Magnesium	Direct determination by inductively coupled plasma - mass spectrometry (ICP-MS).
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1675	TPH Aliphatic/Aromatic split in Waters by GC-FID(cf. Texas Method 1006 / TPH CWG)	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	Pentane extraction / GCxGC FID detection
1700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GC FID detection
1760	Volatile Organic Compounds (VOCs) in Waters by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics. (cf. USEPA Method 8260)	Automated headspace gas chromatographic (GC) analysis of water samples with mass spectrometric (MS) detection of volatile organic compounds.
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	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.
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
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
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.

Test Methods

SOP	Title	Parameters included	Method summary
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
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
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2790	Semi-Volatile Organic Compounds (SVOCs) in Soils by GC-MS	Semi-volatile organic compounds(cf. USEPA Method 8270)	Acetone/Hexane extraction / GC-MS
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*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2810	Polychlorinated Biphenyls (PCB) as Aroclors in Soils by GC-ECD	Polychlorinated Biphenyls expressed as an Aroclor (normally reported as *Aroclor 1242)	Extraction of a soil sample, as received, into hexane/acetone (50:50) followed by gas chromatography (GC) using mass spectrometric (MS) detection for identification of polychlorinated biphenyls and electron capture detection (ECD) for quanitation if present.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

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

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report No.:	17-19935-1		
Initial Date of Issue:	08-Aug-2017		
Client	Rodgers Leask Environmental		
Client Address:	St James House St Marys Wharf Mansfield Road Derby DE1 3TQ		
Contact(s):	Adam Taylor Mark Churchill		
Project	P17-176 - Athersley, Barnsley		
Quotation No.:	Q14-02112	**Date Received:**	31-Jul-2017
Order No.:	RLE 17-08-01	**Date Instructed:**	01-Aug-2017
No. of Samples:	7		
Turnaround (Wkdays):	5	**Results Due:**	07-Aug-2017
Date Approved:	08-Aug-2017		
Approved By:			

Details: Keith Jones, Technical Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental				**Chemtest Job No.:**	17-19935	17-19935	17-19935	17-19935	17-19935	17-19935	17-19935
Quotation No.: Q14-02112				**Chemtest Sample ID.:**	490892	490894	490895	490896	490897	490898	490899
Order No.: RLE 17-08-01				Client Sample Ref.:	TP1	TP8B	TP8B	TP12	TP12	TP15	TT4
				Client Sample ID.:	B1	B1	B2	B3	B4	B2	B1
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.50	2.50	1.90	2.20	1.90	1.00
				Bottom Depth (m):	0.60						
				Date Sampled:	19-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017	24-Jul-2017	24-Jul-2017
				Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
ACM Type	U	2192		N/A							Fibres/Clumps
Asbestos Identification	U	2192	%	0.001							Amosite Chrysotile
Moisture	N	2030	%	0.020	27	23	4.9	29	9.4	28	11
pH	U	2010		N/A	4.9	4.7	5.7	4.8	6.4		8.8
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40							1.4
Magnesium (Water Soluble)	N	2120	g/l	0.010	0.016	0.016	< 0.010	0.020	< 0.010		
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.12	< 0.010	< 0.010	0.080	< 0.010		0.66
Calorific Value	N	2140	MJ/kg	0.10	15	24		14		17	
Total Sulphur	U	2175	%	0.010	0.43	0.30	0.075	0.38	0.015		0.16
Chloride (Water Soluble)	U	2220	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010		
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010		
Cyanide (Complex)	U	2300	mg/kg	0.50							< 0.50
Cyanide (Free)	U	2300	mg/kg	0.50							< 0.50
Cyanide (Total)	U	2300	mg/kg	0.50							< 0.50
Thiocyanate	U	2300	mg/kg	5.0							6.8
Sulphide (Easily Liberatable)	U	2325	mg/kg	0.50							11
Ammonium (Water Soluble)	U	2120	g/l	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
Sulphate (Acid Soluble)	U	2430	%	0.010	0.051	0.011	0.24	0.086	0.014		0.39
Arsenic	U	2450	mg/kg	1.0							18
Cadmium	U	2450	mg/kg	0.10							0.28
Chromium	U	2450	mg/kg	1.0							21
Copper	U	2450	mg/kg	0.50							36
Mercury	U	2450	mg/kg	0.10							< 0.10
Nickel	U	2450	mg/kg	0.50							29
Lead	U	2450	mg/kg	0.50							71
Selenium	U	2450	mg/kg	0.20							< 0.20
Vanadium	U	2450	mg/kg	5.0							22
Zinc	U	2450	mg/kg	0.50							92
Organic Matter	U	2625	%	0.40							12
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	U	2680	mg/kg	1.0							< 1.0
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0							< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0							< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0							9.1

Chemtest
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Results - Soil

Project: P17-176 - Athersley, Barnsley

Client: Rodgers Leask Environmental					**Chemtest Job No.:**	17-19935	17-19935	17-19935	17-19935	17-19935	17-19935	17-19935
Quotation No.: Q14-02112					**Chemtest Sample ID.:**	490892	490894	490895	490896	490897	490898	490899
Order No.: RLE 17-08-01					Client Sample Ref.:	TP1	TP8B	TP8B	TP12	TP12	TP15	TT4
					Client Sample ID.:	B1	B1	B2	B3	B4	B2	B1
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.50	2.50	1.90	2.20	1.90	1.00
					Bottom Depth (m):	0.60						
					Date Sampled:	19-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017	21-Jul-2017	24-Jul-2017	24-Jul-2017
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0								67
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0								< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0								76
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	U	2680	mg/kg	1.0								< 1.0
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0								< 1.0
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0								< 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0								5.1
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0								81
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0								< 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0								86
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0								160
Naphthalene	U	2700	mg/kg	0.10								< 0.10
Acenaphthylene	U	2700	mg/kg	0.10								< 0.10
Acenaphthene	U	2700	mg/kg	0.10								< 0.10
Fluorene	U	2700	mg/kg	0.10								< 0.10
Phenanthrene	U	2700	mg/kg	0.10								2.5
Anthracene	U	2700	mg/kg	0.10								0.58
Fluoranthene	U	2700	mg/kg	0.10								2.6
Pyrene	U	2700	mg/kg	0.10								2.5
Benzo[a]anthracene	U	2700	mg/kg	0.10								1.7
Chrysene	U	2700	mg/kg	0.10								1.2
Benzo[b]fluoranthene	U	2700	mg/kg	0.10								1.7
Benzo[k]fluoranthene	U	2700	mg/kg	0.10								0.61
Benzo[a]pyrene	U	2700	mg/kg	0.10								1.2
Indeno(1,2,3-c,d)Pyrene	U	2700	mg/kg	0.10								1.1
Dibenz(a,h)Anthracene	U	2700	mg/kg	0.10								< 0.10
Benzo[g,h,i]perylene	U	2700	mg/kg	0.10								0.59
Total Of 16 PAH's	U	2700	mg/kg	2.0								16
Benzene	U	2760	µg/kg	1.0								< 1.0
Toluene	U	2760	µg/kg	1.0								< 1.0
Ethylbenzene	U	2760	µg/kg	1.0								< 1.0
m & p-Xylene	U	2760	µg/kg	1.0								< 1.0
o-Xylene	U	2760	µg/kg	1.0								< 1.0
Total Phenols	U	2920	mg/kg	0.30								< 0.30

Chemtest
The right chemistry to deliver results

Test Methods

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.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2140	Calorific Value	Calorific Value	Bomb Calorimeter
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
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
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.
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
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.

Report Information

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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

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

UKAS TESTING
2183

Final Report

Report No.:	17-20042-1
Initial Date of Issue:	09-Aug-2017
Client	Rodgers Leask Environmental
Client Address:	St James House St Marys Wharf Mansfield Road Derby DE1 3TQ
Contact(s):	Adam Taylor Mark Churchill
Project	P17-176 - Athersley, Barnsley

Quotation No.:	Q14-02112	**Date Received:**	31-Jul-2017
Order No.:	RLE 17-08-01	**Date Instructed:**	01-Aug-2017
No. of Samples:	1		
Turnaround (Wkdays):	7	**Results Due:**	09-Aug-2017
Date Approved:	09-Aug-2017		

Approved By:

Details: Martin Dyer, Laboratory Manager

Results - 2 Stage WAC

Project: P17-176 - Athersley, Barnsley

							Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	17-20042						**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Chemtest Sample ID:	491251								
Sample Ref:	TT4								
Sample ID:	B1								
Top Depth(m):	1.00								
Bottom Depth(m):	1.00								
Sampling Date:	24-Jul-2017								
Determinand	**SOP**	**Accred.**	**Units**						
Total Organic Carbon	2625	U	%			4.9	3	5	6
Loss On Ignition	2610	U	%			8.4	--	--	10
Total BTEX	2760	U	mg/kg			< 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg			< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg			100	500	--	--
Total (Of 17) PAH's	2700	N	mg/kg			31	100	--	--
pH	2010	U				8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg			0.050	--	To evaluate	To evaluate
Eluate Analysis			**2:1 mg/l**	**8:1 mg/l**	**2:1 mg/kg**	**Cumulative mg/kg 10:1**	**Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg**		
Arsenic	1450	U	0.0032	0.0038	< 0.050	< 0.050	0.5	2	25
Barium	1450	U	0.038	0.014	< 0.50	< 0.50	20	100	300
Cadmium	1450	U	0.00011	< 0.00010	< 0.010	< 0.010	0.04	1	5
Chromium	1450	U	0.0044	0.0018	< 0.050	< 0.050	0.5	10	70
Copper	1450	U	0.0059	0.0027	< 0.050	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.00050	< 0.0010	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.069	0.013	0.14	0.21	0.5	10	30
Nickel	1450	U	0.0012	< 0.0010	< 0.050	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.0010	< 0.010	< 0.010	0.5	10	50
Antimony	1450	U	0.0043	0.0027	< 0.010	0.029	0.06	0.7	5
Selenium	1450	U	0.0028	0.0020	< 0.010	0.021	0.1	0.5	7
Zinc	1450	U	0.021	0.0031	< 0.50	< 0.50	4	50	200
Chloride	1220	U	19	3.0	38	53	800	15000	25000
Fluoride	1220	U	1.3	1.0	2.6	10	10	150	500
Sulphate	1220	U	660	90	1300	1700	1000	20000	50000
Total Dissolved Solids	1020	N	790	150	1600	2400	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.030	< 0.30	< 0.50	1	-	-
Dissolved Organic Carbon	1610	U	16	13	< 50	130	500	800	1000

Soild Information	
Dry mass of test portion/kg	0.175
Moisture (%)	12

Leachate Test Information	
Leachant volume 1st extract/l	0.327
Leachant volume 2nd extract/l	1.400
Eluant recovered from 1st extract/l	0.250

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

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Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2700	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-FID	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Dichloromethane extraction / GC-FID
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS

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E - Insufficient Sample

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
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If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

Appendix K: Geotechnical Laboratory Results

TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

4041

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

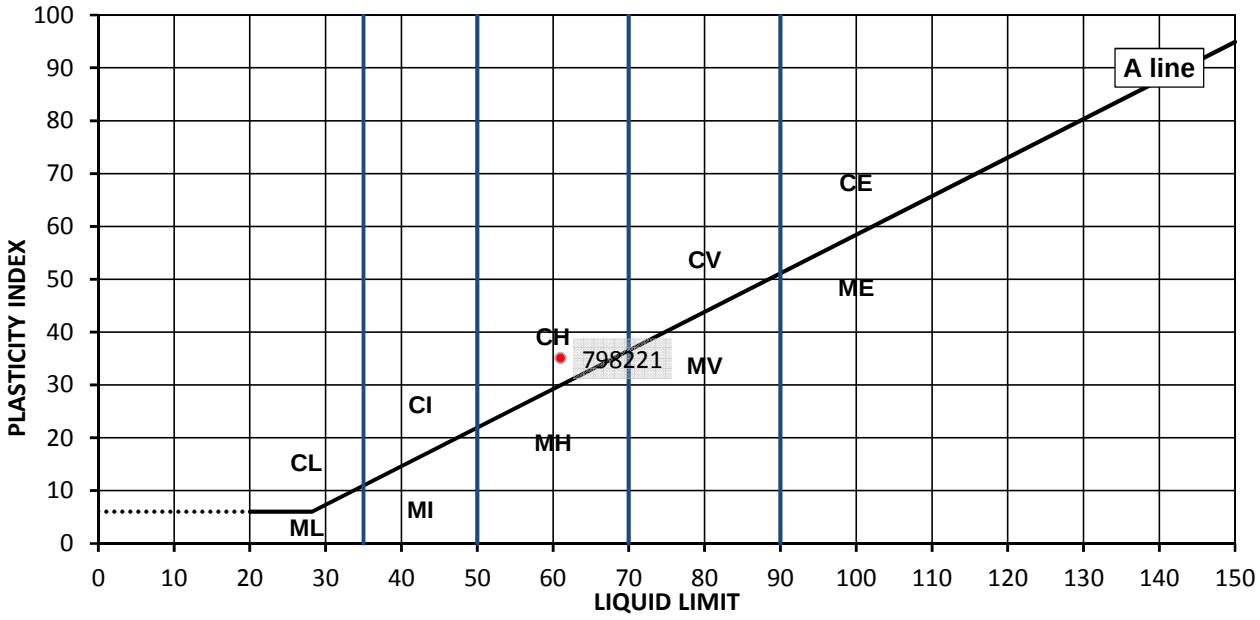
Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby, DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
Contact:	Adam Taylor	Date Tested:	17/08/2017
Site Name:	P17-176	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 798221
Sample Reference: 1

Description:	Grey CLAY	Sample Type:	B
Location:	TP1	Depth Top [m]:	1.00
Sample Preparation:	Tested in natural condition	Depth Base [m]:	1.50

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
22	61	26	35	100



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager Geotechnical Section
Date Reported: 24/08/2017

Signed:

Sushil Sharda
Technical Manager (Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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The results included within the report are representative of the samples submitted for analysis.
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."

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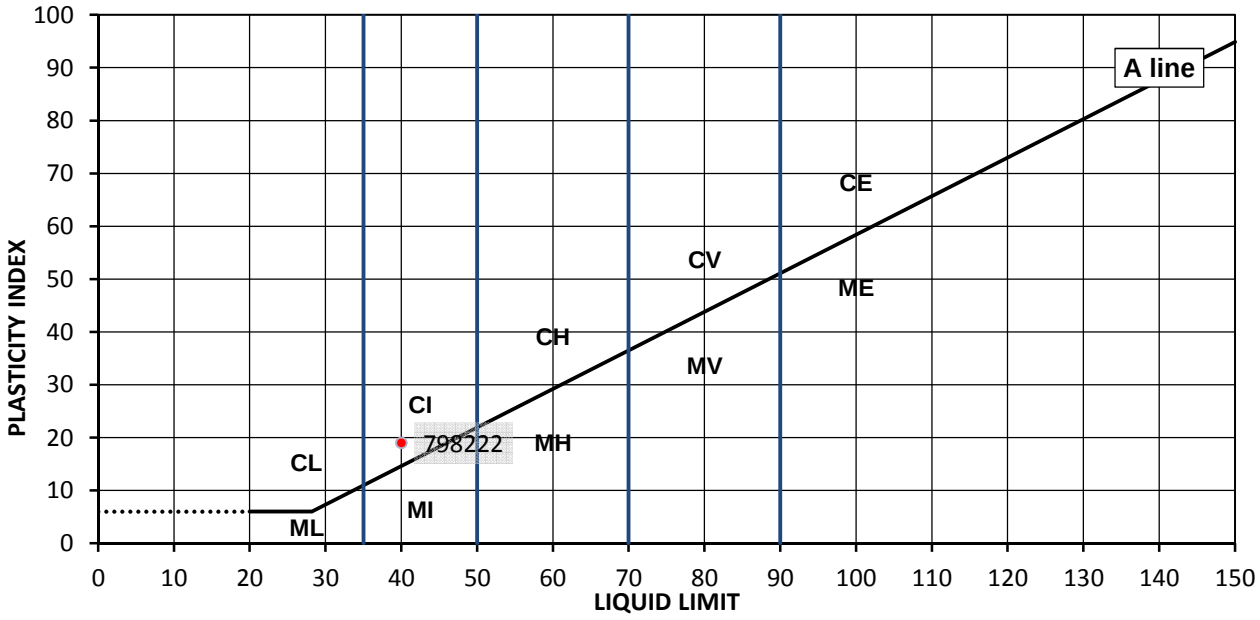
Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby, DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
Contact:	Adam Taylor	Date Tested:	17/08/2017
Site Name:	P17-176	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 798222
Sample Reference: 1

Description:	Brownish grey sandy CLAY	Sample Type:	B
Location:	TP3	Depth Top [m]:	1.10
Sample Preparation:	Tested in natural condition	Depth Base [m]:	1.60

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
16	40	21	19	100



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

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Date Reported: 24/08/2017

Signed:

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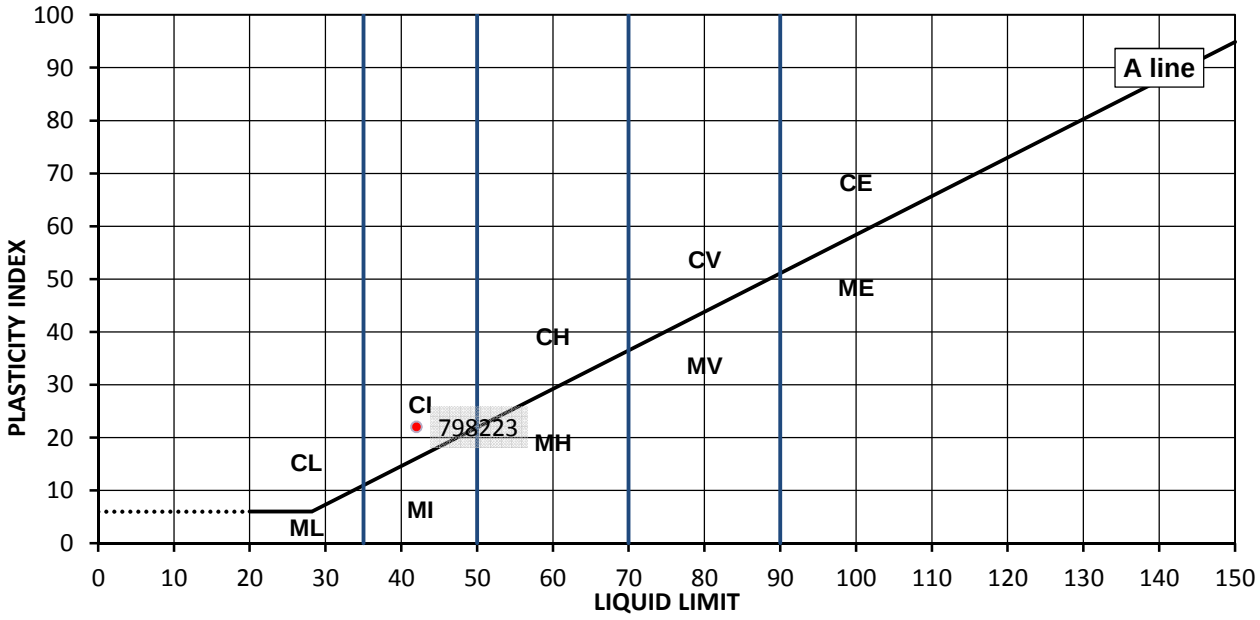
Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby, DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
Contact:	Adam Taylor	Date Tested:	17/08/2017
Site Name:	P17-176	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 798223
Sample Reference: 1

Description:	Orangish grey sandy CLAY	Sample Type:	B
Location:	TP6A	Depth Top [m]:	1.00
Sample Preparation:	Tested in natural condition	Depth Base [m]:	1.00

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
20	42	20	22	100



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager Geotechnical Section
Date Reported: 24/08/2017

Signed:

Sushil Sharda
Technical Manager (Geotechnical Division)

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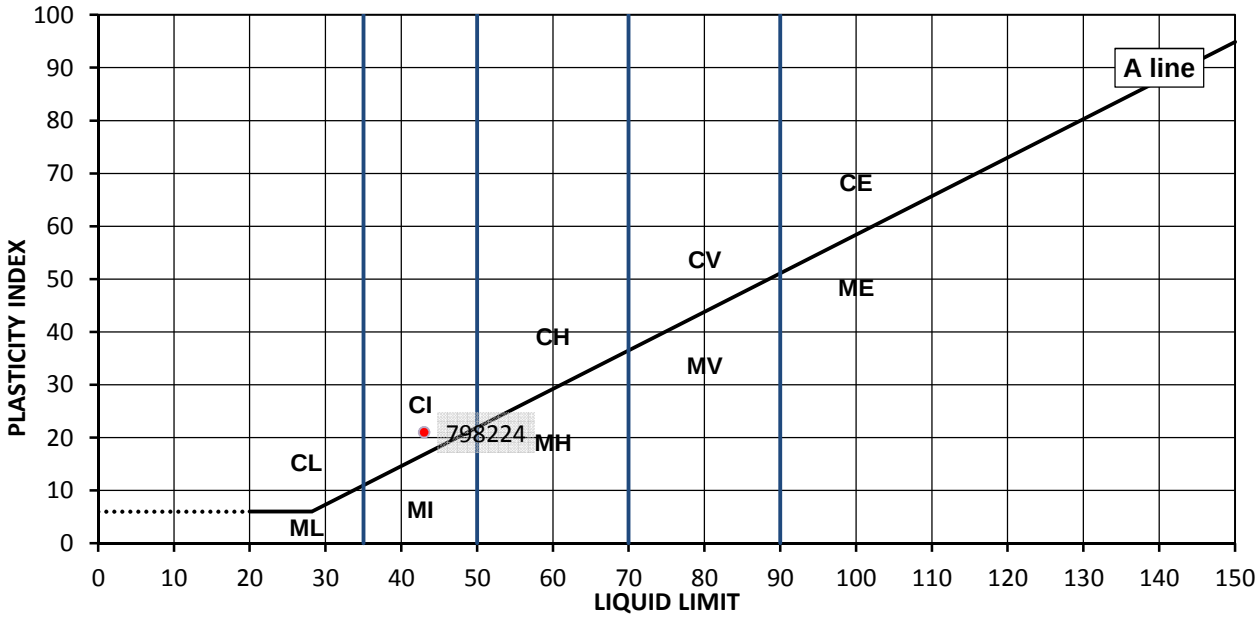
Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby, DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
Contact:	Adam Taylor	Date Tested:	17/08/2017
Site Name:	P17-176	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 798224
Sample Reference: 1

Description:	Brown gravelly sandy CLAY	Sample Type:	B
Location:	TP7	Depth Top [m]:	1.00
Sample Preparation:	Tested after washing to remove >425um	Depth Base [m]:	1.00

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
21	43	22	21	64



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager Geotechnical Section
Date Reported: 24/08/2017

Signed:

Sushil Sharda
Technical Manager (Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

4041

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby, DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
Contact:	Adam Taylor	Date Tested:	17/08/2017
Site Name:	P17-176	Sampled By:	Not Given
Site Address:	Not Given		

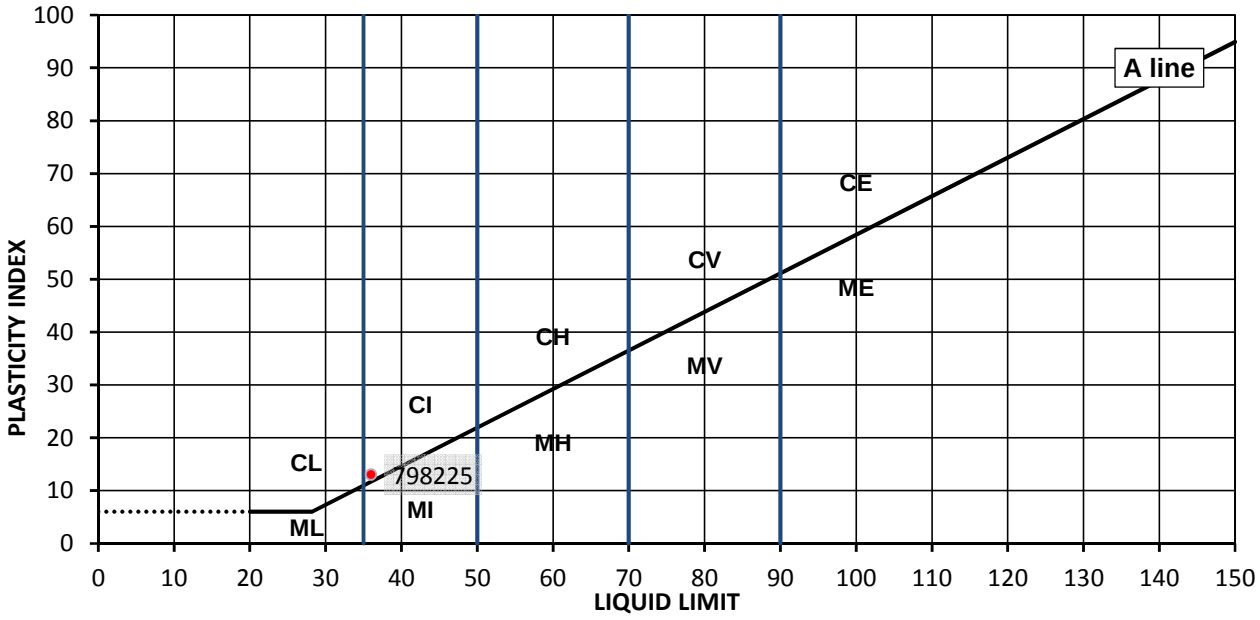
TEST RESULTS

Laboratory Reference: 798225
Sample Reference: 2

Description: Brownish grey slightly gravelly sandy CLAY
Location: TP8B
Sample Preparation: Tested after washing to remove >425um

Sample Type: B
Depth Top [m]: 2.50
Depth Base [m]: 2.50

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
4.7*	36	23	13	91



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks * Sample is dry

Approved:

Dariusz Piotrowski
PL Laboratory Manager Geotechnical Section
Date Reported: 24/08/2017

Signed:

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Technical Manager (Geotechnical Division)

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

4041

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

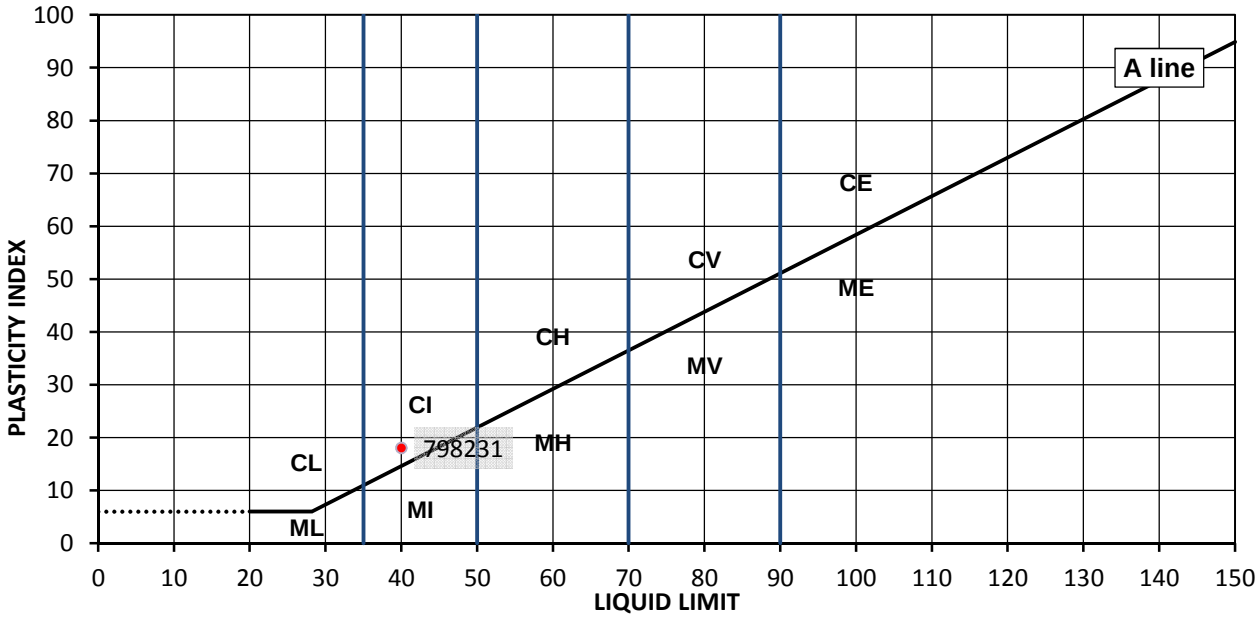
Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby, DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
Contact:	Adam Taylor	Date Tested:	17/08/2017
Site Name:	P17-176	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 798231
Sample Reference: 1

Description:	Mottled grey sandy CLAY	Sample Type:	B
Location:	TP13A	Depth Top [m]:	1.00
Sample Preparation:	Tested in natural condition	Depth Base [m]:	1.00

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
22	40	22	18	100



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

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PL Laboratory Manager Geotechnical Section
Date Reported: 24/08/2017

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for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Liquid and Plastic Limits

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7 Woodshots Meadow
Croxley Green Business Park
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4041

Tested in Accordance with BS1377-2: 1990: Clause 4.4 & 5: One Point Method

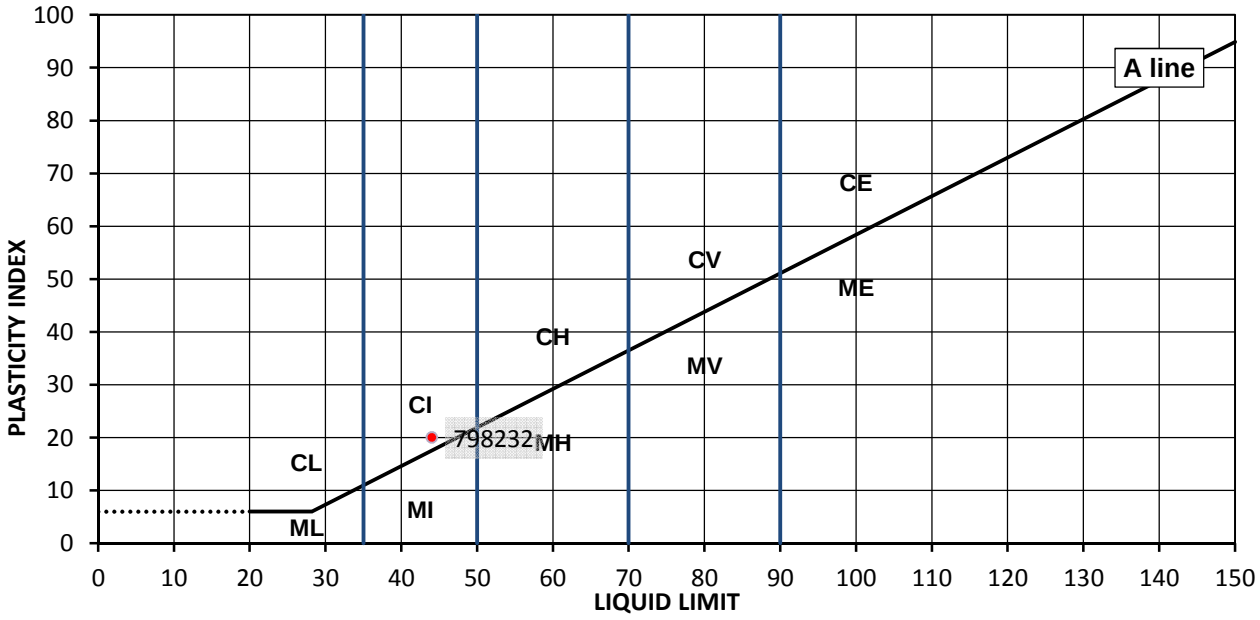
Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby, DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
Contact:	Adam Taylor	Date Tested:	17/08/2017
Site Name:	P17-176	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference: 798232
Sample Reference: 2

Description:	Brownish grey sandy CLAY	Sample Type:	B
Location:	TP13A	Depth Top [m]:	2.00
Sample Preparation:	Tested in natural condition	Depth Base [m]:	2.00

As Received Moisture Content [%]	Liquid Limit [%]	Plastic Limit [%]	Plasticity Index [%]	% Passing 425µm BS Test Sieve
21	44	24	20	100



Legend, based on BS 5930:2015 Code of practice for site investigations

		Plasticity		Liquid Limit
C	Clay	L	Low	below 35
M	Silt	I	Medium	35 to 50
		H	High	50 to 70
		V	Very high	70 to 90
		E	Extremely high	exceeding 90
	Organic	O	append to classification for organic material (eg CHO)	

Remarks

Approved:

Dariusz Piotrowski
PL Laboratory Manager Geotechnical Section
Date Reported: 24/08/2017

Signed:

Sushil Sharda
Technical Manager (Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Summary of Classification Test Results

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

Client: Rodgers Leask
Client Address: St James House
St Mary's Wharf
Mansfield Road
Derby, DE1 3TQ
Contact: Adam Taylor
Site Name: P17-176
Site Address: Not Given

Client Reference: P17-176
Job Number: 17-57189
Date Sampled: Not Given
Date Received: 10/08/2017
Date Tested: 17/08/2017
Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Soil Description	Density		M/C	Atterberg				PD
		Reference	Top depth [m]	Base depth [m]	Type		bulk Mg/m3	dry Mg/m3	%	% Passing 425um %	LL %	PL %	PI %	Mg/m3
798221	TP1	1	1.00	1.50	B	Grey CLAY			22	100	61	26	35	
798231	TP13A	1	1.00	1.00	B	Mottled grey sandy CLAY			22	100	40	22	18	
798232	TP13A	2	2.00	2.00	B	Brownish grey sandy CLAY			21	100	44	24	20	
798222	TP3	1	1.10	1.60	B	Brownish grey sandy CLAY			16	100	40	21	19	
798223	TP6A	1	1.00	1.00	B	Orangish grey sandy CLAY			20	100	42	20	22	
798224	TP7	1	1.00	1.00	B	Brown gravelly sandy CLAY			21	64	43	22	21	
798225	TP8B	2	2.50	2.50	B	Brownish grey slightly gravelly sandy CLAY			4.7*	91	36	23	13	

Comments: * Sample is dry

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Date Reported: 24/08/2017

Signed:

Sushil Sharda
Technical Manager (Geotechnical Division)

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Determination of Particle Size Distribution

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

4041

Tested in Accordance with BS1377:Part 2:1990, clause 9.2

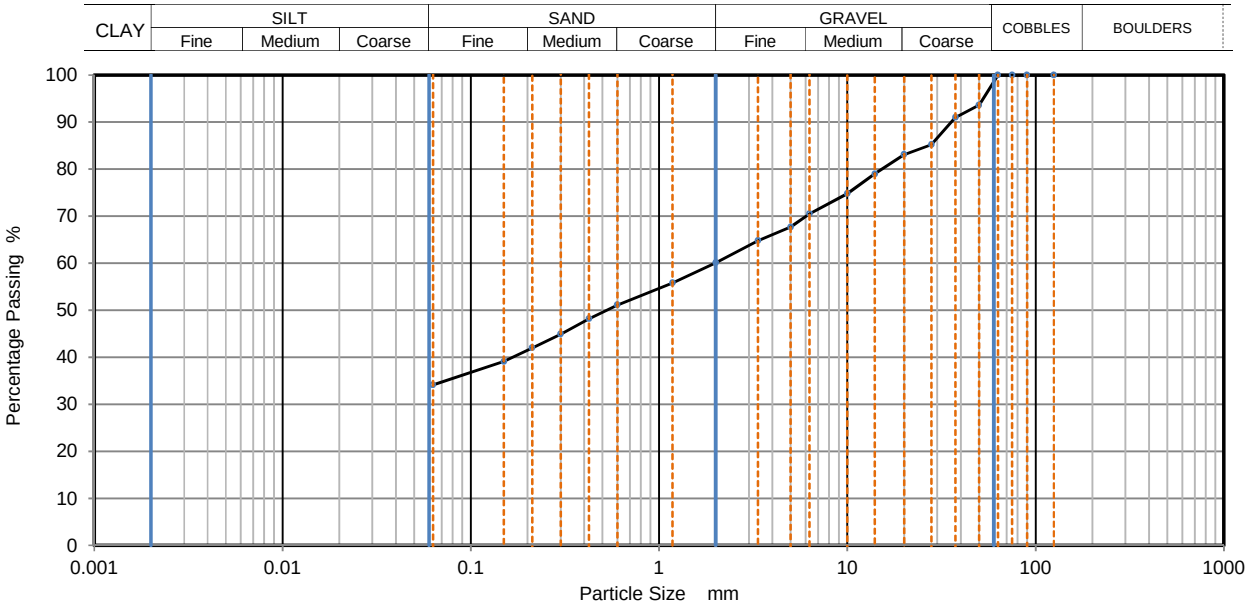
Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby, DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
Contact:	Adam Taylor	Date Tested:	17/08/2017
Site Name:	P17-176	Sampled By:	Not Given
Site Address:	Not Given		

TEST RESULTS Laboratory Reference: 798234 Sample Reference: 1

Sample description: Yellowish brown very sandy very clayey GRAVEL Sample Type: B

Location: TP16 Depth Top [m]: 0.70

Supplier: Not Given Depth Base [m]: 0.70



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	94		
37.5	91		
28	85		
20	83		
14	79		
10	75		
6.3	71		
5	68		
3.35	65		
2	60		
1.18	56		
0.6	51	Particle density	(assumed)
0.425	48	2.65	Mg/m3
0.3	45		
0.212	42		
0.15	39		
0.063	34		

Dry Mass of sample [g]: 6998

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	39.90
Sand	26.00
Fines <0.063mm	34.10

Grading Analysis		
D100	mm	63
D60	mm	1.98
D30	mm	
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 24/08/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship
Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

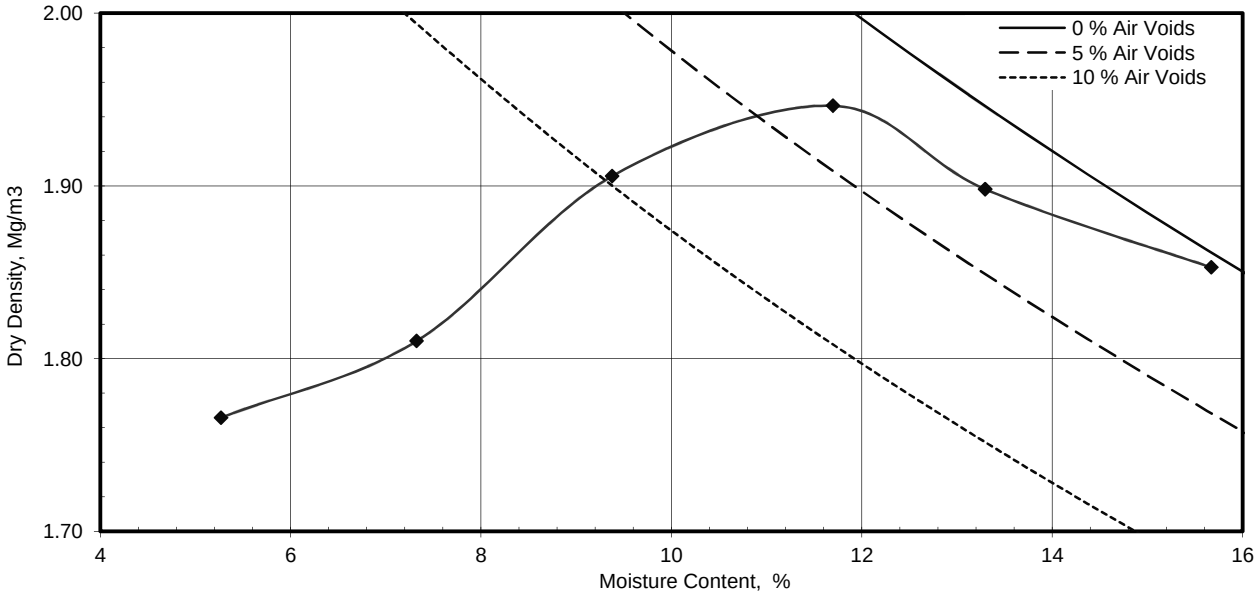
UKAS TESTING 4041

Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
		Date Tested:	18/08/2017
Contact:	Adam Taylor	Sampled By:	Not Given
Site Name:	P17-176		
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference:	798226		
Hole No.:	TP10	Depth Top [m]:	2.00
Sample Reference:	1	Depth Base [m]:	2.00
Sample Description:	Brownish grey sandy CLAY	Sample Type:	B



Preparation		Material used was natural
Mould Type		1 Litre
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.63
As received Moisture Content	%	13
Maximum Dry Density	Mg/m³	**1.95**

Optimum Moisture Content	%	**12**

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 24/08/2017

for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship
Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

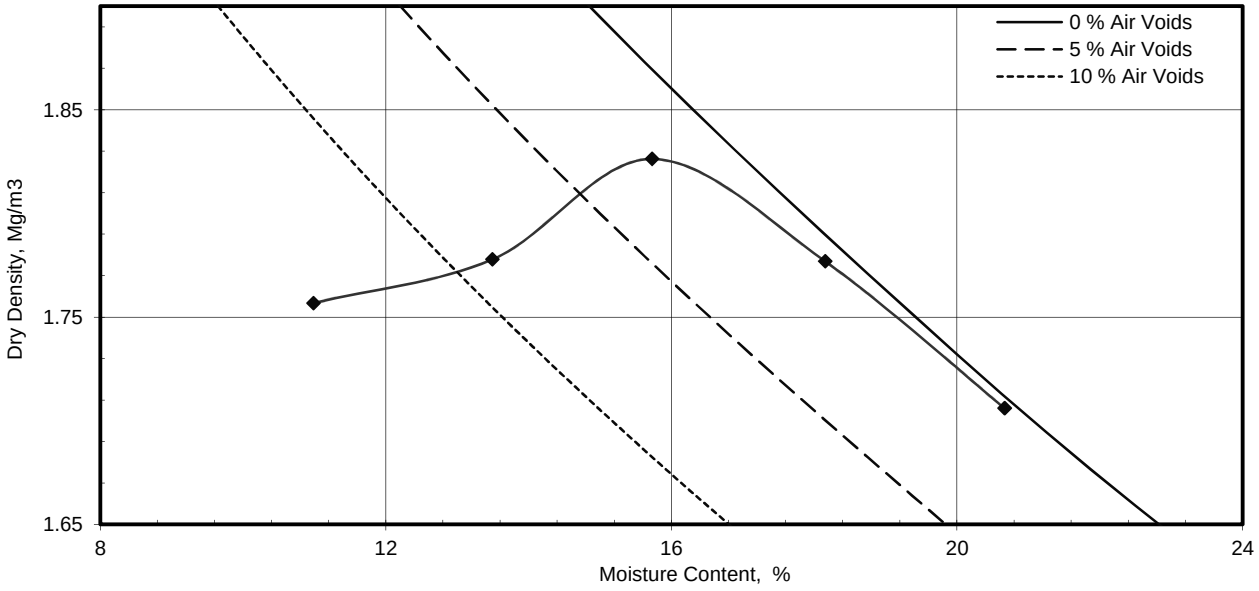
UKAS TESTING 4041

Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
		Date Tested:	18/08/2017
Contact:	Adam Taylor	Sampled By:	Not Given
Site Name:	P17-176		
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference:	798227		
Hole No.:	TP11	Depth Top [m]:	1.80
Sample Reference:	2	Depth Base [m]:	1.80
Sample Description:	Yellowish brown sandy CLAY	Sample Type:	B



Preparation		Material used was natural
Mould Type		1 Litre
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.65
As received Moisture Content	%	18
Maximum Dry Density	Mg/m³	**1.83**

Optimum Moisture Content	%	**16**

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 24/08/2017

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship
Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

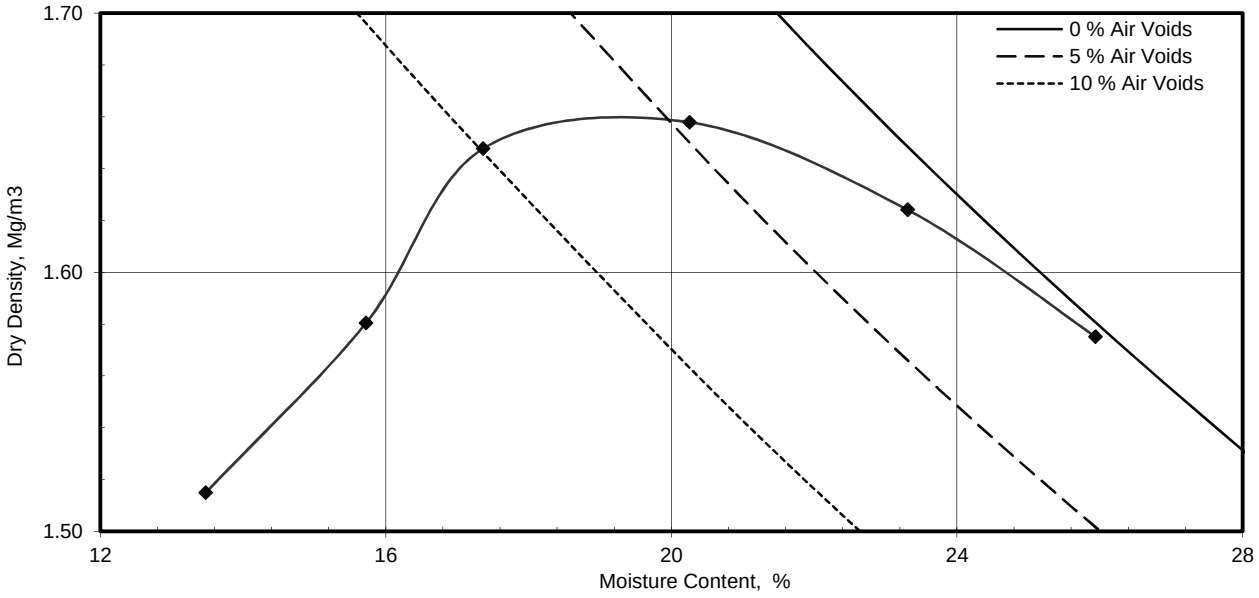
UKAS TESTING 4041

Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
		Date Tested:	18/08/2017
Contact:	Adam Taylor	Sampled By:	Not Given
Site Name:	P17-176		
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference:	798228		
Hole No.:	TP12	Depth Top [m]:	1.20
Sample Reference:	1	Depth Base [m]:	1.20
Sample Description:	Brownish grey slighly sandy CLAY	Sample Type:	B



Preparation		Material used was natural
Mould Type		1 Litre
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.68
As received Moisture Content	%	23
Maximum Dry Density	Mg/m³	**1.66**

Optimum Moisture Content	%	**20**

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 24/08/2017

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship
Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

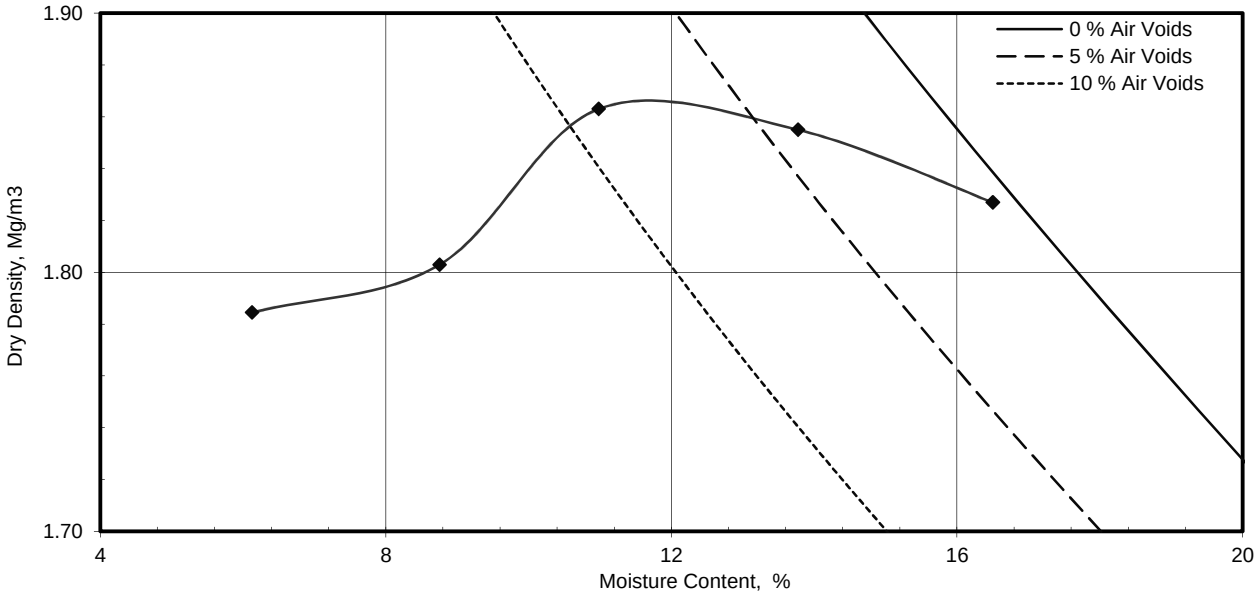
UKAS TESTING 4041

Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
		Date Tested:	18/08/2017
Contact:	Adam Taylor	Sampled By:	Not Given
Site Name:	P17-176		
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference:	798229		
Hole No.:	TP12	Depth Top [m]:	2.20
Sample Reference:	4	Depth Base [m]:	2.20
Sample Description:	Brownish grey slightly sandy CLAY	Sample Type:	B



Preparation		Material used was natural
Mould Type		1 Litre
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	0
Particle Density - Assumed	Mg/m³	2.64
As received Moisture Content	%	14
Maximum Dry Density	Mg/m³	**1.87**

Optimum Moisture Content	%	**12**

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
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Date Reported: 24/08/2017

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship
Light Compaction

i2 Analytical Ltd
7 Woodshots Meadow
Croxley Green Business Park
Watford Herts WD18 8YS

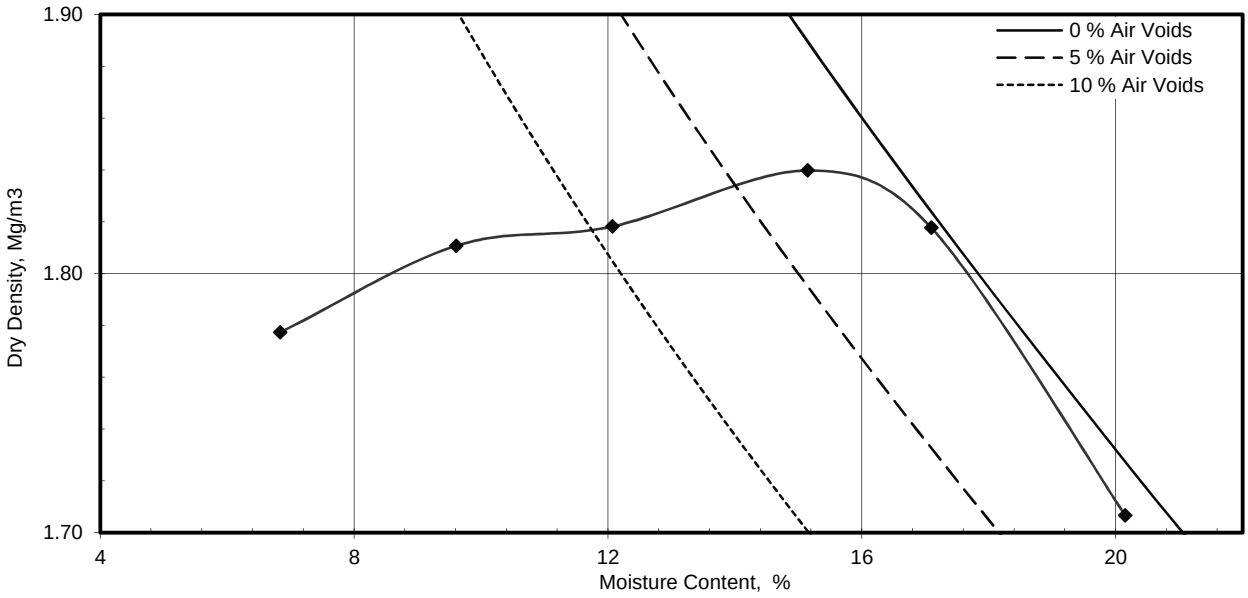
UKAS TESTING 4041

Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
		Date Tested:	18/08/2017
Contact:	Adam Taylor	Sampled By:	Not Given
Site Name:	P17-176		
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference:	798230		
Hole No.:	TP13	Depth Top [m]:	1.50
Sample Reference:	1	Depth Base [m]:	1.50
Sample Description:	Brownish grey slightly sandy gravelly CLAY with sandstones	Sample Type:	B



Preparation		Material used was natural
Mould Type		1 Litre
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	5
Particle Density - Assumed	Mg/m³	2.65
As received Moisture Content	%	15
Maximum Dry Density	Mg/m³	**1.84**

Optimum Moisture Content	%	**15**

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 24/08/2017

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TEST CERTIFICATE

Dry Density / Moisture Content Relationship
Light Compaction

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Croxley Green Business Park
Watford Herts WD18 8YS

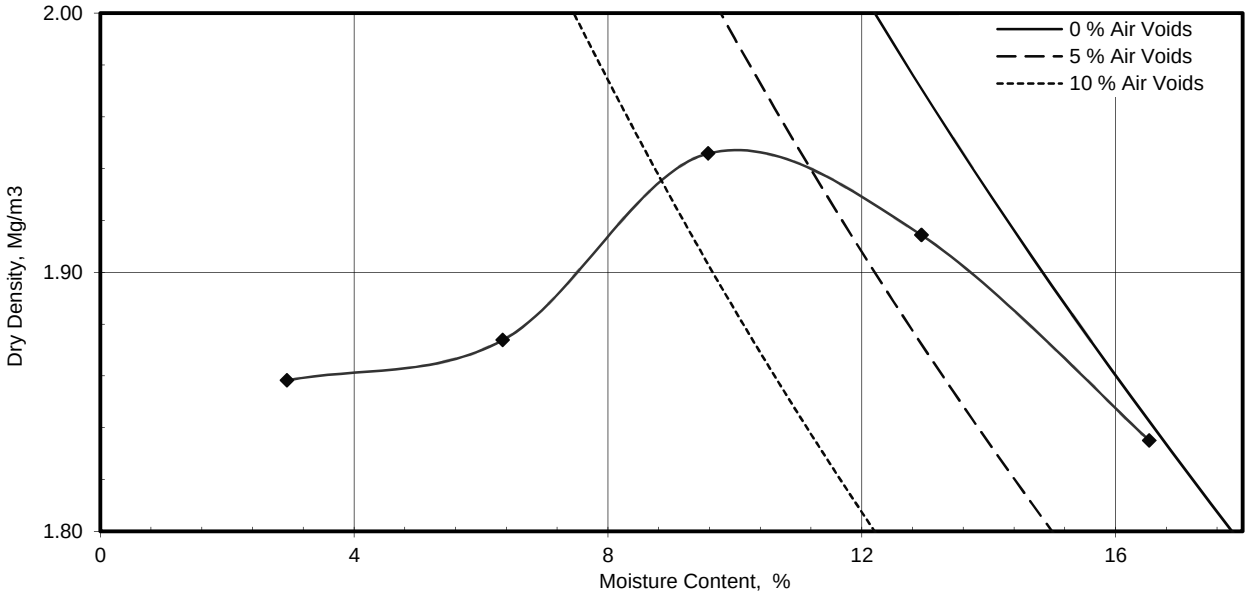
UKAS TESTING 4041

Tested in accordance with BS 1377-4:1990: Clause 3.3 using 2.5kg[light] Rammer

Client:	Rodgers Leask	Client Reference:	P17-176
Client Address:	St James House St Mary's Wharf Mansfield Road Derby DE1 3TQ	Job Number:	17-57189
		Date Sampled:	Not Given
		Date Received:	10/08/2017
		Date Tested:	18/08/2017
Contact:	Adam Taylor	Sampled By:	Not Given
Site Name:	P17-176		
Site Address:	Not Given		

TEST RESULTS

Laboratory Reference:	798233		
Hole No.:	TP14	Depth Top [m]:	1.70
Sample Reference:	1	Depth Base [m]:	1.70
Sample Description:	Brownish grey slightly gravelly slightly sandy CLAY	Sample Type:	B



Preparation		Material used was natural
Mould Type		1 Litre
Samples Used		Composite specimens tested
Material Retained on 37.5 mm Sieve	%	0
Material Retained on 20.0 mm Sieve	%	1
Particle Density - Assumed	Mg/m³	2.65
As received Moisture Content	%	17
Maximum Dry Density	Mg/m³	**1.95**

Optimum Moisture Content	%	**9.6**

Remarks:

Approved:

Dariusz Piotrowski
PL Laboratory Manager
Geotechnical Section

Signed:

Sushil Sharda
Technical Manager
(Geotechnical Division)

Date Reported: 24/08/2017

for and on behalf of i2 Analytical Ltd

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This report may not be reproduced other than in full without the prior written approval of the issuing laboratory.
The results included within the report are representative of the samples submitted for analysis.
The analysis was carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland."

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