PATRICKPARSONS



PHASE 2 GEOENVIRONMENTAL APPRAISAL
HEATON AVENUE, CLECKHEATON
for
Planned Contracts Ltd

October 2017

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Phase 2 Geoenvironmental Appraisal

Heaton Avenue, Cleckheaton

for

Planned Contracts Ltd

H17074	Phase 2 Geoenvironmental Appraisal, Heaton Avenue, Cleckheaton

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3.001.3 PPL DMS

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Ground Conditions	Reworked topsoil and hardstanding underlain by reworked clays and granular made ground to a maximum depth of 1.8m overlying natural soils comprising firm and stiff residual clays and medium dense and dense residual granular soils with solid strata proved at between 2.0 and 3.0m depth. Remnant substructures (WW2 air raid shelters) and foundations are present.
Groundwater	No free perched groundwater is present.
Ground Gas	CIRIA C665 Characteristic Situation 2 or NHBC Amber 1 gas regimes. Gas protection measures will be required, as appropriate. No radon protection measures are required.
Contamination and Remediation	Elevated concentrations of PAH contamination has been identified in shallow ash based and demolition derived made ground. No other significant visual or olfactory evidence of potential contamination was noted. Remediation comprising provision of clean capping within gardens is necessary to protect end users.
Mining	The site is unaffected by historic shallow coal mining with no additional structural precautions required in this respect.
Foundations	The use of a traditional strip and trench fill foundations are considered appropriate bearing upon either the natural firm and stiff clays/medium dense and dense granular soils. Deepening of foundations up to 2.5m depth will be necessary at the location of remnant substructures. Ground bearing floor slabs are generally considered suitable with suspended floor slabs appropriate in areas of deeper made ground.
Tree Influence	Where within influence of trees, foundations will require deepening in accordance with current guidance, assuming a low volume change potential for the natural residual clays.
Concrete Classification	Buried concrete in contact with made ground should be designed to BRE Special Digest 1:2005 Design Sulphate Class DS-2 with an ACEC site classification AC-2 with DS-1 and AC-1 appropriate for natural soils.
SUDS	The use of soakaways for surface water drainage is considered as feasible, subject to detailed design.
Waste Classification	A waste classification assessment in accordance with WM3 guidance may be required if off-site disposal of soils is anticipated.
Roads	A design CBR value of 1% for made ground and natural clays and 3% for natural granular soils at formation.

The above summary should not be used in isolation and reference should be made the full report which provides a detailed assessment of the risks affecting the development.

1.0 Introduction

1.1 Commission

Patrick Parsons Ltd (PPL) was commissioned by Planned Contracts Ltd (PCL) to undertake a Phase 2 Ground Investigation for a proposed residential development at Heaton Avenue, Cleckheaton. A site location plan is presented as Drawing No. H17074-701 in Appendix A.

1.2 Proposals

It is understood that PCL propose to construct 15 no. low rise semi-detached and terraced residential properties with gardens and drives on the site. A proposed site layout plan by Chris Finn Architect, Dwg. No. 2587-01-01F April 2017 is presented in Appendix A.

1.3 Objectives

The objectives of the investigation were as follows:

- Review existing data and reports pertaining to the site
- Provide information on ground conditions
- Provide recommendations for foundation solutions
- Assessment of potential risks from contamination
- To assess the risk posed by hazardous ground gas
- Provide recommendations for development.

This report presents the factual information available during this appraisal, interpretation of the intrusive data obtained and recommendations with respect to future development. It has been assumed in the production of this report that the site is to be redeveloped for a residential end use with the potential for consumption of homegrown produce.

1.4 Information Sources

This Phase 2 Intrusive Investigation is based on the findings of the phased intrusive works, chemical analysis and geotechnical testing undertaken during the course of the assessment. The results have been used to refine the preliminary conceptual model and initial recommendations outlined in the PPL Desk Study and Kirklees MBC Coal Mining Risk Assessment together with a limited PPL intrusive investigation for the purposes of assessing infiltration potential of the subsoils, as referenced below:

- 'Coal Mining Risk Assessment, Heaton Avenue, Cleckheaton', Kirklees MBC Physical Resources and Procurement, Ref. ES590434, dated September 2014
- 'Phase 1 Geoenvironmental Report, Heaton Avenue, Cleckheaton', PPL Ref. H17074DTS, dated October 2017
- 'Infiltration Testing for Soakaway Design', PPL Letter Report Ref. H17074/SA, dated July 2017.

1.5 Limitations

This report has been prepared for PCL and their appointed agents only and should not be relied upon by any third party without the written permission of PPL. If any unauthorised third party comes into possession of this report, they rely on it at their own risk and the authors do not owe them any Duty of Care or Skill. This report is based on and limited to an assessment of the information and ground

conditions identified here. PPL is not responsible for ground conditions not revealed during these investigations.

2.0 Summary of Phase 1 Desk Study and Preliminary Risk Assessment

2.1 The following is a summary of the findings of the Phase 1 Desk Study, including Coal Mining Risk Assessment, and should not be read in isolation. For full details reference should be made to the reports outlined in Section 1.4. In summary, the Phase 1 Geoenvironmental Report highlighted the following:

Site Description	The site comprises an area of approximately 0.35ha forming an 'L' shaped parcel of land and is generally level. The site comprises predominantly hardstandings and demolition materials with lesser areas of peripheral soft landscaping. Along the southern and southeastern boundaries, a low brick retaining wall retains the site some 0.5 to 1m above that of the adjacent road. Semi-mature and mature trees are present along the southern and northern site boundaries with trees adjacent and outside of the western boundary. An earlier underground utility mapping scan identified multiple unknown buried features and former WW2 underground air raid shelters beneath the site.
Site History	Since the 1930s, the site has been developed as a school, which was recently demolished.
Geology	Directly underlain by sandstone of the Carboniferous Lower Coal Measures. No superficial soils are recorded, however, limited intrusive information for the site confirms the presence of natural firm clays and granular soils. The Wheatley Lime coal seam outcrops to the north and northwest and underlies the site at shallow depth together with the Middleton Eleven Yards coal and the Blocking Bed coal seams.
Coal Mining	A *moderate to high* risk of the site being affected by shallow mine workings.
Contamination	The risk of significant contamination on the site is considered as being *low to moderate*.
Environmental	• Solid Geology: Secondary A Aquifer. • No significant watercourses within 250m. • No licenced landfills within 250m. • A former refuse tip within 250m.
Ground Gas	The risk of ground gas affecting the site is considered as being *low to moderate*. No radon protection measures are required.
Flooding	There is no flood risk identified.
SUDS	SUDS (soakaways) are considered feasible, as demonstrated by recent infiltration testing.

Foundations	Traditional spread or trench fill foundations should generally be suitable for low rise housing. At this stage, suspended floor slabs should be assumed.

2.2 Preliminary Conceptual Site Model

The Phase 1 Preliminary Conceptual Site Model is provided below:

Preliminary Conceptual Site Model

Source	Pathway	Receptor	Pollutant Linkage: Assessed Risk
Human Health			
Made ground and Asbestos (in soils) from former school development	Direct contact and ingestion/inhalation of contaminated soil and dust	Construction workers	*Low to Moderate*: Mitigated by use of appropriate PPE and good site practice
	Direct contact and ingestion/inhalation of contaminated soil and dust. Ingestion of home grown vegetables	End users	*Low to Moderate*: Mitigation measures may be required as part of the development to prevent end users coming into contact with made ground and asbestos in soils
Ground gas associated with on-site made ground, shallow mineworkings and former refuse tip in the surrounding area	Vertical and lateral migration into confined spaces. Inhalation	End users	*Low to Moderate*: Gas monitoring may be required to confirm the ground gas regime, subject to the findings of an intrusive investigation
Controlled Waters			
Made ground from former on-site development	Vertical and lateral migration	Secondary A Aquifer (solid)	*Low*: Limited on-site intrusive information has confirmed shallow low permeability natural clays, which will inhibit any vertical and lateral migration of potential contaminants

3.0 Fieldwork & Laboratory Testing

Based on the findings of the Phase 1 Appraisal and Coal Mining Risk Assessment together with earlier limited intrusive information at the site, the following scope of fieldwork and laboratory analysis was undertaken:

- Drilling of 9 no. mini percussive boreholes (WS01 to WS08A) to a maximum depth of 2.45m below existing ground level (begl), to assess ground conditions, allow in situ testing and obtain samples for laboratory analysis
- Mechanical excavation of 10 no. trial pits (TP04 and TP13) to a maximum depth of 3.2m begl to assess shallow ground conditions, investigate substructures and obtain samples for laboratory analysis
- Drilling of 3 no. rotary open hole boreholes (R01 to R03) to a maximum depth of 30m begl to confirm the presence of shallow coal workings beneath the site
- Installation of 3 no. combined gas and groundwater monitoring standpipes
- Geotechnical laboratory testing of soils, including water soluble sulphate, soil pH, Atterberg Limits and CBR tests
- Chemical laboratory testing of soils comprising standard suites of metals, metalloids, non-metals, Polyaromatic Hydrocarbons (PAH), Total Petroleum Hydrocarbons (TPH), asbestos presence determination.

The fieldworks were undertaken in 2 separate phases; initially on 13th and subsequently on 25th September 2017.

A plan showing the location of the exploratory holes is included as Drawing No. H17074-703 in Appendix A and copies of the exploratory hole records are provided in Appendix B.

Laboratory Geotechnical and Chemical Test results are included in Appendix C and D respectively with Generic Assessment Criteria (GAC) presented in Appendix E.

3.1 Exploratory Hole Rationale

Based on the findings of the desk study and the preliminary Conceptual Site Model, the location of the exploratory holes was based on the following rationale:

Exploratory Hole	Rationale
TP04, TP07 to TP13	Determine nature of remnant substructures (WW2 air rad shelters) and foundations
TP05, TP06, WS01 to WS08A	General site coverage
R01 to R03	Determine the presence of historic shallow coal mineworkings across the site

4.0 Ground Conditions

4.1 Soil Profile

Depth Range to Top of Strata (Thickness)	Material Type
Ground level (0.05 to 0.2m)	**Hardstanding**: Concrete and coated macadam
Ground level (0.3 to 0.8m)	**Reworked Topsoil**: With brick and glass content *NB. **Relic Topsoil** proved at between 0.15 and 0.35m begl (150 to 300mm thick)*
0.05 to 0.3m (0.1 to 1.8m)	**Made Ground**: 'Loose' and compact gravelly sand including slag and ash content or gravel, cobble and boulder size demolition materials of brick, sandstone and concrete interbedded with reworked soft and firm gravelly clays with variable gravel content
0.3 to 1.0m (0.1 to 2.5m)	**Natural Residual Cohesive Soils**: Firm and stiff gravelly clay
0.3 to 1.8m (0.3 to 1.75m)	**Natural Residual Granular Soils**: Medium dense, dense and very dense gravelly sand, sandy gravel and sand and gravel
2.1 to 2.9m (>28m)	**Solid Strata**: Interbedded very weak mudstone, weak sandstone and coal

4.2 Material Properties

4.2.1 Made Ground

Corrected hand shear vane results for the reworked clays recorded average undrained shear strength values of 50kN/m^2 at less than 1m depth.

No laboratory classification testing was undertaken on these soils.

4.2.2 Natural Residual Cohesive Soils

Corrected hand shear vane results for the natural residual clays recorded average undrained shear strength values of 63kN/m^2 (<1m), 86kN/m^2 (1 to 2m) and 94kN/m^2 (2 to 3m), indicative of firm and stiff or medium and high strength soils. Corrected SPT N_{60} average values for these soils were 17 at between 1 and 2m depth, which are equivalent to shear strength values of 85kN/m^2 or stiff (high strength) soils.

Plasticity results confirm these clays to be of low to intermediate plasticity. Calculation of the modified plasticity index in accordance with NHBC Chapter 4.2 indicate these soils to have low volume change potential.

4.2.1 Natural Residual Granular Soils

Corrected SPT N_{60} average values for these soils were 34 at between 1 and 2m depth and in excess of 50 or refusal between 2 and 3m depth.

4.2.2 Solid Strata

Corrected SPT N_{60} values for the mudstone and sandstone were all in excess of 50 or refusal.

4.3 Historic Shallow Coal Mining

A total of 3 no. rotary percussive boreholes (R01 to R03) were put down across the site to depths of between 27.0 and 30.0m begl. Intact coal seams were proved at depths of between 8.1 and 9.3m begl (0.2m thick = upper seam) and between 13.4 and 18.3m begl (1.1m thick = lower seam). No evidence of historic mineworkings was noted. The findings are as anticipated from the desk based appraisal with the coal seams dipping and consequently deepening southwards across the site.

In summary, the site is considered to be unaffected by historic shallow coal mining.

4.4 Remnant Substructures and Foundations

Evidence of buried substructures (former WW2 air raid shelters) was recorded within the central northern and eastern parts of the site (TP04, TP09, TP10 and WS08A). These structures were generally constructed to between 2.2 and 2.6m begl, linear (approximately 2.5m wide externally) and of concrete and brick construction. The concrete roof slab was noted as reinforced and between 100 and 250mm thickness.

Remnant foundations associated with the former school were proved to depths of between 1.0 and 1.8m begl.

The approximate locations of the 'as proved' underground air raid shelters are presented on Dwg. H17074-703, included within Appendix A.

4.5 Groundwater

No free perched groundwater was encountered during the advancement of the exploratory holes.

4.6 Contamination - Visual and Olfactory

Excepting the presence of ash-based made ground materials, no visual or olfactory evidence to suggest gross or significant impact or contamination of the made ground or natural soils was noted during the advancement of the exploratory holes.

Although no visual evidence of suspected asbestos containing materials (ACMs) was noted within the made ground soils, discarded pieces of asbestos cement corrugated sheeting were noted on the surface adjacent to the western site boundary.

4.7 Obstructions

As discussed above, remnant former substructures (WW2 air raid shelters) and foundations were present at depths of between 1.0 and a maximum of 2.6m begl. The substructures (underground shelters) are located within the central northern and eastern areas of the site with the foundations

restricted to the presence of the former school building in the southern part of the site. The approximate locations of the 'as proved' underground air raid shelters are presented on Dwg. H17074-703, included within Appendix A.

Solid strata of mudstone and sandstone, generally present at between 2.0 and 3.0m begl, resulted in refusal of any further progress in the mini percussive boreholes.

5.0 Preliminary Ground Gas Assessment

5.1 The intrusive investigation has proved thicknesses of made ground up to a maximum of 1.8m (generally less than 1.0m), essentially comprising either gravel, cobble and boulder size demolition-derived materials or reworked natural clays with no significant putrescible content. There is no evidence to suggest the presence of hydrocarbon or volatile vapours. There is a former refuse tip identified as present within 250m of the site, however, this dates from the 1960s and 1970s and has now been developed with residential properties. No evidence has been proved to indicate the presence of historic shallow mineworkings beneath the site. As such, there is considered to be a *low* risk from site-derived or off-site ground gases potentially affecting end users of the site.

The requirement for undertaking a ground gas monitoring programme is not considered warranted as the potential risk has been assessed in accordance with CLAIRE RB17 'A pragmatic approach to ground gas risk assessment', 2012. Any potential or plausible source of ground gas is considered to be restricted to on-site made ground only and its constituents. Total Organic Content (TOC) values for the made ground materials are between 1.4 and 3.2%, which together with the presence of historic made ground (>20 years old) at thicknesses of less than 3.0m would classify the site as Characteristic Situation 2 or NHBC Amber 1, in accordance with CIRIA 665 (2007) and BS8485 (2015) guidance.

5.2 Provisional Assessment of Gas Protection Measures

A Characteristic Situation 2 or NHBC Amber 1 classification represents a *low* hazard potential which would require the incorporation of basic gas protection measures during construction. Note that this assessment is subject to regulatory approval.

Essentially, the design of gas protection measures for residential properties depends on the nature of the floor slab construction.

5.2.1 Suspended Floor Slab with Minimum 150mm Void

The NHBC Traffic Light system only applies to residential developments which utilise beam and block floors with clear passive void ventilation provided (minimum 150mm void thickness). The design choice variables are limited to decisions relating to the membrane specification and verification recommendations. Designers utilising this system would therefore need to refer to the following documents to assess compliance for specific recommendations:

- NHBC and RSK GROUP, 'Guidance on Evaluation of Development Proposals on Sites Where Methane and Carbon Dioxide are Present', Ref. 10627-R01(04), 2007
- NHBC Technical Extra Issue 20, 'Ground Gas Update – Site Assessment, Characterisation and Design of Gas Protection Measures', April 2016

5.2.2 All Other Floor Types

In accordance with Table 4 of BS8485, a residential end use equates to a Type A Building. For Characteristic Situation 2 ground gas conditions, it is necessary to attain a point score value of at least 3.5 through incorporation of adequate gas protection measures, which can be achieved from a range of measures as described in Section 7 of the Standard, including floor slab type (structural barrier),

ventilation measures and use of a gas resistant membrane. At least 2 or more of these measures are required.

We would recommend that independent CQA validation of the protection measures is carried out in accordance with a prepared Remediation Statement.

Incorporation of radon protection measures are not necessary.

6.0 Contamination Assessment

6.1 Generic Risk Assessment for Human Health

The assessment involves the screening of the measured concentrations of contaminants of concern obtained during the investigations against published generic assessment criteria (GAC) values which are representative of a 'minimal' or 'tolerable' risk to human health. The assessment criteria adopted are the LQM/CIEH Suitable for Use Levels (S4ULs) for Human Health Risk Assessment (Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3279; All rights reserved). Where no S4UL is available, reference is made to other relevant standards as appropriate.

Based on the proposed end use, GACs for a residential end use with homegrown produce have been adopted. A conservative soil organic matter content of 1% has been assumed. A summary table of relevant GAC values is provided in Appendix E.

6.1.1 Metals, Metalloids, Non-metals

A total of 6 shallow soil samples (1 of reworked topsoil, 2 of relic topsoil and 3 of made ground) were analysed. No determinands were present at concentrations exceeding their respective GAC values.

6.1.2 Total Petroleum Hydrocarbons (TPH)

A total of 6 shallow soil samples (made ground and relic/reworked topsoil) were analysed for speciated TPH. No determinands were present at concentrations exceeding their respective GAC values.

6.1.3 Polyaromatic Hydrocarbons (PAH)

A total of 6 shallow soil samples (made ground and relic/reworked topsoil) were analysed for speciated PAH. Concentrations of benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene were recorded in excess of their respective GAC values within shallow samples of demolition-derived and ash-based made ground recovered from WS04 and WS08 respectively.

6.1.4 Asbestos

A total of 6 shallow made ground and relic/reworked topsoil samples recovered at depths of around a 1.0m begl or less were screened for the presence of asbestos. None of the samples tested positive for the presence of asbestos.

No visual evidence of suspected asbestos containing materials (ACMs) was noted within the made ground soils during the intrusive investigation.

6.2 Controlled Waters Risk Assessment

Taking cognisance of the results of the laboratory analysis on the shallow soils and the intrusive findings, the absence of any free groundwater or any nearby significant surface watercourses together with the presence of natural cohesive soils beneath the site, no controlled waters (surface and aquifers) are deemed to be at risk and, hence, no leachate or groundwater testing has been undertaken.

7.0 Revised Conceptual Site Model

Based on the findings of the ground investigation, the Preliminary Conceptual Site Model developed in the Phase I desk study has been revised to reflect the increased level of data now available.

7.1 Background

Risk to human health or environmental receptors is based on an assessment of one or more source-pathway-receptor linkages. The 'source' is any substance which has the potential to cause significant harm to a relevant receptor and the 'pathway' is any route by which contamination may travel to impact on a 'receptor'.

The Conceptual Site Model (CSM) summarises the principal contaminant sources, pathways and receptors for this site and the likelihood of the existence of a pollutant linkage. The assessment is based on a presumed end use of a residential development incorporating homegrown produce.

7.2 Contaminants of Concern

The intrusive investigation has confirmed the presence of several PAH compounds at concentrations in excess of their GACs within samples of demolition-derived and historic ash-based made ground materials and, as such, has deemed these materials as presenting a risk to end users of the site.

7.3 Gas Risk

There is considered to be a *low* risk to end users of the site from on-site made ground derived ground gases potentially affecting the proposed development.

7.4 Phase 2 Revised Conceptual Site Model and Environmental Risk Assessment

The significance of the potential source-pathway-receptor linkages identified in the Conceptual Site Model can be assessed using the following criteria:

- Low risk – not likely to cause significant harm to human health or controlled waters. Remedial measures are not likely to be required;
- Moderate risk – it is possible that significant harm to human health or controlled waters could occur depending on site specific circumstances. Remedial measures may be required to mitigate potential risks;
- High risk – it is likely that significant harm to human health or controlled waters will occur unless appropriate remedial measures are incorporated into the development.

The potential pollutant linkages pertaining to the site and the assessed significance are summarised in the Revised Conceptual Site Model table below.

Revised Conceptual Site Model

Source	Pathway	Receptor	Pollutant Linkage: Assessed Risk
Human Health			
Made ground contaminants from former school development – elevated concentrations of PAH compounds are present	Direct contact and ingestion/inhalation of contaminated soil and dust	Construction workers	*Low to Moderate*: Mitigated by use of appropriate PPE and good site practice
	Direct contact and ingestion/inhalation of contaminated soil and dust. Ingestion of home grown vegetables	End users	*Low to Moderate*: Mitigation measures will be required as part of the development to prevent end users coming into contact with made ground
Ground gas associated with on-site made ground	Vertical and lateral migration into confined spaces. Inhalation	End users	*Low*: Gas monitoring is not considered to be necessary. Basic gas protection measures to be provided
Controlled Waters			
Made ground contaminants from former school development – PAH compounds	Vertical and lateral migration	Secondary A Aquifer (solid)	*Negligible to Low*: Absence of any free groundwater or nearby significant surface watercourses and the presence of natural cohesive soils will inhibit any vertical and lateral migration of potential contaminants

8.0 Remediation

8.1 Contaminants of Concern

The generic risk assessment has confirmed there to be several PAH compounds present within the made ground soils that may potentially pose a risk to human health for the proposed residential end-use together with presenting a potential risk to construction personnel during the proposed redevelopment. The risk to environmental receptors (Secondary A aquifer) is assessed as *negligible to low*.

8.2 Remediation Recommendations

It is not considered feasible to remove the contaminated made ground soils from site. Consequently, all gardens and soft landscaping areas will require the provision of clean capping soils to prevent site end users from coming into contact with the made ground soils. As no suitable topsoil is present on the site, all capping soils will require importation.

It is considered that the cover system should include a minimum of 600mm of clean cover soils, although early consultation with the Local Authority is advised in this respect. Any imported materials to be used within the cover system should be managed in accordance with the YALPAG – 'Verification Requirements for Cover Systems: Technical Guidance for Developers, Landowners and Consultants' (2016). The chemical testing validation rates are shown in the table below:

Source and Validation Rate	**Chemical Analysis Suite**		
	General Soil Suite	Asbestos	Hydrocarbons (TPHCWG)
Greenfield / Manufactured soils 1 per 250m³ (minimum of 3)	✓	✓	
Brownfield / Screened soils 1 per 100m³ (minimum of 6)	✓	✓	✓

It is recommended that a Remediation Strategy should be prepared to provide more detail on the remedial requirements and validation procedures for the proposed development. This document is a planning requirement and will need to be agreed with the NHBC or other warranty provider and the Local Authority.

In addition, potential short-term exposure to made ground soils by site personnel will occur during construction and it is recommended that good practice and appropriate hygiene measures (in accordance with established guidance) are followed during these activities, to mitigate any potential risk to construction personnel.

If during site redevelopment works, potentially significant soil (or groundwater) contamination is encountered, then all works should cease and the advice of a geoenvironmental engineer should be sought.

8.3 Utilities

The need for additional protection (barrier pipes) to underground services and pipework may be warranted, subject to specific chemical testing in accordance with UKWIR guidance and local water authority recommendations. The results of laboratory chemical tests should be provided to the appropriate utility companies to allow their assessment for the correct selection of water supply pipework.

8.4 Waste Disposal

Any site generated materials which the developer intends to discard as part of the construction phase of the development would be classed as waste and must be appropriately handled in accordance with current Waste Legislation. The developer should be aware of and utilise the waste hierarchy where possible – Reduce → Reuse → Recycle → Recovery → Disposal. Where materials are unable to remain on site and disposal is the only option, the waste should be classified and sent to an appropriately licensed waste receiving facility.

Whether any soils generated are to remain on site or are to be removed from site for disposal, in order to comply with statutory regulations, they will need to be classified in accordance with WM3 'Waste Classification' guidance. Any classification should be reserved until such construction-derived potential waste materials have been generated on site. The preparation of a waste classification assessment is beyond the scope of this report, however, if considered necessary PPL would be pleased to assist with this service.

8.5 Gas Protection Measures

Incorporation of gas protection measures with respect to carbon dioxide and methane and in accordance with a site classification Characteristic Situation 2 or NHBC Amber 1 will be required as part of the development, subject to regulatory approval. Preliminary discussions with Kirklees MBC Environmental Health department has confirmed no regulatory requirement for ground gas monitoring in principle, subject to acceptance of mitigation measures presented within this report.

The site does not lie within an area where radon protection measures are required.

9.0 Geotechnical Appraisal

It is proposed to construct 15 no. low rise semi-detached and terraced residential properties incorporating gardens and private drives. Proposed finished levels are understood to remain more or less as existing site levels.

9.1 Mining

The intrusive investigation has not confirmed the presence of shallow coal mineworkings beneath the site. As such, ground consolidation treatment (drill and grout) of the underlying strata is not required with additional structural precautions not necessary in this respect.

9.2 Foundations

The intrusive investigation has proved either reworked topsoil or hardstandings overlying made ground to a maximum thickness of 1.8m. Natural soils comprise firm and stiff residual clays and medium dense and dense residual granular soils in turn underlain by mudstone and sandstone present at between 2.0 and 3.0m begl. Remnant substructures (former underground WW2 air raid shelters) and foundations are present to a maximum depth of 2.6m begl. No free perched groundwater is present.

Traditional strip and trench fill foundations are considered as suitable bearing upon either the natural firm and stiff clays/medium dense and dense granular soils at around 1.0m begl. However, within the footprints of the remnant underground air raid shelters and the school building, substructures are present to between approximately 1.5 and 2.5m depth and, as such, deepening of foundations using trench fill should be appropriate for these plots with the resultant void (in its entirety) backfilled with engineered materials. All remnant walls and floor slabs to the air raid shelters will require breaking out together with remnant foundations beneath the former school buildings. It is considered that plots 3, 4 and 18 will be affected by remnant air raid shelters and those in the south of the site by remnant foundations associated with the former school building.

The results of the in situ testing suggest that the firm and stiff clays and the medium dense and dense granular soils are able to accommodate static loadings of 125kN/m^2 with total and differential settlements within tolerable limits. The mudstone and sandstone are assessed as able to accommodate static loadings of at least 200kN/m^2. Foundations should ideally be placed within the same strata, however, where they straddle different soils they should be widened and incorporate appropriate reinforcement.

Where foundations are within natural clays and within the influencing distance of tress or hedges they will need to be deepened in accordance with current guidance, assuming a low volume change potential for the natural residual clays.

9.3 Floor Slabs

The use of ground bearing floor slabs is considered as potentially feasible where made ground thicknesses are less than 600mm, subject to proof rolling and treatment of any soft spots. Elsewhere, the use of suspended floor slabs is considered appropriate.

9.4 Drives and Hardstanding

The results of in situ and laboratory testing together with information gained from the intrusive investigation would suggest a preliminary design CBR value of 1% for the made ground materials natural residual clays and 3% for the natural residual granular soils at formation, subject to proof rolling and any soft spots treated appropriately. Any over-sized materials should be removed together with any significant accumulations of unsuitable anthropogenic materials.

9.5 Excavations

Generally, excavations within the made ground and natural soils should be achievable using conventional plant and should remain stable in the short-term. However, support and battering back of temporary excavations should be undertaken if required, in accordance with CIRIA Report 97 Trenching Practice (2nd Edition 2001). The use of hydraulic breakers should be anticipated where remnant foundations and substructures are present and if deeper excavations are proposed within the competent natural solid strata (mudstone and sandstone).

Any groundwater ingress should be adequately controlled through pumping from sumps. It should be noted that groundwater levels vary seasonably.

9.6 Concrete Classification

For the made ground soils the results indicate a design sulphate class of DS-2 and ACEC class of AC-2 and for the natural soils a design sulphate class of DS-1 and ACEC class of AC-1 for concrete in accordance with BRE Special Digest 1, 2005, 3rd Edition, assuming mobile groundwater conditions, with concrete designed appropriately.

9.7 Drainage

Field infiltration testing undertaken previously has demonstrated that the natural granular residual soils and the underlying sandstone strata present beneath the central and southern parts of the site are feasible for disposing of surface water by way of soakaway, subject to detailed design.

10.0 Further Works

Based on the findings of the intrusive ground investigation, the following works will be required for planning and regulatory purposes:

- Production of a Remediation Strategy detailing the methodology and validation measures necessary for provision of remedial capping to made ground soils and CQA requirements for gas protection measures;
- Undertake chemical validation testing of the imported clean capping soils.

Appendix A

Figures

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Key			
Plot No.	Type	sqm	sqft
1	semi	89.0	957.64
2	semi	89.0	957.64
3	semi	90.78	976.79
4	semi	90.78	976.79
5	semi	89.0	957.64
6	semi	89.0	957.64
7	semi	90.78	976.79
8	semi	90.78	976.79
9	semi	90.78	976.79
10	semi	90.78	976.79
11	semi	89.0	957.64
12	semi	89.0	957.64
13	end tce	72.53	780.42
14	mid tce	72.53	780.42
15	end tce	72.53	780.42
16	end tce	72.53	780.42
17	mid tce	72.53	780.42
18	end tce	72.53	780.42
Totals		1,480.92	15,934.70

Planned Contracts Ltd
Heaton Avenue, Cleckheaton BD19 3AE
Proposed Site Layout Plan scale 1:200 16/03/2017 drwg. no. 2587-01-01D

Chris Finn Architect
BOWLING GREEN HOUSE
38 RYTHERGATE
CAWOOD SELBY YO8 3TP
TEL: 01757 268650

A4 ORIGINAL SIZE - DO NOT SCALE.
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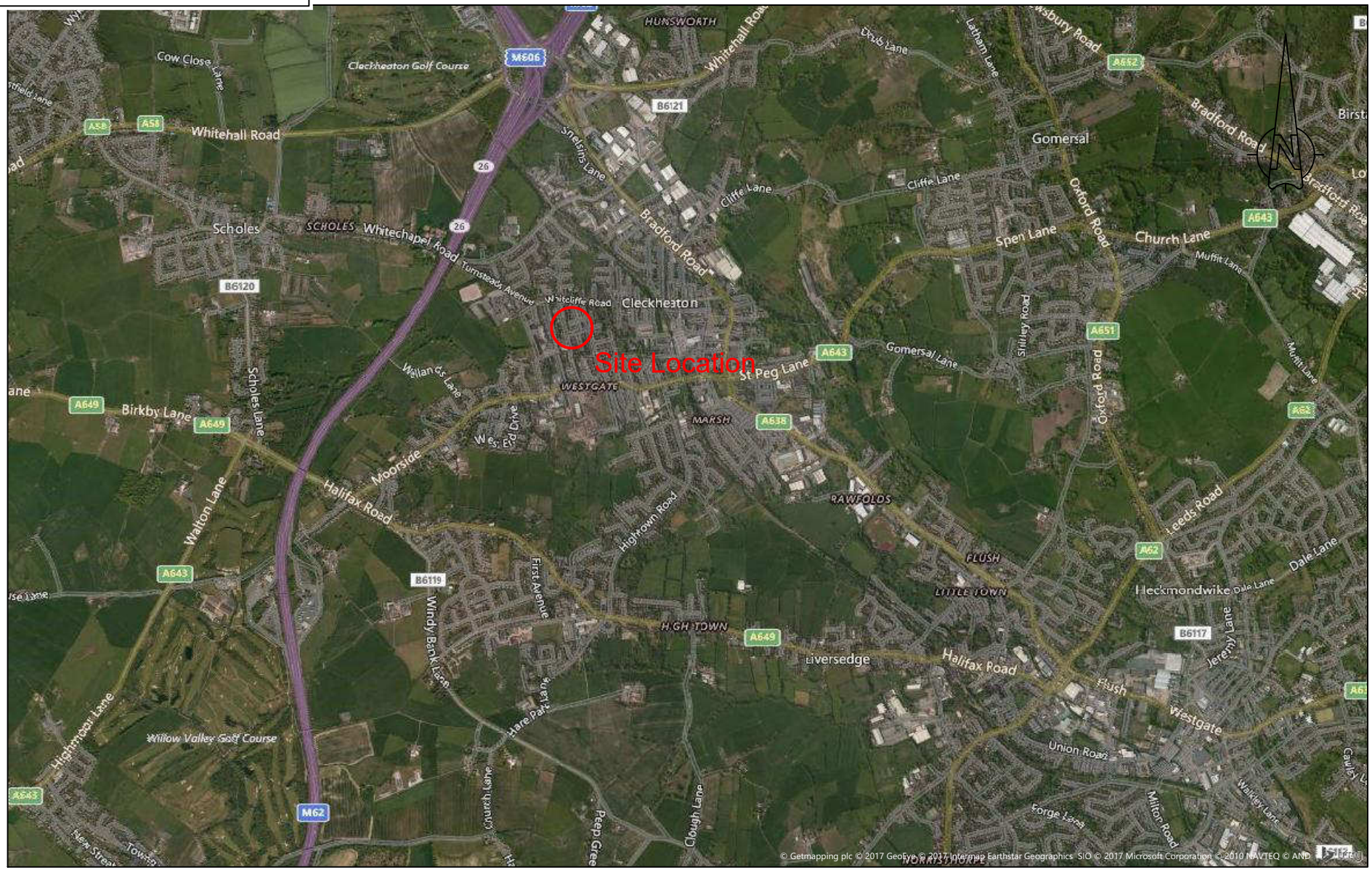

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Client: Planned Contracts Ltd	Drawing: Site Location Plan	Scales: NTS	Drawn: TF July 2017	Checked: JR
Project: Heaton Avenue, Cleckheaton		Drawing No.: H17074-701		Rev.: P1

A4 ORIGINAL SIZE - DO NOT SCALE.
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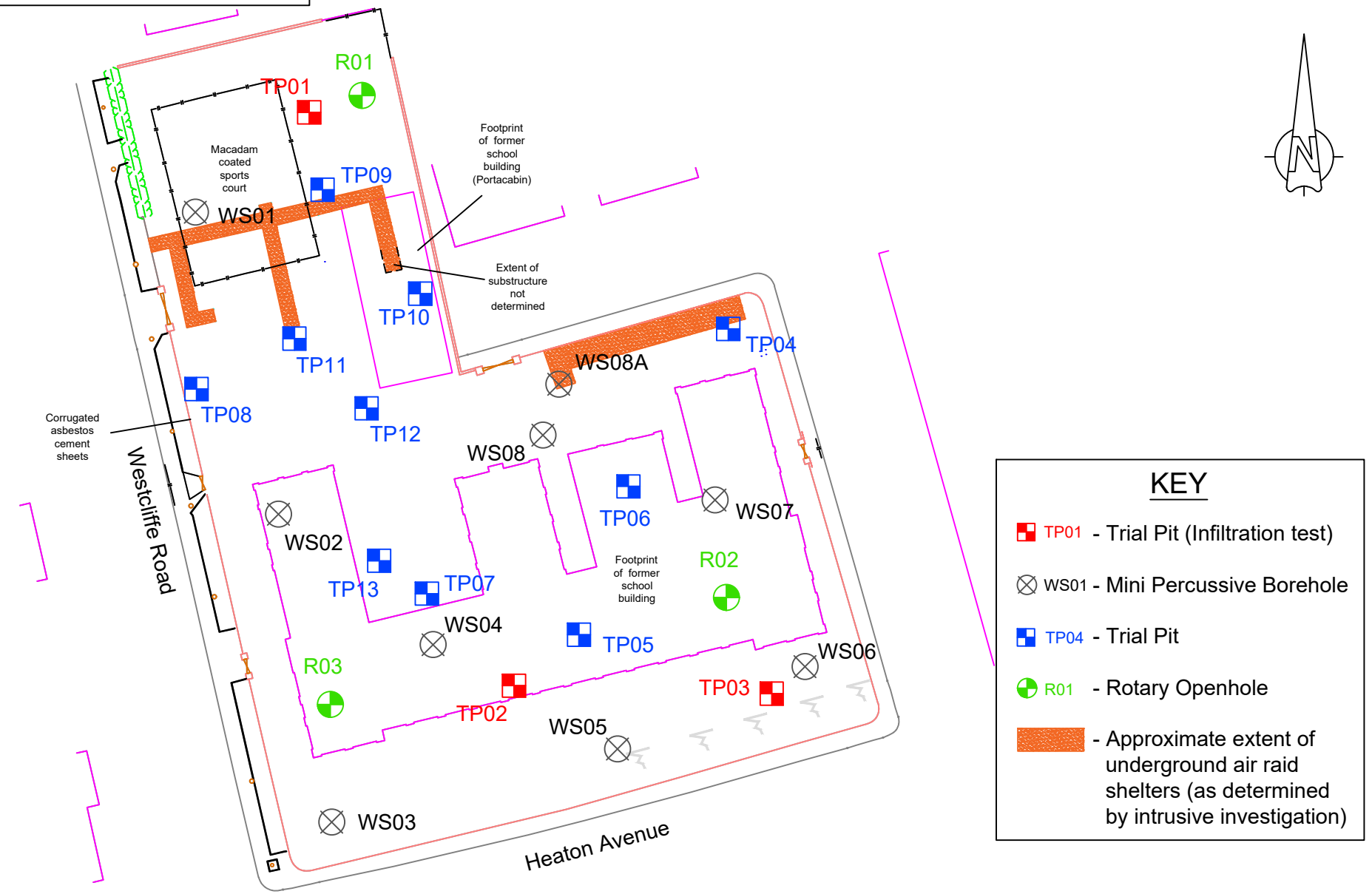

KEY

- TP01 - Trial Pit (Infiltration test)
- WS01 - Mini Percussive Borehole
- TP04 - Trial Pit
- R01 - Rotary Openhole
- Approximate extent of underground air raid shelters (as determined by intrusive investigation)

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Client: Planned Contracts Ltd

Project: Heaton Avenue, Cleckheaton

Drawing: Site Features and Exploratory Hole Location Plan

Scales: NTS | Drawn: TF September 2017 | Checked: JR

Drawing No.: H17074-703 | Rev.: P1

Appendix B

Exploratory Hole Logs

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
Huddersfield
Tel: 01484 516 977

Trialpit No
TP01
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	28/06/2017
Location: Cleckheaton		Dimensions: 1.80m	Scale 1:20
Client: Planned Contracts Ltd		Depth 3.80m, 0.70m	Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						Grass over reworked TOPSOIL.
			0.30			Soft to firm yellow brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of sandstone and mudstone.
			1.10			Firm grey slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of sandstone, siltstone and mudstone.
			2.00			Firm grey silty very gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone.
			2.80			Very weak thinly laminated grey MUDSTONE recovered as tabular angular to subangular fine to coarse gravel size fragments.
			3.80			Trialpit Complete at 3.80 m

Remarks: Excavation faces stable
Infiltration test undertaken at 3.8m

Groundwater: No groundwater encountered

AGS

HoleBASE 3.1 (Bld 426.46) Standard Trialpit Log v2 dated 27th Nov 03

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
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Huddersfield
Tel: 01484 516 977

Trialpit No
TP02
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	28/06/2017
Location: Cleckheaton		Dimensions: 1.60m, Depth 3.10m, 0.70m	Scale 1:20
Client: Planned Contracts Ltd			Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND: 'Loose' brown very clayey very gravelly fine to medium sand with low to medium cobble and boulder content. Gravel is angular to subangular fine to coarse of brick, concrete, clay pipe, sandstone and macadam. Cobbles and boulders are angular of brick, concrete and sandstone.
			0.45			MADE GROUND: Soft to firm yellow slightly gravelly sandy reworked clay with low cobble content. Gravel is angular to subangular fine to coarse of sandstone. Cobbles are angular of sandstone.
			1.00			MADE GROUND: Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone and brick. Frequent roots throughout.
			1.80			Compact yellow very sandy angular to subangular fine to coarse GRAVEL of sandstone with high cobble content. Sand is fine to coarse. Cobbles are flaggy angular of sandstone.
			3.10			Trialpit Complete at 3.10 m

1
2
3

Remarks: Excavation faces stable
Infiltration test undertaken at 3.1m

Groundwater: No groundwater encountered

AGS

HoleBASE 3.1 (Bld 426.46) Standard Trialpit Log v2 dated 27th Nov 03

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
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Huddersfield
Tel: 01484 516 977

Trialpit No
TP03
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	28/06/2017
Location: Cleckheaton		Dimensions: 1.70m, Depth 3.20m, 0.60m	Scale 1:20
Client: Planned Contracts Ltd			Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND: 'Loose' black and red angular cobbles and boulders of brick, macadam and concrete with much sand and gravel. Sand is fine to coarse, Gravel is angular fine to coarse of brick, macadam and concrete. Occasional wood and metal fragments.
			1.10			MADE GROUND: CONCRETE
			1.30			Soft to firm yellow brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of mudstone and sandstone.
			2.20			Compact yellow very sandy angular to subangular fine to coarse flaggy GRAVEL of sandstone with medium cobble content. Sand is fine to coarse. Gravel is angular of flaggy sandstone.
			2.60			Weak yellow very thinly bedded SANDSTONE. Recovered as fine to coarse sand, angular fine to coarse gravel, angular cobbles and boulder size fragments.
			3.20			Trialpit Complete at 3.20 m

Remarks: Excavation faces unstable between GL and 1.1m
Infiltration test undertaken at 3.2m

Groundwater: No groundwater encountered

AGS

HoleBASE 3.1 (Bld 426.46) Standard Trialpit Log v2 dated 27th Nov 03

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
Huddersfield
Tel: 01484 516 977

Trialpit No
TP04
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	25/09/2017
Location: Cleckheaton		Dimensions: 2.80m	Scale 1:20
Client: Planned Contracts Ltd		Depth 2.50m, 0.80m	Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.07			MADE GROUND: Macadam.
						MADE GROUND: Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including sandstone, brick, concrete and coal.
0.50-0.70	B					
			0.70			Compact yellow clayey very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone.
			1.30			Compact yellow flaggy angular COBBLES of sandstone with some sand and gravel. Sand is fine to coarse. Gravel is angular fine to coarse of sandstone.
			2.50			Trialpit Complete at 2.50 m

Remarks: In north face, macadam GL to 0.10m, concrete 0.10 to 0.30m and brick wall 0.30 to 2.20m (Substructure).
Faces stable. Hand vane results corrected in accordance with BS1377.

Groundwater: No groundwater encountered.

AGS

HoleBASE 3.1 (Bld 426.46) Standard Trialpit Log v2 dated 27th Nov 03

PATRICK PARSONS consulting engineers

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Huddersfield
Tel: 01484 516 977

Trialpit No
TP05
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	25/09/2017
Location: Cleckheaton		Dimensions: 2.40m	Scale 1:20
Client: Planned Contracts Ltd		Depth 2.50m, 0.90m	Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
						MADE GROUND: 'Loose' black and red angular cobbles and boulders of brick, macadam and concrete with much sand and gravel. Sand is fine to coarse. Gravel is angular fine to coarse of brick, macadam and concrete. Occasional fragments of wood, wire and metal.
			0.90			MADE GROUND: Strong grey CONCRETE. 50% aggregate subangular to subrounded fine to coarse of various lithologies. 1% small voids 1-2mm diameter.
			1.00			Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including sandstone, mudstone and coal.
			1.15			Compact yellow clayey fine to coarse SAND and angular to subangular fine to coarse GRAVEL of sandstone.
			2.20			Compact yellow flaggy angular COBBLES of sandstone with some sand and gravel. Sand is fine to coarse. Gravel is angular fine to coarse of sandstone.
			2.50			Trialpit Complete at 2.50 m

1
2
3

Remarks: Excavation faces unstable between GL and 0.90m bgl.
Hand vane results corrected in accordance with BS1377.

Groundwater: No groundwater encountered.

AGS

HoleBASE 3.1 (Bld 426.46) Standard Trialpit Log v2 dated 27th Nov 03

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Tel: 01484 516 977

Trialpit No
TP06
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	25/09/2017
Location: Cleckheaton		Dimensions: 3.00m Depth 2.30m 0.80m	Scale 1:20
Client: Planned Contracts Ltd			Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.15			MADE GROUND: Strong grey reinforced CONCRETE. 50-60% aggregate angular to subangular fine to coarse of various lithologies. 3% small voids 1-2mm diameter. At 0.06 and 0.11m reinforcement bars 5mm diameter. Black plastic at base.
			0.20			MADE GROUND: White polystyrene.
						MADE GROUND: 'Loose' grey brown clayey very gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of various lithologies including mudstone.
			0.60			MADE GROUND: Macadam.
			0.70			MADE GROUND: Compact yellow very clayey fine to coarse sand and angular to subangular fine to coarse gravel of various lithologies including sandstone and brick.
			1.00			Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including sandstone and mudstone.
			1.30			Compact yellow clayey very gravelly fine to coarse SAND with medium cobble content. Gravel is angular to subangular fine to coarse of sandstone. Cobbles are angular of sandstone.
			1.70			Compact yellow flaggy angular COBBLES of sandstone with some sand and gravel. Sand is fine to coarse. Gravel is angular fine to coarse of sandstone.
			2.30			Trialpit Complete at 2.30 m

1
2
3

Remarks: Faces stable.
Hand vane results corrected in accordance with BS1377.

Groundwater: No groundwater encountered.

AGS

HoleBASE 3.1 (Bld 426.46) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP07
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	25/09/2017
Location: Cleckheaton		Dimensions: 5.00m	Scale 1:20
Client: Planned Contracts Ltd		Depth 2.00m, 0.80m	Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.07			MADE GROUND: Macadam.
						MADE GROUND: Soft grey brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including sandstone, mudstone, brick, concrete and macadam.
			0.40			Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including sandstone, mudstone and coal.
0.50-0.80	B					
			0.90			Compact yellow very clayey fine to coarse SAND and angular to subangular fine to coarse GRAVEL of sandstone.
			1.80			Compact yellow flaggy angular COBBLES of sandstone with some sand and gravel. Sand is fine to coarse. Gravel is angular fine to coarse of sandstone.
			2.00			Trialpit Complete at 2.00 m

1
2
3

Remarks: In south face, brick GL to 1.30m and concrete 1.30m to 1.80m (Remnant foundation).
Excavation extended 5.00m north to determine presence of suspected substructure.
Faces stable. Hand vane results corrected in accordance with BS1377.

Groundwater: No groundwater encountered.

AGS

HoleBASE 3.1 (Bd 426.46) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP08
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	25/09/2017
Location: Cleckheaton		Dimensions: 2.60m	Scale 1:20
Client: Planned Contracts Ltd		Depth 1.50m, 0.70m	Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.10			MADE GROUND: Macadam.
						MADE GROUND: 'Loose' red brown clayey very gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of various lithologies including brick, concrete and sandstone.
			0.40			Compact yellow very sandy angular to subangular fine to coarse GRAVEL of sandstone with high cobble content. Sand is fine to coarse. Cobbles are angular of flaggy sandstone.
			1.50			Trialpit Complete at 1.50 m

Remarks: Excavation extended 4.50m east to determine presence of suspected substructure.
Faces stable.
Hand vane results corrected in accordance with BS1377.

Groundwater: No groundwater encountered.

AGS

HoleBASE 3.1 (Bld 426.46) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP09
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	25/09/2017
Location: Cleckheaton		Dimensions: 2.50m Depth 3.20m 0.70m	Scale 1:20
Client: Planned Contracts Ltd			Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.10			MADE GROUND: Macadam.
						MADE GROUND: 'Loose' brown and black slightly clayey fine to coarse sand of ash and angular to subangular fine to coarse gravel of various lithologies including brick, sandstone, cinder and concrete. Occasional fragments of metal.
			0.50			
0.60	IVN	52				Soft to firm yellow slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including sandstone and mudstone.
0.50-0.90	B					
			0.90			
1.00	IVN	82				Firm grey and brown mottled slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of siltstone and mudstone.
2.00	IVN	94				
			2.60			Firm grey silty very gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone.
			2.90			Very weak thinly laminated grey MUDSTONE. Recovered as tabular angular to subangular fine to coarse gravel size fragments.
			3.20			Trialpit Complete at 3.20 m

1
2
3

Remarks: In south face, made ground GL to 0.50m, concrete 0.50 to 0.60m and brick wall 0.60 to 2.60m (Substructure).
Faces stable. Hand vane results corrected in accordance with BS1377.

Groundwater: No groundwater encountered.

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HoleBASE 3.1 (Bd 426.46) Standard Trialpit Log v2 dated 27th Nov 03

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Trialpit No
TP10
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	25/09/2017
Location: Cleckheaton		Dimensions: 3.20m	Scale 1:20
Client: Planned Contracts Ltd		Depth 1.20m, 0.90m	Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.10			MADE GROUND: Macadam.
						MADE GROUND: 'Loose' red sandy angular to subangular fine to coarse gravel of brick. Sand is fine to coarse.
			0.30			
			0.40			Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including sandstone, mudstone and coal.
						Compact yellow very sandy angular to subangular fine to coarse GRAVEL of sandstone with medium cobble content. Sand is fine to coarse. Cobbles are angular of flaggy sandstone.
			0.80			Compact yellow flaggy angular COBBLES of sandstone with some sand and gravel. Sand is fine to coarse. Gravel is angular fine to coarse of sandstone.
			1.20			Trialpit Complete at 1.20 m

1
2
3

Remarks: Faces stable.
Hand vane results corrected in accordance with BS1377.

Groundwater: No groundwater encountered.

AGS

HoleBASE 3.1 (Bld 426.46) Standard Trialpit Log v2 dated 27th Nov 03

PATRICK PARSONS consulting engineers

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Tel: 01484 516 977

Trialpit No
TP11
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	25/09/2017
Location: Cleckheaton		Dimensions: 2.90m	Scale 1:20
Client: Planned Contracts Ltd		Depth 1.80m, 0.90m	Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.07			MADE GROUND: Macadam.
			0.14			MADE GROUND: Macadam.
						MADE GROUND: 'Loose' red brown clayey fine to coarse sand and angular to subangular fine to coarse gravel of various lithologies including brick.
			0.35			Firm yellow brown and grey slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone and sandstone.
0.40-0.70 0.60	B IVN	64				
1.00	IVN	76				
			1.45			Compact yellow fine to coarse SAND and angular to subangular fine to coarse GRAVEL of sandstone.
			1.60			Compact yellow flaggy angular COBBLES of sandstone with some sand and gravel. Sand is fine to coarse. Gravel is angular fine to coarse of sandstone.
			1.80			Trialpit Complete at 1.80 m

Remarks: In north face, macadam GL to 0.15m, concrete 0.15 to 0.30m and brick wall 0.30 to undetermined depth (Substructure).
Faces stable. Hand vane results corrected in accordance with BS1377.

Groundwater: No groundwater encountered.

AGS

HoleBASE 3.1 (Bld 426.46) Standard Trialpit Log v2 dated 27th Nov 03

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5 Waverley Road
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Trialpit No
TP12
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	25/09/2017
Location: Cleckheaton		Dimensions: 4.00m Depth 1.60m 0.80m	Scale 1:20
Client: Planned Contracts Ltd			Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.10			MADE GROUND: Macadam.
			0.20			MADE GROUND: Soft brown and black slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including sandstone and brick.
			0.40			Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including sandstone, mudstone and coal.
1.00	IVN	96				Firm yellow and grey slightly sandy, locally sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of mudstone and sandstone.
			1.50			Compact yellow flaggy angular COBBLES of sandstone with some sand and gravel. Sand is fine to coarse. Gravel is angular fine to coarse of sandstone.
			1.60			Trialpit Complete at 1.60 m

1
2
3

Remarks: Excavation extended 4.00m west to determine presence of suspected substructure.
Faces stable.
Hand vane results corrected in accordance with BS1377.

Groundwater: No groundwater encountered.

AGS

HoleBASE 3.1 (Bld 426.46) Standard Trialpit Log v2 dated 27th Nov 03

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
Huddersfield
Tel: 01484 516 977

Trialpit No
TP13
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Date
Heaton Avenue	H17074	Level: -	25/09/2017
Location: Cleckheaton		Dimensions: 2.80m	Scale 1:20
		Depth 2.00m, 0.80m	
Client: Planned Contracts Ltd			Logged By TF

Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
Depth (m)	Type	Results				
			0.10			MADE GROUND: Macadam.
						MADE GROUND: Soft grey brown slightly sandy slightly gravelly clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including sandstone, brick, concrete and mudstone.
			0.40			Compact yellow very clayey fine to coarse SAND and angular to subangular fine to coarse GRAVEL of sandstone.
			1.70			Compact yellow flaggy angular COBBLES of sandstone with some sand and gravel. Sand is fine to coarse. Gravel is angular fine to coarse of sandstone.
			2.00			Trialpit Complete at 2.00 m

Remarks: Excavation positioned to determine presence of suspected substructure.
Faces stable.
Hand vane results corrected in accordance with BS1377.

Groundwater: No groundwater encountered.

AGS

HoleBASE 3.1 (Bld 426.46) Standard Trialpit Log v2 dated 27th Nov 03

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
Huddersfield
Tel: 01484 516 977

Borehole No
WS01
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		WS
Location: Cleckheaton		Level: -	Scale 1:15
Client: Planned Contracts Ltd		Dates: 13/09/2017	Logged By TF

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.10			MADE GROUND: Macadam.
					0.35			MADE GROUND: 'Loose' yellow slightly clayey very gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of sandstone. Geotextile at base.
		0.40	ES		0.55			MADE GROUND: Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including brick, sandstone and coal. (RELIC TOPSOIL)
		0.70	IVN	72				Firm yellow and grey brown slightly gravelly, locally gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular of sandstone and mudstone.
		1.00	SPT	N=16 (4,4/ 3,3,4,6)				1
					1.40			Firm grey and grey brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is subangular fine to medium of mudstone, sandstone and siltstone.
		1.60	D					
		1.70	IVN	88				
		2.00	SPT	50 (8,15/ 36,14 for 15mm)				2
					2.10			Very weak thinly laminated grey and brown MUDSTONE. Recovered as angular fine to coarse gravel sized fragments.
					2.24			End of Borehole at 2.24 m
			Type	Results				

Remarks: No groundwater encountered.
Monitoring well installed at 2.00m bgl.
Hand vane results corrected in accordance with BS1377.

AGS

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
Huddersfield
Tel: 01484 516 977

Borehole No
WS02
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		WS
Location: Cleckheaton		Level: -	Scale 1:15
Client: Planned Contracts Ltd		Dates: 13/09/2017	Logged By TF

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.07			MADE GROUND: Strong grey brown non-reinforced CONCRETE. 60% aggregate angular to subangular fine to coarse of various lithologies. 1-3% small voids 1-2mm diameter.
		0.20	ES		0.15			MADE GROUND: 'Loose' grey brown fine to coarse sand and angular to subangular fine to coarse gravel of various lithologies including sandstone and brick.
					0.30			MADE GROUND: Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including brick and sandstone. Rare fragments of glass. (RELIC TOPSOIL)
		0.40	IVN	62				
		0.50	D					Soft to firm light brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of sandstone.
					0.70			Dense yellow gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone.
		1.00	SPT	N=37 (9,10/ 8,8,10,11)				1
		1.50	D					
					1.75			'Loose' yellow subangular COBBLES of sandstone with some fine to coarse sand.
		2.00	SPT	50 (8,10/ 8,8,16,18 for 60mm)	2.00			Very dense yellow fine to coarse SAND and angular to subangular fine to coarse GRAVEL of sandstone. 2
					2.44			End of Borehole at 2.44 m
			Type	Results				

Remarks: No groundwater encountered.
Exploratory hole backfilled with arisings upon completion.
Hand vane results corrected in accordance with BS1377.

AGS

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
Huddersfield
Tel: 01484 516 977

Borehole No
WS03
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		WS
Location: Cleckheaton		Level: -	Scale 1:15
Client: Planned Contracts Ltd		Dates: 13/09/2017	Logged By TF

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.05			MADE GROUND: Strong grey non-reinforced CONCRETE. 50-60% aggregate angular to subangular fine to coarse of various lithologies. 5% small voids 1-2mm diameter. Plastic sheet at base.
					0.12			MADE GROUND: 'Loose' grey sandy angular to subangular fine to coarse gravel of concrete and limestone. Sand is fine to coarse.
		0.30	ES					MADE GROUND: Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including brick, sandstone and limestone. Occasional rootlets. (RELIC TOPSOIL)
					0.45			Soft to firm light brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is subangular fine to medium of various lithologies including sandstone and coal.
		0.60	D					
					0.90			Very dense yellow gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone.
		1.00 1.00	SPT D	50 (4,5/ 8,10,12,20 for 65mm)				
					1.44			End of Borehole at 1.44 m

1

2

Type | Results

Remarks: No groundwater encountered.
Exploratory hole backfilled with arisings upon completion.
Hand vane results corrected in accordance with BS1377.

AGS

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
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Borehole No
WS04
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		WS
Location: Cleckheaton		Level: -	Scale 1:15
Client: Planned Contracts Ltd		Dates: 13/09/2017	Logged By TF

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
		0.80	ES					MADE GROUND: 'Loose' grey and red angular to subangular COBBLES of brick and concrete with some fine to coarse sand and much angular to subangular fine to coarse gravel of various lithologies including concrete, sandstone, brick and macadam. Occasional fragments of wood.
		1.00	SPT	N=30 (2,4/ 4,8,10,8)				
					1.10			Medium dense to dense yellow slightly clayey fine to coarse SAND and angular to subangular fine to coarse GRAVEL of sandstone.
		1.40	D					
					1.70			Very dense yellow very sandy angular to subangular fine to coarse GRAVEL of sandstone. Sand is fine to coarse.
		1.80	D					
		2.00	SPT	50 (10,15 for 70mm/ 18,24,8 for 10mm				
					2.31			End of Borehole at 2.31 m
			Type	Results				

1

2

Remarks: No groundwater encountered.
Monitoring well installed at 2.00m bgl.
Hand vane results corrected in accordance with BS1377.

AGS

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
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Huddersfield
Tel: 01484 516 977

Borehole No
WS05
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		WS
Location: Cleckheaton		Level: -	Scale 1:15
Client: Planned Contracts Ltd		Dates: 13/09/2017	Logged By TF

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.50	ES					MADE GROUND: Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including brick, sandstone, concrete and coal. Frequent rootlets throughout. (REWORKED TOPSOIL)
					0.80			
		1.00	SPT	N=13 (3,5/ 3,3,3,4)				Firm light yellow brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of sandstone
		1.20	D					
		1.80	SPT	50 (25 for 20mm/ 50 for 35mm)	1.80			Very dense yellow very sandy angular to subangular fine to coarse GRAVEL of sandstone. Sand is fine to coarse.
					1.86			End of Borehole at 1.86 m
		Type		Results				

Remarks: No groundwater encountered.
Exploratory hole backfilled with arisings upon completion.
Hand vane results corrected in accordance with BS1377.

AGS

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
Huddersfield
Tel: 01484 516 977

Borehole No
WS06
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		WS
Location: Cleckheaton		Level: -	Scale 1:15
Client: Planned Contracts Ltd		Dates: 13/09/2017	Logged By TF

Well	Water Strikes	Samples & In Situ Testing Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.10			MADE GROUND: 'Loose' brown clayey very gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of various lithologies including brick, concrete, macadam, sandstone and slag.
					0.40			MADE GROUND: Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including brick, sandstone and concrete. (RELIC TOPSOIL)
					0.65			MADE GROUND: 'Loose' yellow sandy angular to subangular fine to coarse gravel of sandstone. Sand is fine to coarse.
		1.00	SPT	N=26 (5,5/ 5,6,7,8)				MADE GROUND: Firm brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including brick, sandstone, coal and slag.
		1.20	ES		1.20			Very dense yellow gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone.
		1.90	D					
		2.00	SPT	50 (23,2 for 0mm/ 32,18 for 30mm)				
					2.18			End of Borehole at 2.18 m

Type	Results

Remarks: No groundwater encountered.
Exploratory hole backfilled with arisings upon completion.
Hand vane results corrected in accordance with BS1377.

AGS

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
Huddersfield
Tel: 01484 516 977

Borehole No
WS07
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		WS
Location: Cleckheaton		Level: -	Scale 1:15
Client: Planned Contracts Ltd		Dates: 13/09/2017	Logged By TF

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
								MADE GROUND: Weak grey CONCRETE.
					0.20			
								MADE GROUND: 'Loose' grey very sandy subangular fine to coarse gravel of various lithologies including concrete and sandstone. Sand is fine to coarse.
					0.30			
								MADE GROUND: Soft brown slightly gravelly sandy clay. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including brick, sandstone and coal. Occasional fragments of ceramic tiles.
		0.80	ES					
		0.90	IVN	54				
		1.00	SPT	N=9				
		1.00	D	(2,2/ 2,2,2,3)				
					1.20			Loose yellow brown clayey gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone.
					1.60			Very dense yellow sandy angular to subangular fine to coarse GRAVEL of sandstone. Sand is fine to coarse.
		1.70	D					
		2.00	SPT	50 (11,14 for 60mm/ 17,28,5 for 5mm)				
					2.29			End of Borehole at 2.29 m
		Type		Results				

1
2

Remarks: No groundwater encountered.
Monitoring well installed at 2.00m bgl.
Hand vane results corrected in accordance with BS1377.

AGS

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
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Tel: 01484 516 977

Borehole No
WS08
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		WS
Location: Cleckheaton		Level: -	Scale 1:15
Client: Planned Contracts Ltd		Dates: 13/09/2017	Logged By TF

Well	Water Strikes	Samples & In Situ Testing			Depth (m)	Level (m AOD)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05			MADE GROUND: Macadam.
		0.20	IVN	46	0.15			MADE GROUND: 'Loose' black and brown sandy angular to subangular fine to coarse gravel of various lithologies including brick, sandstone and macadam. Sand is fine to coarse of ash.
		0.20	ES		0.30			MADE GROUND: Soft brown slightly sandy slightly gravelly clay. Sand is fine to coarse of ash. Gravel is angular to subangular fine to coarse of various lithologies including sandstone, brick and coal.
		0.60	D					Compact yellow clayey very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse of sandstone.
					0.80			Compact yellow very sandy angular to subangular fine to coarse GRAVEL of sandstone. Sand is fine to coarse.
		1.40	D					
					2.00			End of Borehole at 2.00 m
			Type	Results				

1
2

Remarks: No groundwater encountered.
Exploratory hole backfilled with arisings upon completion.
Hand vane results corrected in accordance with BS1377.

AGS

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
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Borehole No
WS08A
Sheet 1 of 1

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		WS
Location: Cleckheaton		Level: -	Scale 1:15
Client: Planned Contracts Ltd		Dates: 13/09/2017	Logged By TF

Well	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Depth (m)	Level (m AOD)	Legend	Stratum Description
					0.10			MADE GROUND: Macadam.
								MADE GROUND: Compact yellow clayey very gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of sandstone.
					0.45			MADE GROUND: Reinforced CONCRETE.
					0.70			VOID (Substructure).
					2.50			At 2.50m, solid base of void.
								End of Borehole at 2.50 m

1
2

Type | Results

Remarks: Exploratory hole terminated at 0.70m due to discovery of unknown void.
No groundwater encountered.
Exploratory hole sealed at surface.
Hand vane results corrected in accordance with BS1377.

AGS

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
Huddersfield HD1 5NA
Tel: 01484 516977

Borehole No
R01
Sheet 1 of 3

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		RO
Location: Cleckheaton		Level: -	Scale 1:50
Client: Planned Contracts Ltd		Dates: 25/09/2017	Logged By TF

Well	Water Strikes	Samples Depth (m)	Samples Type	Time (mins) 5 10 15	Depth (m)	Level (m AOD)	Legend	Stratum Description
								Weathered becoming competent SANDSTONE
					3.30			Grey MUDSTONE
					5.80			SANDSTONE
			Type	Results				Continued next sheet

Remarks:
1. No loss of flush returns noted during drilling
2. No elevated gases detected at borehole
3. Upon completion borehole backfilled with arisings and cement with a bentonite seal at rockhead

AGS

HoleBASE 3.1 (Bld 426.46) Rotary Open Hole Log v1 dated 5th Feb 09

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
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Borehole No
R01
Sheet 2 of 3

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		RO
Location: Cleckheaton		Level: -	Scale 1:50
Client: Planned Contracts Ltd		Dates: 25/09/2017	Logged By TF

Well	Water Strikes	Samples Depth (m)	Samples Type	Time (mins) 5 10 15	Depth (m)	Level (m AOD)	Legend	Stratum Description
								SANDSTONE
					12.10			Grey MUDSTONE
					13.40			Black COAL (intact)
					14.50			Grey MUDSTONE
					15.70			Black COAL (intact)
					15.90			Grey MUDSTONE
					18.70			SANDSTONE
			Type	Results				Continued next sheet

Remarks:
1. No loss of flush returns noted during drilling
2. No elevated gases detected at borehole
3. Upon completion borehole backfilled with arisings and cement with a bentonite seal at rockhead

AGS

HoleBASE 3.1 (Bld 426.46) Rotary Open Hole Log v1 dated 5th Feb 09

PATRICK PARSONS consulting engineers

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Borehole No
R01
Sheet 3 of 3

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		RO
Location: Cleckheaton		Level: -	Scale 1:50
Client: Planned Contracts Ltd		Dates: 25/09/2017	Logged By TF

Well	Water Strikes	Samples Depth (m)	Samples Type	Time (mins) 5 10 15	Depth (m)	Level (m AOD)	Legend	Stratum Description
								SANDSTONE
					21			
					22			
					23			
					24			
					25			
					26			
					27			
					28			
					29			
			Type	Results				End of Borehole at 30.00 m

Remarks:
1. No loss of flush returns noted during drilling
2. No elevated gases detected at borehole
3. Upon completion borehole backfilled with arisings and cement with a bentonite seal at rockhead

AGS

HoleBASE 3.1 (Bld 426.46) Rotary Open Hole Log v1 dated 5th Feb 09

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
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Tel: 01484 516977

Borehole No
R02
Sheet 1 of 3

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		RO
Location: Cleckheaton		Level: -	Scale 1:50
Client: Planned Contracts Ltd		Dates: 25/09/2017	Logged By TF

Well	Water Strikes	Samples Depth (m)	Samples Type	Time (mins) 5 10 15	Depth (m)	Level (m AOD)	Legend	Stratum Description
								MADE GROUND
					1.20			Weak SANDSTONE
					3.70			SANDSTONE
					8.10			Black COAL (intact)
					8.30			SANDSTONE
			Type	Results				Continued next sheet

Remarks:
1. No loss of flush returns noted during drilling
2. No elevated gases detected at borehole
3. Upon completion borehole backfilled with arisings and cement with a bentonite seal at rockhead

AGS

HoleBASE 3.1 (Bld 426.46) Rotary Open Hole Log v1 dated 5th Feb 09

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
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Borehole No
R02
Sheet 2 of 3

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		RO
Location: Cleckheaton		Level: -	Scale 1:50
Client: Planned Contracts Ltd		Dates: 25/09/2017	Logged By TF

Well	Water Strikes	Samples Depth (m)	Samples Type	Time (mins) 5 10 15	Depth (m)	Level (m AOD)	Legend	Stratum Description
								SANDSTONE
					16.40			Grey MUDSTONE
					18.30			Black COAL (intact)
					19.40			Grey MUDSTONE
			Type	Results				Continued next sheet

Remarks:
1. No loss of flush returns noted during drilling
2. No elevated gases detected at borehole
3. Upon completion borehole backfilled with arisings and cement with a bentonite seal at rockhead

AGS

HoleBASE 3.1 (Bld 426.46) Rotary Open Hole Log v1 dated 5th Feb 09

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
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Huddersfield HD1 5NA
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Borehole No
R02
Sheet 3 of 3

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		RO
Location: Cleckheaton		Level: -	Scale 1:50
Client: Planned Contracts Ltd		Dates: 25/09/2017	Logged By TF

Well	Water Strikes	Samples Depth (m)	Samples Type	Time (mins) 5 10 15	Depth (m)	Level (m AOD)	Legend	Stratum Description
								Grey MUDSTONE
					21.60			SANDSTONE
								End of Borehole at 30.00 m

Type Results

Remarks:
1. No loss of flush returns noted during drilling
2. No elevated gases detected at borehole
3. Upon completion borehole backfilled with arisings and cement with a bentonite seal at rockhead

AGS

HoleBASE 3.1 (Bld 426.46) Rotary Open Hole Log v1 dated 5th Feb 09

PATRICKPARSONS consulting engineers

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Borehole No
R03
Sheet 1 of 3

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		RO
Location: Cleckheaton		Level: -	Scale 1:50
Client: Planned Contracts Ltd		Dates: 25/09/2017	Logged By TF

Well	Water Strikes	Samples Depth (m)	Samples Type	Time (mins) 5 10 15	Depth (m)	Level (m AOD)	Legend	Stratum Description
								MADE GROUND
					1.00			Weak SANDSTONE
					4.20			SANDSTONE
					9.30			Black COAL (intact)
					9.50			SANDSTONE
			Type	Results				Continued next sheet

Remarks:
1. No loss of flush returns noted during drilling
2. No elevated gases detected at borehole
3. Upon completion borehole backfilled with arisings and cement with a bentonite seal at rockhead

AGS

HoleBASE 3.1 (Bld 426.46) Rotary Open Hole Log v1 dated 5th Feb 09

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
5 Waverley Road
Huddersfield HD1 5NA
Tel: 01484 516977

Borehole No
R03
Sheet 2 of 3

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		RO
Location: Cleckheaton		Level: -	Scale 1:50
Client: Planned Contracts Ltd		Dates: 25/09/2017	Logged By TF

Well	Water Strikes	Samples Depth (m)	Samples Type	Time (mins) 5 10 15	Depth (m)	Level (m AOD)	Legend	Stratum Description
								SANDSTONE
					16.30			Grey MUDSTONE
					18.00			Black COAL (intact)
					19.10			Grey MUDSTONE
			Type	Results				Continued next sheet

Remarks:
1. No loss of flush returns noted during drilling
2. No elevated gases detected at borehole
3. Upon completion borehole backfilled with arisings and cement with a bentonite seal at rockhead

AGS

HoleBASE 3.1 (Bld 426.46) Rotary Open Hole Log v1 dated 5th Feb 09

PATRICK PARSONS consulting engineers

Patrick Parsons Ltd
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Huddersfield HD1 5NA
Tel: 01484 516977

Borehole No
R03
Sheet 3 of 3

Project Name	Project No.	Co-ords: -	Hole Type
Heaton Avenue	H17074		RO
Location: Cleckheaton		Level: -	Scale 1:50
Client: Planned Contracts Ltd		Dates: 25/09/2017	Logged By TF

Well	Water Strikes	Samples Depth (m)	Samples Type	Time (mins) 5 10 15	Depth (m)	Level (m AOD)	Legend	Stratum Description
								Grey MUDSTONE
					22.10			SANDSTONE
					27.00			End of Borehole at 27.00 m

Type | Results

Remarks:
1. No loss of flush returns noted during drilling
2. No elevated gases detected at borehole
3. Upon completion borehole backfilled with arisings and cement with a bentonite seal at rockhead

AGS

HoleBASE 3.1 (Bld 426.46) Rotary Open Hole Log v1 dated 5th Feb 09

Appendix C

Geotechnical Test Results

PSL
Professional Soils Laboratory

LABORATORY REPORT

REPORT

UKAS TESTING
4043

Contract Number: PSL17/4476

Report Date: 20 September 2017

Client's Reference: H17074/JR/2691

Client Name: Patrick Parsons
5 Waverley Road
Huddersfield
West Yorkshire
HD1 5NA

For the attention of: Jonny Roberts

Contract Title: Heaton Avenue, Cleckheaton

Date Received: 15/9/2017
Date Commenced: 15/9/2017
Date Completed: 20/9/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	C Marshall (Laboratory Manager)	A Fry (Senior Technician)

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fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS01	D2	S	1.60		Brown mottled grey slightly gravelly slightly sandy very silty CLAY.
WS05	D2	S	1.20		Brown gravelly sandy very silty CLAY.

UKAS TESTING
4043

PSL
Professional Soils Laboratory

Heaton Avenue, Cleckheaton

Contract No:
PSL17/4476
Client Ref:
H17074/JR/2691

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS01	D2	S	1.60		18			43	25	18	91	Intermediate plasticity CI.
WS05	D2	S	1.20		16			30	18	12	80	Low plasticity CL.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

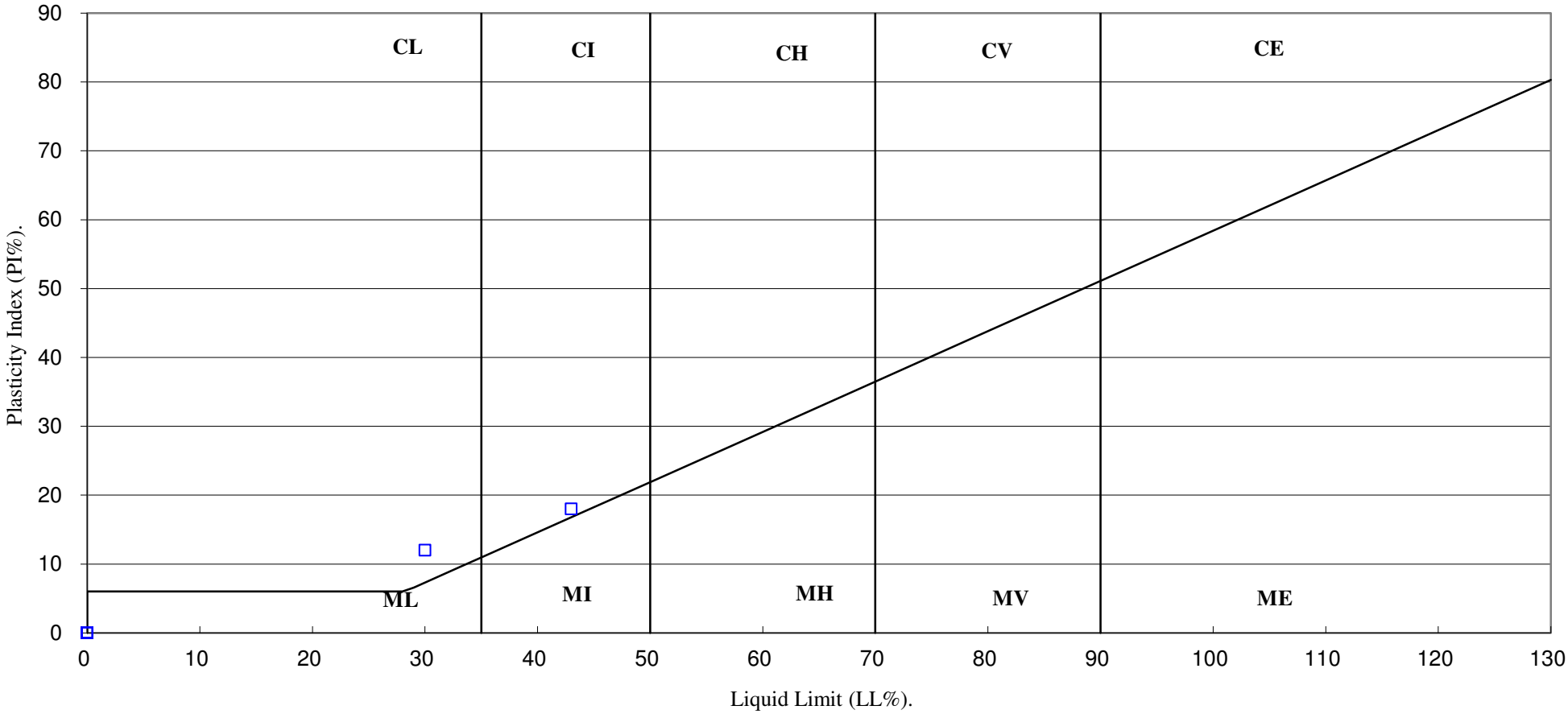
PSL Professional Soils Laboratory

Heaton Avenue, Cleckheaton

Contract No:
PSL17/4476
Client Ref:
H17074/JR/2691

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



UKAS TESTING 4043	PSL Professional Soils Laboratory	Heaton Avenue, Cleckheaton	**Contract No:** PSL17/4476 **Client Ref:** H17074/JR/2691

PSL
Professional Soils Laboratory

LABORATORY REPORT

REPORT

UKAS TESTING
4043

Contract Number: PSL17/4672

Report Date: 11 October 2017

Client's Reference: H17074/JR/2720

Client Name: Patrick Parsons
9 Frederick Road
Edgebaston
Birmingham
B15 1JD

For the attention of: Jonny Roberts

Contract Title: Heaton Avenue, Cleckheaton

Date Received: 26/9/2017
Date Commenced: 26/9/2017
Date Completed: 11/10/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	C Marshall (Laboratory Manager)	A Fry (Senior Technician)

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awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP04	B1	S	0.50		Brown very gravelly slightly sandy very silty CLAY.
TP07	B1	S	0.50	0.80	Dark brown very gravelly sandy CLAY.
TP09	B1	S	0.50	0.90	Brown slightly gravelly very sandy CLAY.

UKAS TESTING 4043	PSL Professional Soils Laboratory	Heaton Avenue, Cleckheaton	Contract No: PSL17/4672 Client Ref: H17074/JR/2720

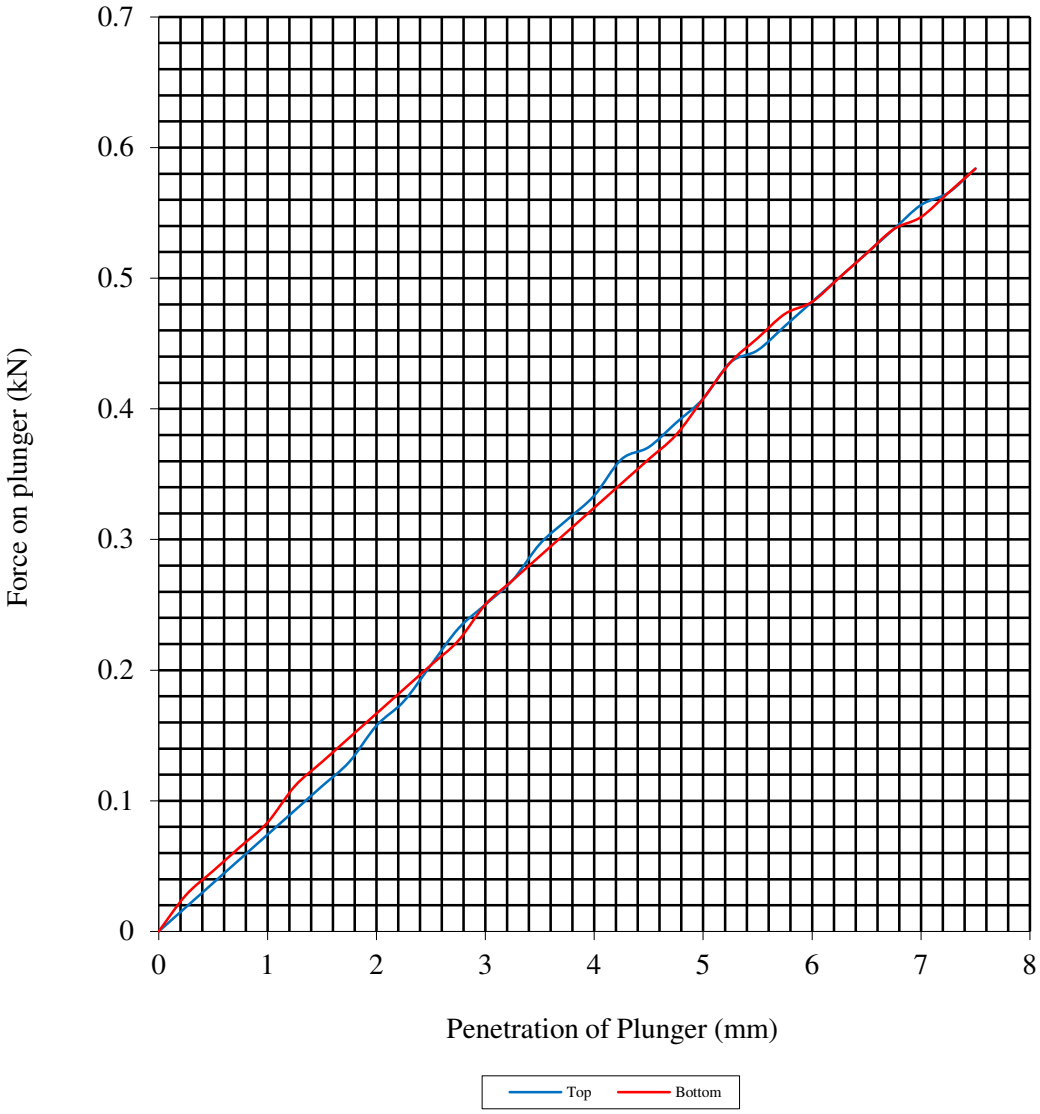
CALIFORNIA BEARING RATIO TEST

Non compliance with BS 1377 : Part 4 : 1990

Hole Number: TP04 **Top Depth (m):** 0.50

Sample Number: B1 **Base Depth (m):**

Sample Type: S



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	24	Surcharge Kg:	4.20	Sample Top	24	Sample Top	2.0
Bulk Density Mg/m3:	2.00	Soaking Time hrs	0	Sample Bottom	24	Sample Bottom	2.0
Dry Density Mg/m3:	1.62	Swelling mm:	0.00	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			28				
Compaction Conditions		4.5kg					

UKAS TESTING 4043

PSL Professional Soils Laboratory

Heaton Avenue, Cleckheaton

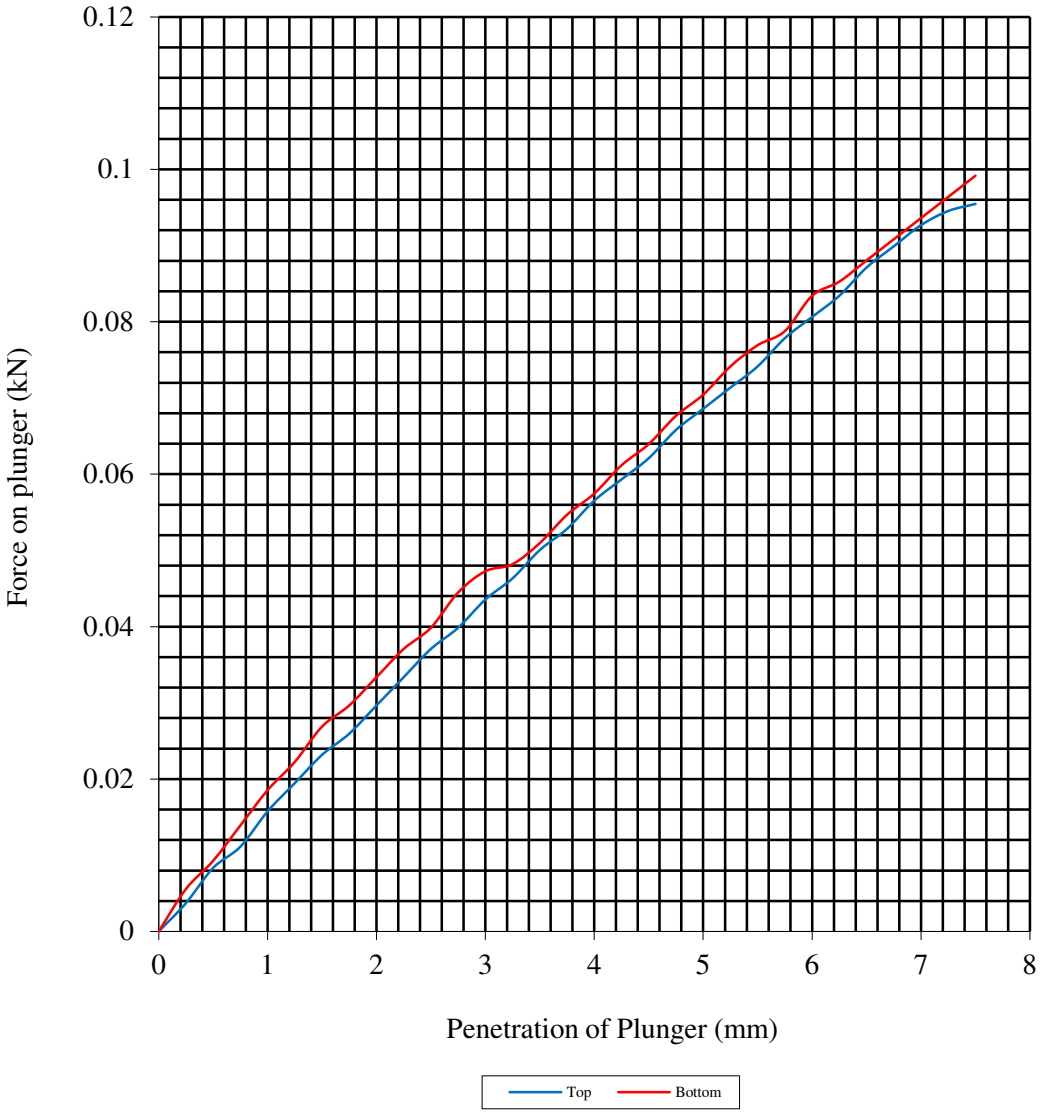
Contract No: PSL17/4672

Client Ref: H17074/JR/2720

CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number:	**TP07**	**Top Depth (m):**	**0.50**
Sample Number:	**B1**	**Base Depth (m):**	**0.80**
Sample Type:	**S**		

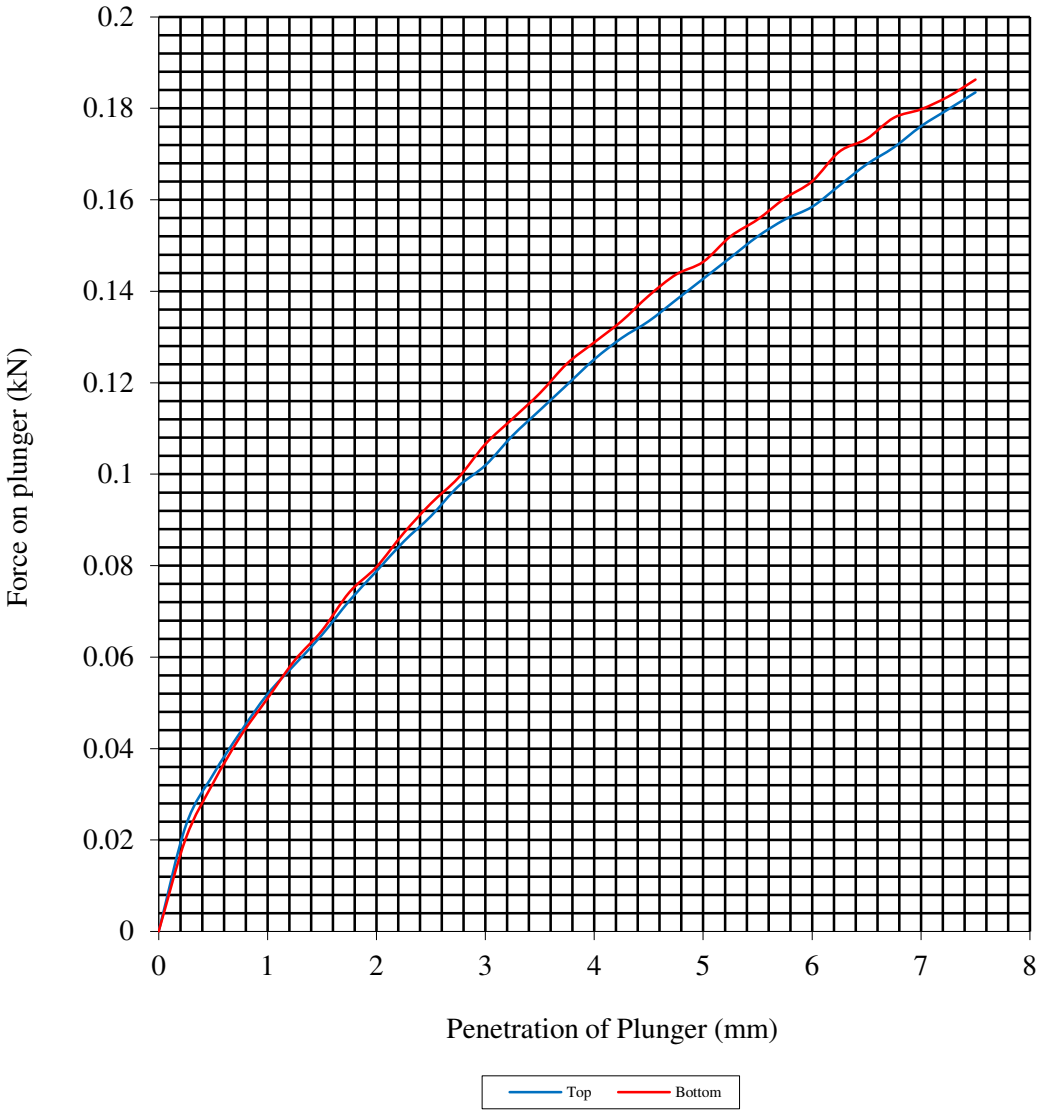


Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	26	Surcharge Kg:	4.20	Sample Top	27	Sample Top	0.3
Bulk Density Mg/m3:	1.94	Soaking Time hrs	0	Sample Bottom	26	Sample Bottom	0.4
Dry Density Mg/m3:	1.54	Swelling mm:	0.00	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			14				
Compaction Conditions		4.5kg					

CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

Hole Number:	**TP09**	**Top Depth (m):**	**0.50**
Sample Number:	**B1**	**Base Depth (m):**	**0.90**
Sample Type:	**S**		



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	28	Surcharge Kg:	4.20	Sample Top	28	Sample Top	0.7
Bulk Density Mg/m3:	1.92	Soaking Time hrs	0	Sample Bottom	28	Sample Bottom	0.7
Dry Density Mg/m3:	1.50	Swelling mm:	0.00	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			5				
Compaction Conditions		4.5kg					

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Heaton Avenue, Cleckheaton**	**Contract No: PSL17/4672** **Client Ref: H17074/JR/2720**

Appendix D

Chemical Test Results

Certificate of Analysis

Certificate Number 17-10588

22-Sep-17

Client Patrick Parsons
5 Waverley Road
Huddersfield
HD1 5NA

Our Reference	17-10588
Client Reference	H17074
Order No	H17074/JR/2690
Contract Title	Heaton Avenue, Cleckheaton
Description	11 Soil samples.
Date Received	18-Sep-17
Date Started	18-Sep-17
Date Completed	22-Sep-17
Test Procedures	Identified by prefix DETSn (details on request).

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

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Matrix Descriptions

Our Ref 17-10588
Client Ref H17074
Contract Title Heaton Avenue, Cleckheaton

Sample ID	Depth	Lab No	Completed	Matrix Description
WS01	0.4	1231071	22/09/2017	Dark brown gravelly, very sandy CLAY
WS03	0.3	1231073	22/09/2017	Dark brown gravelly, very clayey SAND including odd rootlets
WS04	0.8	1231075	22/09/2017	Dark brown very gravelly SAND including some wood (Made ground - plastic, brick)
WS05	0.5	1231077	22/09/2017	Dark brown gravelly, very sandy CLAY
WS06	1.2	1231078	22/09/2017	Brown slightly clayey, sandy GRAVEL (Made ground - brick, glass, slag) (sample matrix outside MCERTS scope of accreditation)
WS08	0.2	1231081	22/09/2017	U/s - rock core (sample matrix outside MCERTS scope of accreditation)

Summary of Chemical Analysis
Soil Samples

Our Ref 17-10588
Client Ref H17074
Contract Title Heaton Avenue, Cleckheaton

			Lab No	1231071	1231072	1231073	1231074	1231075	1231076	1231077
			Sample ID	WS01	WS02	WS03	WS03	WS04	WS04	WS05
			Depth	0.40	0.50	0.30	0.60	0.80	1.80	0.50
			Other ID							
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	13/09/17	13/09/17	13/09/17	13/09/17	13/09/17	13/09/17	13/09/17
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	24		31		8.1		29
Cadmium	DETSC 2301#	0.1	mg/kg	0.2		0.3		0.5		0.3
Chromium	DETSC 2301#	0.15	mg/kg	14		18		72		17
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0		< 1.0		< 1.0		< 1.0
Copper	DETSC 2301#	0.2	mg/kg	53		75		39		56
Lead	DETSC 2301#	0.3	mg/kg	140		120		81		79
Mercury	DETSC 2325#	0.05	mg/kg	0.26		0.29		< 0.05		0.22
Nickel	DETSC 2301#	1	mg/kg	17		22		13		22
Selenium	DETSC 2301#	0.5	mg/kg	0.5		0.9		0.9		< 0.5
Zinc	DETSC 2301#	1	mg/kg	72		100		280		87
Inorganics										
pH	DETSC 2008#			6.7	6.6	6.6	5.2	10.5	7.5	5.8
Total Organic Carbon	DETSC 2002	0.1	%	3.1		2.1		2.0		2.5
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	23	55	80	65	1100	250	73
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.06		0.08		0.99		0.07
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg			< 0.01		< 0.01		
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg			< 0.01		< 0.01		
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg			< 0.01		< 0.01		
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg			< 1.5		< 1.5		
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg			< 1.2		< 1.2		
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg			< 1.5		< 1.5		
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg			< 3.4		59		
Aliphatic C5-C35	DETSC 3072*	10	mg/kg			< 10		59		
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg			< 0.01		< 0.01		
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg			< 0.01		< 0.01		
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg			< 0.01		< 0.01		
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg			< 0.9		< 0.9		
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg			< 0.5		< 0.5		
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg			< 0.6		9.1		
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg			< 1.4		150		
Aromatic C5-C35	DETSC 3072*	10	mg/kg			< 10		160		
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg			< 10		220		
PAHs										
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1		< 0.1		0.3		< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1		< 0.1		2.8		< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1		< 0.1		0.2		< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1		< 0.1		1.3		< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.2		0.6		17		0.2
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1		0.2		5.6		< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	0.3		1.3		31		0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 17-10588
Client Ref H17074
Contract Title Heaton Avenue, Cleckheaton

			Lab No	1231071		1231072		1231073		1231074		1231075	
			Sample ID	WS01		WS02		WS03		WS03		WS04	
			Depth	0.40		0.50		0.30		0.60		0.80	
			Other ID										
			Sample Type	SOIL		SOIL		SOIL		SOIL		SOIL	
			Sampling Date	13/09/17		13/09/17		13/09/17		13/09/17		13/09/17	
			Sampling Time	n/s		n/s		n/s		n/s		n/s	
Test	**Method**	**LOD**	**Units**										
Pyrene	DETSC 3301	0.1	mg/kg	0.3				1.0				28	
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.1				0.6				12	
Chrysene	DETSC 3301	0.1	mg/kg	0.2				0.6				12	
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1				0.5				11	
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1				0.3				6.3	
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1				0.6				13	
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1				0.5				8.5	
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1				< 0.1				1.2	
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1				0.4				7.1	
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6				6.5				160	

			Lab No	1231076		1231077							
			Sample ID	WS04		WS05							
			Depth	1.80		0.50							
			Other ID										
			Sample Type	SOIL		SOIL							
			Sampling Date	13/09/17		13/09/17							
			Sampling Time	n/s		n/s							
Test	**Method**	**LOD**	**Units**										
Pyrene	DETSC 3301	0.1	mg/kg			0.3							
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg			0.1							
Chrysene	DETSC 3301	0.1	mg/kg			0.1							
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg			0.2							
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg			0.1							
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg			< 0.1							
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg			< 0.1							
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg			< 0.1							
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg			< 0.1							
PAH Total	DETSC 3301	1.6	mg/kg			< 1.6							

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 17-10588
Client Ref H17074
Contract Title Heaton Avenue, Cleckheaton

			Lab No	1231078	1231079	1231080	1231081
			Sample ID	WS06	WS06	WS07	WS08
			Depth	1.20	1.90	1.00	0.20
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	13/09/17	13/09/17	13/09/17	13/09/17
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	16			26
Cadmium	DETSC 2301#	0.1	mg/kg	0.2			0.1
Chromium	DETSC 2301#	0.15	mg/kg	16			26
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0			< 1.0
Copper	DETSC 2301#	0.2	mg/kg	49			34
Lead	DETSC 2301#	0.3	mg/kg	49			26
Mercury	DETSC 2325#	0.05	mg/kg	0.05			< 0.05
Nickel	DETSC 2301#	1	mg/kg	23			14
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5			< 0.5
Zinc	DETSC 2301#	1	mg/kg	83			39
Inorganics							
pH	DETSC 2008#			6.7	6.5	7.5	8.6
Total Organic Carbon	DETSC 2002	0.1	%	1.4			3.2
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	22	< 10	45	25
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.04			0.04
Petroleum Hydrocarbons							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5			< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2			2.3
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5			8.3
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4			93
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10			100
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01			< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9			< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5			12
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6			140
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4			470
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10			630
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10			730
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1			0.5
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1			6.4
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1			1.0
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1			3.3
Phenanthrene	DETSC 3301	0.1	mg/kg	0.2			20
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1			8.3
Fluoranthene	DETSC 3301	0.1	mg/kg	0.4			73

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 17-10588
Client Ref H17074
Contract Title Heaton Avenue, Cleckheaton

			Lab No	1231078	1231079	1231080	1231081
			Sample ID	WS06	WS06	WS07	WS08
			Depth	1.20	1.90	1.00	0.20
			Other ID				
			Sample Type	SOIL	SOIL	SOIL	SOIL
			Sampling Date	13/09/17	13/09/17	13/09/17	13/09/17
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Pyrene	DETSC 3301	0.1	mg/kg	0.4			67
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	0.2			27
Chrysene	DETSC 3301	0.1	mg/kg	0.3			27
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	0.2			22
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.1			13
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1			30
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1			19
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1			2.8
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1			16
PAH Total	DETSC 3301	1.6	mg/kg	2.0			340

Summary of Asbestos Analysis
Soil Samples

Our Ref 17-10588
Client Ref H17074
Contract Title Heaton Avenue, Cleckheaton

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1231071	WS01 0.40	SOIL	NAD	none	Rebecca Burgess
1231073	WS03 0.30	SOIL	NAD	none	Rebecca Burgess
1231075	WS04 0.80	SOIL	NAD	none	Rebecca Burgess
1231077	WS05 0.50	SOIL	NAD	none	Rebecca Burgess
1231078	WS06 1.20	SOIL	NAD	none	Rebecca Burgess
1231081	WS08 0.20	SOIL	NAD	none	Rebecca Burgess

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

Information in Support of the Analytical Results

Our Ref 17-10588
Client Ref H17074
Contract Heaton Avenue, Cleckheaton

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1231071	WS01 0.40 SOIL	13/09/17	GJ 250ml, GJ 60ml, PT 500ml		
1231072	WS02 0.50 SOIL	13/09/17	PT 500ml		
1231073	WS03 0.30 SOIL	13/09/17	GJ 250ml, GJ 60ml, PT 500ml		
1231074	WS03 0.60 SOIL	13/09/17	PT 500ml		
1231075	WS04 0.80 SOIL	13/09/17	GJ 250ml, GJ 60ml, PT 500ml		
1231076	WS04 1.80 SOIL	13/09/17	PT 500ml		
1231077	WS05 0.50 SOIL	13/09/17	GJ 250ml, GJ 60ml, PT 500ml		
1231078	WS06 1.20 SOIL	13/09/17	GJ 250ml, GJ 60ml, PT 500ml		
1231079	WS06 1.90 SOIL	13/09/17	PT 500ml		
1231080	WS07 1.00 SOIL	13/09/17	PT 500ml		
1231081	WS08 0.20 SOIL	13/09/17	GJ 250ml, GJ 60ml, PT 500ml		

Key: G-Glass P-Plastic J-Jar T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO4	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO4	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

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

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

Appendix E

PPL Generic Assessment Criteria

PATRICKPARSONS

	* Non SOM dependent	Residential with Homegrown Produce			Source
	SOM %	1	2.5	6	
Metals and Inorganics *	Antimony				
	Arsenic		37		7
	Barium				
	Beryllium		1.7		7
	Boron		290		7
	Cadmium		11		7
	Chromium (III)		910		7
	Chromium (VI) (Hexavalent)		6		7
	Copper		2400		7
	Cyanide (Free)				
	Elemental Mercury		1.2		7
	Inorganic Mercury		40		7
	Methylmercury		11		7
	Lead		200		8
	Molybdenum				
	Nickel		130		7
	Selenium		250		7
	Tin				
	Vanadium		410		7
	Zinc		3700		7
	Tributlytinoxide				
Polyaromatic Hydrocarbons	Acenaphthene	210	210	1100	7
	Acenaphthylene	170	420	920	7
	Anthracene	2400	5400	11000	7
	Benzo[a]anthracene	7.2	11	13	7
	Benzo[a]pyrene	2.2	2.7	3	7
	Benzo[b]fluoranthene	2.6	3.3	3.7	7
	Benzo[ghi]perylene	320	340	350	7
	Benzo[k]fluoranthene	77	93	100	7
	Chrysene	15	22	27	7
	Dibenz[ah]anthracene	0.24	0.28	0.3	7
	Fluoranthene	280	560	890	7
	Fluorene	170	400	860	7
	Indeno[123-cd]pyrene	27	36	41	7
	Naphthalene	2.3	5.6	13	7
	Phenanthrene	95	220	440	7
	Pyrene	620	1200	2000	7
	Coal Tar (B[a]P as surrogate marker)	0.79	0.98	1.1	7
Petroleum Hydrocarbons	Benzene	0.087	0.17	0.37	7
	Toluene	130	290	660	7
	Ethylbenzene	47	110	260	7
	m-Xylene	59	140	320	7
	o-Xylene	60	140	330	7
	p-Xylene	56	130	310	7
	Methyl tert-butyl ether (MTBE)				
	1,2,4-Trimethylbenzene				
	iso-Propylbenzene				
	Propylbenzene				
	Styrene				
	Aliphatic EC 5-6	42	78	160	7
	Aliphatic EC >6-8	100	230	530	7
	Aliphatic EC >8-10	27	65	150	7
	Aliphatic EC >10-12	130 (48) [vap]	330 (118) [vap]	760 (283) [vap]	7
	Aliphatic EC >12-16	1100 (24) [sol]	2400 (59) [sol]	4300 (142) [sol]	7
	Aliphatic EC >16-35	65000 (8.48) [f, sol]	92000 (21) [sol]	110000	7
	Aliphatic EC >35-44	65000 (8.48) [f, sol]	92000 (21) [sol]	110000	7
	Aromatic EC 5-7 (benzene)	70	140	300	7
	Aromatic EC >7-8 (toluene)	130	290	660	7
	Aromatic EC >8-10	34	83	190	7
	Aromatic EC >10-12	74	180	380	7
	Aromatic EC >12-16	140	330	660	7
	Aromatic EC >16-21	260	540	930	7
	Aromatic EC >21-35	1100	1500	1700	7
	Aromatic EC >35-44	1100	1500	1700	7
	Petroleum Hydrocarbons EC >44-70	1600	1800	1900	7

Source

7 LQM/CIEH S4UL 3279 (2014)

8 DEFRA C4SL SP1010 (2014)

PATRICKPARSONS

London – Central

Ash Vale

Birmingham

Chester

Manchester

Huddersfield

Newcastle upon Tyne

Glasgow

Dubai

Sydney