

Phase 2 Geoenvironmental Appraisal

Healey Lane, Batley

For

Planned Contracts Ltd

H17075

May 2018

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for
Planned Contracts Ltd

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Executive Summary

Ground Conditions	A mantle of topsoil and made ground (<1.0m thick) overlying natural residual clays, lesser amounts of residual granular soils, with competent mudstone and sandstone strata at between 1.0 and 3.0m depth.
Groundwater	Groundwater levels are between 1.0 and 3.0m.
Ground Gas	A preliminary gas risk classification of CIRIA C665 Characteristic Situation CS1 gas regime. At this stage, gas protection measures are not considered necessary (subject to completion of gas monitoring programme).
Contamination and Remediation	Elevated concentrations of arsenic and PAHs within shallow made ground. No visual or olfactory evidence of significant or gross contamination was noted. It is recommended that 600mm of clean capping soils are placed in garden and soft landscaping areas. If considered for re-use, further chemical validation testing of existing topsoil is recommended.
Mining	The site is considered stable as regards shallow mine workings with no structural precautions considered necessary in this respect. A former shaft was not confirmed as present within the southeastern part of the site, however, further intrusive investigation (a site strip) is recommended.
Foundations	Traditional strip foundations bearing in natural residual firm and stiff clays/granular soils or competent mudstone and sandstone strata. Maximum static loadings of 150 and at least 250kN/m² for the residual clays/granular soils and competent solid strata respectively. Suspended floor slabs are recommended.
Tree Influence	Volume change potential of clay soils is 'Medium'. Trees are present on the southern boundary and felling of former trees has occurred, hence foundation depths will require deepening where within influence.
Concrete Classification	Buried concrete in contact with natural strata should be designed to BRE Special Digest 1:2005 Design Sulphate Class DS-1 with an ACEC site classification AC-2z and Class DS-1 with an ACEC site classification AC-1 for made ground.
Soakaway Drainage	The results of infiltration testing have demonstrated the subsoils as not suitable for drainage by way of soakaway.
Waste Classification	A comprehensive waste classification assessment in accordance with WM3 guidance may be necessary if soils are to be disposed to landfill.
Roads	A design CBR value of 3% for natural residual clays/granular soils and 1% for made ground 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 of a parcel of land adjacent to Healey Lane, Batley. A site location plan is presented as Drawing No. H17075-701 in Appendix A.

1.2 Proposals

It is understood that PCL propose to construct 15 no. low rise detached and terraced residential properties with associated areas of hardstanding, parking and soft landscaping together with an access road. A proposed site layout plan by Chris Finn Architect, Dwg. No. 2605-02-01C December 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 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 an end use comprising residential with home grown produce.

1.4 Information Sources

This Phase 2 Site Appraisal is based on the findings of the investigation, chemical analysis and geotechnical testing undertaken during the course of the assessment. The results have been used to refine the conceptual model and initial recommendations/risk assessment as outlined in the both the PPL desk study and coal mining risk assessment reports:

- 'Phase 1 Geoenvironmental Report, Healey Lane, Batley', Ref. H17075DTS, dated April 2018
- 'Coal Mining Risk Assessment, Healey Lane, Batley', Ref. H17075CMRA, dated April 2018.

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

The following is a summary of the findings of the Phase 1 Desk Study and should not be read in isolation. For full details reference should be made to the report outlined in Section 1.4. In summary, the Phase 1 Site Appraisal highlighted the following:

Site Description	A 0.57ha parcel of land cleared of trees and all former buildings, primarily under grass and coarse vegetation with areas of hardstanding. Levels fall gently southwards by approximately 5.0m with an embankment present along the northeastern boundary adjoining higher land.
Site History	The site was developed with a school during the 1970s. All buildings have since been demolished.
Geology	Solid strata comprise the Thornhill Rock sandstone of the Middle Coal Measures. No superficial deposits are recorded.
Coal Mining	A <i>low to moderate</i> risk of the site being affected by unrecorded shallow mine workings. A former mine entry (shaft) is recorded as adjacent to the southeastern site boundary. As such, there is a <i>high</i> risk that this recorded shaft, and potentially further unrecorded mine entries, may be present on the site itself. A <i>low to moderate</i> risk of the potential for the presence and migration of mine gases onto the site.
Contamination	The risk of significant contamination on site is considered as <i>low to moderate</i> .
Environmental	• Solid Geology: Secondary A Aquifer. • No significant watercourses within 250m. • A former landfill within 250m.
Ground Gas	The risk of the site being affected by ground gas is considered as <i>low to moderate</i>. Basic radon protection measures are necessary.
Flooding	There is no flood risk identified.
Soakaway Drainage	SUDS (soakaways) are potentially considered as feasible, subject to field infiltration testing.

2.1 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 (soils) from former on-site development (school)	Direct contact and ingestion/inhalation of contaminated soil and dust	Construction workers	<i>Low to Moderate:</i> 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	<i>Low to Moderate:</i> Mitigation measures may be required as part of the development to prevent end users coming into contact with historic made ground
Made ground (soils containing ACM's associated with construction and roofing materials) from former on-site development (school)	Inhalation of contaminated soil and dust	Construction workers	<i>Low to Moderate:</i> Mitigated by use of appropriate PPE and good site practice
	Inhalation of contaminated soil and dust	End users	<i>Low to Moderate:</i> Mitigation measures may be required as part of the development to prevent end users coming into contact with historic made ground
Off-site sources of contamination: made ground (soils) from adjacent school development	Lateral migration through made ground or permeable natural soils.	End users	<i>Low to Moderate:</i> Adjacent historic made ground may facilitate the migration of potential contaminants, subject to the findings of an intrusive investigation
Ground gas associated with on-site made ground, potential shallow mine workings and former landfill in the surrounding area	Vertical and lateral migration into confined spaces. Inhalation	End users	<i>Low to Moderate:</i> Gas monitoring required to confirm the ground gas regime
Controlled Waters			
Made ground from former on-site development and nearby historic landfill site	Vertical and lateral migration	Secondary A Aquifer (solid)	<i>Low to Moderate:</i> Anticipated residual granular soils may potentially facilitate the vertical and lateral migration of potential contaminants, subject to the findings of an intrusive investigation

3.0 Fieldwork & Laboratory Testing

Based on the findings of the Phase 1 Appraisal and Coal Mining Risk Assessment, the following scope of fieldwork and laboratory analysis was undertaken:

- JCB excavation of 11 no. trial pits (TP01 to TP04, TP04A and TP05 to TP10) to a maximum depth of 3.8m below existing ground level (begl) to assess ground conditions and obtain samples for laboratory analysis;
- Infiltration testing in 3 no. trial pits to assess the suitability of the subsoils for drainage by way of soakaway;
- Drilling of 6 no. mini percussive boreholes (WS01 to WS06) to a maximum depth of 3.45m begl, to assess ground conditions and allow in situ testing;
- Drilling of 5 no. rotary open hole boreholes (BH01 to BH05) to a maximum depth of 30m begl to confirm the presence of shallow coal workings beneath the site;
- Installation of 4 no. combined gas and groundwater monitoring standpipes;
- Geotechnical testing of soils, including water soluble sulphate, soil pH, California Bearing Ration (CBR) and Atterberg Limits;
- Contamination testing of soils comprising standard suites of metals, metalloids, non-metals, Polycyclic Aromatic Hydrocarbons (PAH) and Total Petroleum Hydrocarbons (TPH).

The fieldworks were undertaken in 2 separate phases; initially on 24th and later on 27th April 2018.

A plan showing the location of the exploratory holes is included as Drawing No. H17075-703 in Appendix A and copies of the exploratory hole records are provided in Appendix B. The field infiltration testing results are included as Appendix C.

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

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
TP01 to TP03, TP07 to TP10 and WS01 to WS06	General site coverage
BH01 to BH05	Determine the presence of historic shallow coal mine workings beneath site
TP04, TP04A, TP05 and TP06	Determine the presence of historic mine shaft

4.0 Ground Conditions

4.1 Soil Profile

Depth Range to Top of Strata (Thickness)	Material Type
Ground level (0.15 to 0.5m)	Topsoil
Ground level (0.5 to 0.9m)	Made Ground: Firm gravelly clay and sandy gravel with brick and sandstone content
0.15 to 0.9m (0.2 to >2.0m)	Natural Residual Cohesive Soils: Firm and stiff CLAY
2.3m (1.5m)	Natural Residual Granular Soils: Compact GRAVEL of sandstone
0.9 to 3.8m (>30m)	Solid Strata: Weak to medium strong MUDSTONE and medium strong to strong SANDSTONE

4.2 Material Properties

4.2.1 Natural Residual Clay Soils

Hand vane results for the natural residual clays recorded average undrained shear strength values of 69kN/m² (<1m), 94kN/m² (1 to 2m) and 66kN/m² (2 to 3m), indicative of medium to high strength soils. Corrected SPT N₆₀ average values for these soils were 10 to 18 (1 to 2m) and 23 (2 to 3m), which are equivalent to shear strength values between 50 and 90kN/m² (1 to 2m) and 90kN/m² (2 to 3m) or firm to stiff (medium to high strength) soils.

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

4.2.2 Natural Residual Granular Soils

No SPTs were undertaken within the natural residual granular soils.

4.2.3 Solid Strata

Corrected SPT N₆₀ values for the underlying competent mudstone were between 20 and in excess of 50 or refusal.

4.3 Mining

A total of 5 no. rotary percussive boreholes (BH01 to BH05) were put down across the site to depths of between 15 and 30m begl. Only borehole BH01 proved intact coal at a depth of 21.3m begl and 0.8m thick.

TP04, TP04A, TP05 and TP06 located in the extreme southeastern corner of the site did not encounter any evidence of an historical mine shaft or mine entry. A summary of the findings of the mining investigation is provided below.

Exploratory Hole	Bedrock Depth	Depth to Coal Seam (Thickness)	Rock Cover Above Solid Coal Seam (rock cover ratio*)	Notes
BH01	2.3m	21.3m (0.8m)	19.0m (24:1)	Solid Coal
BH02	1.0m	Absent	N/A	Coal absent above 30m
BH03	2.9m	Absent	N/A	Coal absent above 30m
BH04	2.2m	Absent	N/A	Coal absent above 15m
BH05	2.5m	Absent	N/A	Coal absent above 30m

*the ratio between the thickness of bedrock above the seam and the intact seam thickness

4.4 Groundwater

Perched groundwater was encountered during the advancement of the exploratory holes with the following observations made:

Location	Depth (m)	Description
TP03	1.5	Ingress of perched groundwater within natural residual clay
TP06	1.7	Ingress of perched groundwater within natural residual clay
WS04	1.9	Ingress of perched groundwater at top of mudstone
WS05	1.0	Ingress of perched groundwater at top of mudstone

Subsequent monitoring of installations records 'at rest' groundwater levels at between 2.5 and 2.8m begl, details of which are provided in Appendix F.

4.5 Contamination - Visual and Olfactory

No visual or olfactory evidence to suggest gross or significant impact or contamination of the made ground and natural soils was noted during the advancement of the exploratory holes.

No evidence to suggest the presence of asbestos containing materials (ACM) was noted during the intrusive investigation.

4.6 Obstructions

Remnant foundations were encountered to a depth of 0.8m begl. Solid strata of mudstone and sandstone halted the advancement of the mechanically excavated trial pits and mini percussive boreholes at depths of between 1.4 to 3.3m begl.

4.7 Infiltration Testing

A total of 3 soil infiltration tests were undertaken in TP01, TP02 and TP03 in general accordance with BRE 365, at the locations as indicated on Drawing No H17075-703 presented in Appendix A. The excavation was formed as uniform as possible and remained stable for the duration of the tests. The dimensions of each excavation were carefully recorded and logged prior to commencement of each test. Clean water was used in the tests, supplied by a water bowser.

The duration of the tests ranged between 240 and 300 minutes. The testing was carried out at 2.0m begl within mudstone and weathered mudstone strata in TP01 and TP03 and at 2.4m begl within sandstone strata in TP02. Throughout the duration of the tests, water levels remained unchanged in TP01 and TP03, while in TP02 water levels fell marginally by 30mm. Field record sheets are included in Appendix C.

5.0 Preliminary Ground Gas Assessment

5.1 Rationale for Ground Gas Monitoring

The intrusive investigation proved the presence of made ground at <1.0m thick at the surface directly underlain by natural residual soils. The presence of putrescible content was not identified and there was no evidence to suggest the presence of hydrocarbon or volatile vapours impacting the site. There is a former landfill recorded within 250m and northwest of the site. Historic shallow coal mineworkings are not present beneath the site, however, a recorded mine entry (shaft) is recorded close to the southeastern site boundary. Additionally, historic shallow coal mine workings are recorded nearby with deeper mine workings known to be present beneath the site. As such, there is considered to be a *low to moderate* risk from site-derived and/or off-site ground gases potentially affecting end users of the site.

As such, there is considered to be a requirement for undertaking a ground gas monitoring programme to better assess the potential risk presented to site end users. The results of the ground gas monitoring are to be assessed in accordance with CIRIA 665 (2007) and BS 8485 (2015) guidance so that the site can be classified accordingly.

5.2 Provisional Assessment of Monitoring Results

Note that the monitoring assessment provided below is preliminary and subject to change until completion of the monitoring programme.

A total of 4 gas and groundwater monitoring wells were installed during the investigation. Response zones were constructed at depths of between 1.0m and 3.0m bgl within natural residual soils and solid strata in WS01, WS02, WS03 and WS06.

To date, 2 monitoring visits have been carried out. As gas and groundwater monitoring is presently ongoing the complete set of results and recommendations will be presented in an addendum report following the final visit. Copies of the results from the monitoring visits to date are included in Appendix F.

A provisional summary and assessment of the monitoring information obtained to date is presented below.

Location	Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Flow (l/hr)	Barometric Pressure (mb)	Maximum GSV*(l/hr)	
						CO ₂	CH ₄
WS01	0.0	1.5 – 1.8	17.8 – 18.7	<0.1	998 – 999	<0.07	<0.07
WS02	0.0	0.6 – 1.1	19.0 – 19.6	<0.1	998 – 999		
WS03	0.0	0.6 – 1.2	16.9 – 19.1	<0.1	998 – 999		
WS06	0.0	0.2 – 3.0	16.0 – 20.2	<0.1	998 – 999		

* GSV: CIRIA C665 Gas Screening Value, based on maximum flow and concentration

5.3 Provisional Assessment of Gas Protection Measures

Assessment of ground gas monitoring results has been undertaken in accordance with CIRIA C665 and BS8485 (2015). The calculated GSV with respect to carbon dioxide and methane is low ($<0.07\text{l/hr}$), which equates to a Characteristic Situation (CS) CS1 in accordance with BS8485. This is a Very Low hazard potential which does not require gas protection measures. Note that the above assessment is only preliminary and is subject to change on completion of the monitoring programme.

5.4 Further Assessment

On completion of the ground gas monitoring programme, a ground gas risk addendum report is to be issued which will provide a final and formal classification of the site with regard to necessary gas protection measures required during development.

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

Incorporation of basic radon protection measures are 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 home grown produce have been adopted. A conservative soil organic matter content of 1% has been assumed. A summary assessment table of all GACs is provided in Appendix G.

6.1.1 Metals, Metalloids, Non-metals

A total of 6 soil samples (1 of natural soil, 4 of made ground and 1 of topsoil) were analysed. A single sample of shallow granular made ground recovered from TP04 located within the toe of the embankment in the extreme southeastern corner of the site recorded arsenic at an elevated concentration exceeding the GAC value.

6.1.2 Petroleum Hydrocarbons

A total of 6 soil samples (1 of natural soil, 4 of made ground and 1 of topsoil) were analysed for speciated TPH. No determinands were present at concentrations exceeding their respective GAC values.

6.1.3 Polycyclic Aromatic Hydrocarbons

A total of 6 soil samples (1 of natural soil, 4 of made ground and 1 of topsoil) were analysed for speciated PAH. A single sample of shallow reworked cohesive made ground recovered from TP08 located within the approximate centre of the site recorded PAH compounds benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene all at elevated concentrations exceeding their respective GAC values.

6.1.4 Asbestos

A total of 6 shallow topsoil, made ground and natural soil samples, as detailed above, were screened for the presence of asbestos. None of these samples tested positive for the presence of asbestos.

6.2 Controlled Waters Risk Assessment

Taking cognisance of the site's environmental setting; notably the absence of any nearby significant surface watercourses and the confirmed presence of natural residual 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 1 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 with home grown produce.

7.2 Contaminants of Concern

The intrusive ground investigation has confirmed the presence of chemical contaminants of concern at concentrations deemed to present a risk to end users of the site. These are present within shallow made ground soils at <1.0m depth and include the following:

- Arsenic – confined to the granular made ground embankment materials in the extreme southeastern part of the site
- PAHs (benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene and dibenzo(a,h)anthracene) – present within site-wide reworked cohesive made ground materials

The presence of asbestos has not been positively identified within the shallow soils.

7.3 Gas Risk

At this stage of monitoring, there is considered to be a *very low* risk to end users of the site from lateral and upwards migration of ground and mine gases into the proposed development. Monitoring to date classifies the site as Characteristic Situation CS1 or a *very low* hazard potential with gas protection measures not required in new development. A final definitive gas risk classification is reserved until completion of the monitoring programme.

7.4 Phase 2 Revised Conceptual Site Model and Environmental Risk Assessment

The significance of the potential source-pathway-receptor linkages identified in the CSM 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 CSM table below.

Revised Conceptual Site Model

Source	Pathway	Receptor	Pollutant Linkage: Assessed Risk
Human Health			
Elevated concentrations of arsenic and PAHs recorded in shallow made ground	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 (as appropriate)
	Direct contact and ingestion/inhalation of contaminated soil and dust. Ingestion of home grown vegetables	End users	Low to Moderate: Mitigation measures (provision of clean capping) required as part of the development
Off-site sources of contamination: Elevated concentrations of arsenic within granular made ground of embankment from adjacent school development	Lateral migration through made ground	End users	Low to Moderate: Mitigation measures (provision of clean capping) required as part of development
Ground gas associated with historic mine entry (shaft), deeper mine workings and adjacent landfill	Vertical and lateral migration into confined spaces. Inhalation	End users	Low: Gas protection measures may be required, subject to completion of monitoring programme and regulatory approval

8.0 Remediation

8.1 Contaminants of Concern

The generic risk assessment has confirmed there to be elevated concentrations of arsenic and PAHs present within the shallow made ground soils that may potentially pose a risk to human health for the proposed residential end-use. No asbestos containing materials (ACM) or asbestos has been positively identified within these soils. The risk to environmental receptors (Surface waters and Secondary A aquifer) is assessed as negligible to low.

8.2 Remediation Recommendations

It is not considered feasible or sustainable to remove the made ground soils from the site. Consequently, all garden and landscaping areas will require capping to prevent site end users from coming into contact with made ground soils.

Existing topsoil present at the site is potentially considered as suitable for re-use as part of the development. However, further chemical testing is recommended together with regulatory approval. Alternatively, all capping soils will be required to be imported.

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’. 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 250m ³ (minimum of 3)	✓	✓	
Brownfield / Screened soils 1 per 100m ³ (minimum of 6)	✓	✓	✓

It is recommended that a Remediation Strategy should be completed to provide more detail on the remedial requirements and validation procedures to be agreed with the NHBC and local regulatory authorities.

8.3 Utilities

The need for additional protection (barrier pipes) to underground services and pipework may be warranted, subject to 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. Waste Acceptance Criteria (WAC) testing would be required by the waste receiving facility prior to disposal.

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. If any materials are to be removed from site, this should be undertaken in accordance with Duty of Care Regulations, 1991 and the Hazardous Waste Regulations, 2005.

The classification of any construction-derived potential waste materials present at the site is beyond the scope of this report.

8.5 Gas Protection Measures

At this stage, incorporation of gas protection measures as part of the development are not considered warranted. These recommendations should be regarded as preliminary only until completion of the gas monitoring programme and assignment of a definitive gas risk classification and are subject to regulatory approval.

The site lies within an area where basic radon protection measures are required.

9.0 Geotechnical Appraisal

It is proposed to construct 15 no. low rise detached and terraced residential properties with associated areas of hardstanding, parking and soft landscaping together with an access road. To facilitate development, existing levels are understood to be raised by around 1m within the southern part of the site and a section of retaining wall (approximately 1.0 to 1.5m high) is to be constructed in the north along the current embankment with the adjacent school site. In preparing this report, we have made assumptions on typical loadings for such a development. If any heavier loaded structures are proposed in the future, or significant changes in ground level are required then the recommendations made may require amendment.

9.1 Mining

The intrusive investigation has confirmed the presence of the Joan coal seam at shallow depth beneath the western part of the site only. Elsewhere, this coal seam was absent with no other coal seams proved as being present at shallow depth and is likely to be affected by faulting within the northern part of the site. The coal seam was intact and is considered to be at sufficient depth as to not present a potential risk to surface instability in the event of it having been historically mined. Hence, with regard to shallow mine workings, the site is considered to be stable with no structural precautions considered necessary in this respect.

Within the extreme southeastern part of the site, intrusive investigation failed to determine the location of the former mine shaft (CA Ref. 422423-005). At this stage, as this feature is discounted as being present within the site itself, the position as recorded by the Coal Authority should be taken as the definitive location of the former mine shaft, which lies approximately 8.0m beyond the site's southeastern boundary within West Park Road itself. However, Coal Authority records suggest an 8.0m departure from this recorded position due to potential inaccuracies from historical mapping sources. Allowing for such, the shaft could potentially be present on the site boundary or just within the confines of the site. Based on a shaft diameter of 2.5m and a competent rockhead depth of 3.0m, the maximum zone of influence is calculated to be approximately 3.0m from the edge of the shaft or 4.25m from its centre. Given that in this part of the site, plot 6 dwelling is some 8.0m distant from the site boundary, the potential zone of influence would not affect any development within the southeastern part of the site should the shaft be present on the site itself at a location just inside of the southeastern site boundary. It would, however, be potentially present within the garden of plot 6.

Although no evidence of the former mine entry was recorded during the intrusive investigation, it is possible that this feature, and unrecorded mine entries, may still be present on the site itself. As such, further intrusive investigation comprising a targeted site strip within this part of the site is recommended ahead of development in order to conclusively discount or confirm such features. In addition, vigilance should be used during the site strip and enabling works undertaken at the site as to the presence of any disturbed/collapsed ground or backfilling of such features. In the event of such features being confirmed within the site, subject to their location with respect to the proposed development layout, the requirement for grouting and capping of mine shafts may be necessary or incorporation of surface reinforcement using geogrid should be allowed for. Consultation and approval from the Coal Authority will be required as to their requirements to mitigate any risk presented to the development.

9.2 Foundations

The intrusive investigation has proved a cover of topsoil and made ground (<1.0m thick) underlain by natural residual firm and stiff clays, to a lesser extent natural residual granular soils, in turn underlain by competent mudstone and sandstone proved generally at depths of between 1.0 and 3.0m begl. 'At rest' groundwater levels vary between 2.5 and 3.0m begl.

Traditional strip foundations are considered suitable bearing upon either the natural residual firm and stiff clays/granular soils or competent mudstone and sandstone strata at around 1.0m begl. Foundations should ideally be placed within the same strata, however, where they straddle different soils they should be widened and incorporate appropriate reinforcement. A minimum foundation depth of 0.9m is recommended for the natural residual clays where foundations are not within influencing distance of trees.

The results of the in situ testing suggest that the natural residual firm and stiff clays and residual granular soils are able to accommodate static loadings of 150kN/m² with total and differential settlements within tolerable limits. The competent mudstone and sandstone strata are assessed as able to accommodate static loadings of at least 250kN/m².

Due to the gradient of the site, either stepped foundations will be necessary or the incorporation of retaining structures if dwellings are to be founded at uniform levels.

Where foundations are within natural clays and within the influencing distance of trees or hedges they will need to be deepened in accordance with current guidance. A medium volume change potential is appropriate for the natural residual clays.

9.2.1 Building Near Trees

Trees are present along the southern boundary of the site and former trees have been felled across the site. Consequently, foundation depths may require increasing in proximity to these areas in accordance with NHBC Chapter 4.2. It is recommended that a tree survey is undertaken to confirm the extent of precautions that may be required.

9.3 Floor Slabs

The use of a suspended floor slab is recommended due to the presence of made ground in excess of 600mm thickness and underlying natural residual clays at formation, the latter potentially resulting in adverse effects associated with a medium volume change potential cohesive soil.

9.4 Roads and Pavements

The results of in situ testing and information gained from the intrusive investigation would suggest a design CBR value of 3% for the natural residual clays and granular soils and 1% for the reworked clay and granular made ground at formation, subject to proof rolling and any soft spots treated appropriately.

Highway design should be agreed with the local highways department before work begins on site.

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. The use of hydraulic breakers should be anticipated if deeper excavations are proposed within the competent mudstone and sandstone strata. Support and battering back of temporary excavations should be undertaken if required, in accordance with CIRIA Report 97 Trenching Practice (2nd Edition 2001).

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 materials, a design sulphate class of DS-1 and ACEC class of AC-1 and for the natural soils a design sulphate class of DS-1 and ACEC class of AC-2z are considered appropriate for buried concrete in accordance with BRE Special Digest 1, 2005, 3rd Edition, assuming mobile groundwater conditions, with concrete designed appropriately.

9.7 Drainage

The results of the soil infiltration testing are indicative of impermeable to very low permeability strata. As such, the use of soakaways as a means of surface water drainage is not considered as feasible with alternative methods sought under the SUDS preferred hierarchy.

9.8 Slope Stability

The existing embankment along the northeastern site boundary is considered to be stable. However, where development encroaches into the embankment in the northern part of the site, a retaining structure is proposed. Exposed soils are likely to comprise made ground underlain by natural firm and stiff residual clays in turn underlain by competent mudstone strata. The unsupported natural strata are considered as remaining stable in the short term to a relatively steep cut, however, any made ground will require support. Adequate drainage behind and at the toe of the retaining structure should be allowed for to prevent the generation of potentially adverse hydrostatic pressure.

10.0 Further Works

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

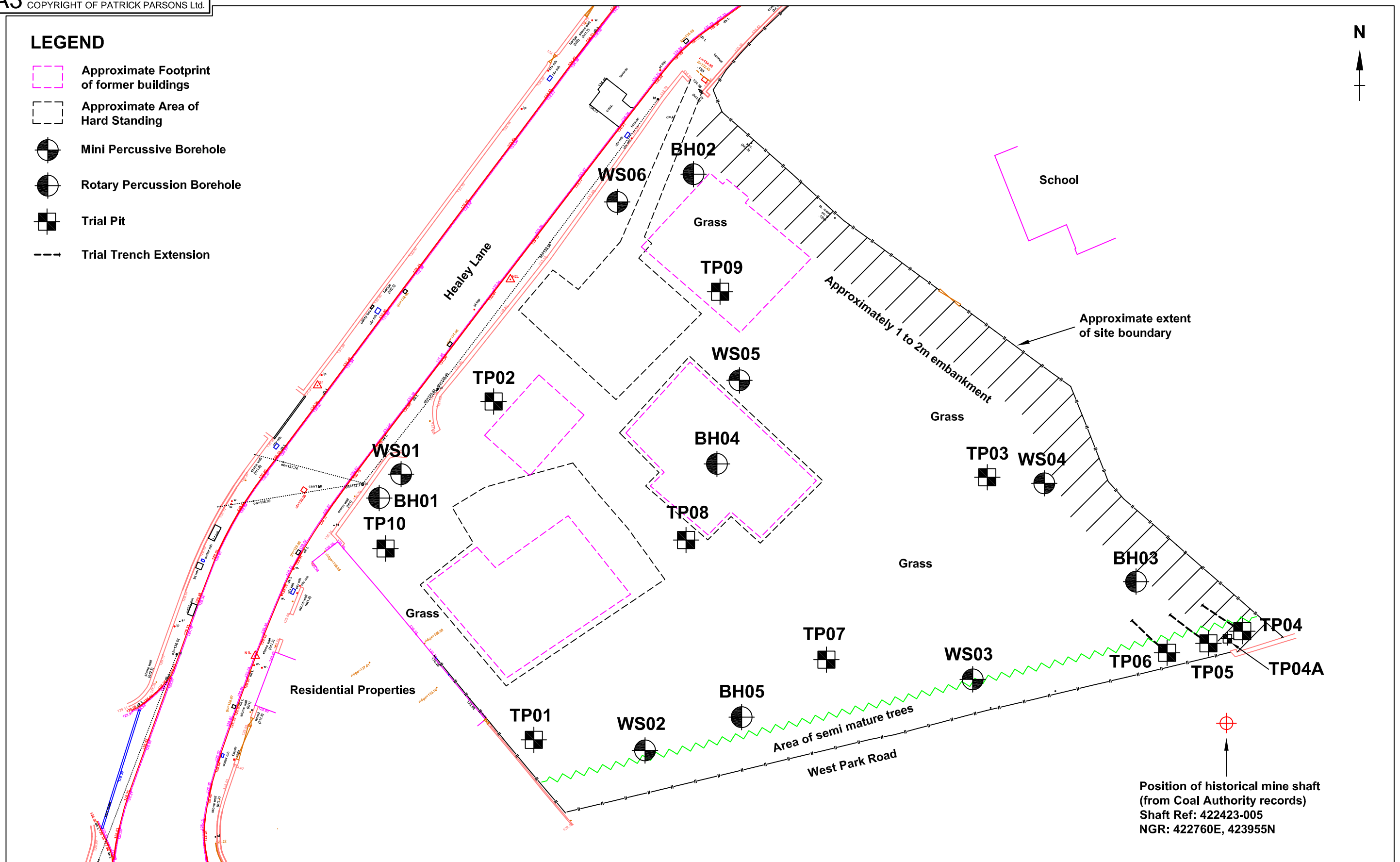
- Additional intrusive works (topsoil and made ground strip) in the southeastern corner of the site to determine the presence or not of historic mine shaft and its potential zone of influence upon development within this part of the site
- Preparation of a Remediation Statement to address potential risks presented by historic made ground soils (and ground gases)
- Possible requirement for additional chemical validation of existing topsoil if to be considered for re-use within the development, subject to regulatory comments and recommendations
- Chemical validation of any imported capping soils for use during the redevelopment
- Independent CQA validation of any gas protection measures installed during the redevelopment, as appropriate.

Appendix A – Figures



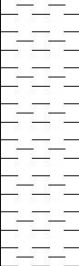
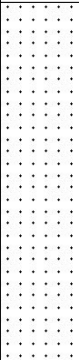
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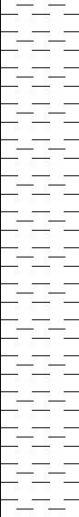
- Approximate Footprint of former buildings
- Approximate Area of Hard Standing
- Mini Percussive Borehole
- Rotary Percussion Borehole
- Trial Pit
- Trial Trench Extension



Appendix B – Exploratory Hole Records

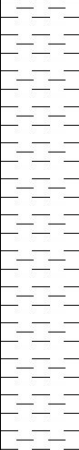
				Trial Pit Log			FINAL		Trial Pit No. TP01 Sheet 1 of 1		
Project Name: Healey Lane				Project No. H17075		Co-ords:		Date 24/04/2018			
						Level (m AOD):					
Location: Batley				Final Depth (m):		Pit Length (m): 2.90		Scale 1:25			
Client: Planned Contracts Ltd				2.00		Pit Width (m): 0.70		Logged By ACV			
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description				
	Depth (m bgl)	Type	Results								
	0.40	D		0.20			MADE GROUND: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone and brick.			1	
							MADE GROUND: Firm brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine to coarse, angular of sandstone.				
		B		0.70			Stiff orange mottled grey CLAY.				
				D		1.40		Weak to medium strong, very thinly to thinly bedded, grey mottled orange, MUDSTONE. Recovered as medium to coarse angular gravel of mudstone.			
		2.00				End of Pit at 2.00m			2		
											3
											4
											5
Remarks: Trial Pit backfilled with arisings to ground level. Mexecones at 0.7m; 2, 1, 1.5, 1.5, 3, refused. No groundwater encountered.											
Pit Stability: Stable											

				Trial Pit Log			FINAL		Trial Pit No. TP02 Sheet 1 of 1	
Project Name: Healey Lane				Project No. H17075		Co-ords:		Date 24/04/2018		
						Level (m AOD):				
Location: Batley						Final Depth (m):	Pit Length (m): 3.50	Scale 1:25		
Client: Planned Contracts Ltd						2.40	Pit Width (m): 0.75	Logged By ACV		
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
				0.26			TOPSOIL: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone.			
							Stiff orange mottled grey CLAY.			
	0.50	D								
	0.60	B								
	1.00	D								
				1.20			Medium strong to strong, thinly bedded, orange mottled grey, well cemented, fine grained SANDSTONE. Recovered as medium to coarse angular gravel of sandstone.			
				2.40			End of Pit at 2.40m			
Remarks: Trial Pit backfilled with arisings to ground level. Mexecone at 0.7m; 7, 7, 8, 10, refused. No groundwater encountered. No further progress possible below 2.40m bgl.										
Pit Stability: Stable with slight spalling										

				Trial Pit Log			FINAL		Trial Pit No. TP03 Sheet 1 of 1	
Project Name: Healey Lane				Project No. H17075		Co-ords:		Date 24/04/2018		
						Level (m AOD):				
Location: Batley						Final Depth (m):	Pit Length (m): 2.60	Scale 1:25		
Client: Planned Contracts Ltd						2.00	Pit Width (m): 0.77	Logged By ACV		
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
	0.40	D	102kPa	0.27			TOPSOIL: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone.			
							Stiff grey mottled orange CLAY. Becoming gravelly of mudstone with depth.			
	1.00	B								
	1.20	HSV								
	1.30	D								
				2.00			End of Pit at 2.00m			
Remarks: Slight water seepage at 1.5m begl. Trial Pit backfilled with arisings to ground level. Mexecone at 0.6m; 2, 2.5, 3, 5, 8, 10, refused.										
Pit Stability: Stable										
										

				Trial Pit Log			FINAL		Trial Pit No. TP04 Sheet 1 of 1	
Project Name: Healey Lane				Project No. H17075		Co-ords:		Date 24/04/2018		
						Level (m AOD):				
Location: Batley						Final Depth (m):	Pit Length (m): 3.70	Scale 1:25		
Client: Planned Contracts Ltd						3.80	Pit Width (m): 0.80	Logged By ACV		
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
	0.50	D		0.30			MADE GROUND: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone and brick.		1	
							MADE GROUND: Dark brown slightly clayey, sandy gravel. Sand is fine to coarse. Gravel is medium to coarse of brick and sandstone.			
	1.00	HSV	50kPa	0.80			Firm to stiff light grey mottled orange CLAY with pockets of coal.			2
	1.80	D		2.30			Compact grey mottled orange clayey GRAVEL with pockets of coal. Gravel is medium to coarse angular of mudstone. Clay in pockets with coal.			3
2.00	HSV	73kPa	3.00			Compact grey mottled orange GRAVEL. Gravel is medium to coarse angular of sandstone. Becoming weathered sandstone towards base.		4		
	3.00	HSV	66kPa	3.80			End of Pit at 3.80m		5	
Remarks: Trial Pit backfilled with arisings to ground level. Trial pit extended as trech in NW direction. No groundwater encountered.										
Pit Stability: Stable										
										

Project Name: Healey Lane				Project No. H17075		Co-ords: Level (m AOD):		Date 24/04/2018
Location: Batley						Final Depth (m): 0.85	Pit Length (m): 2.50 Pit Width (m): 0.70	Scale 1:25 Logged By ACV
Client: Planned Contracts Ltd								
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
	Depth (m bgl)	Type	Results					
				0.50			TOPSOIL: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone.	
				0.85			Firm to stiff orange mottled grey CLAY.	
							End of Pit at 0.85m	
Remarks: Trial Pit backfilled with arisings to ground level. No groundwater encountered.								

				Trial Pit Log			FINAL		Trial Pit No. TP05 Sheet 1 of 1	
Project Name: Healey Lane				Project No. H17075		Co-ords:		Date 24/04/2018		
						Level (m AOD):				
Location: Batley						Final Depth (m):	Pit Length (m): 3.00	Scale 1:25		
Client: Planned Contracts Ltd						2.00	Pit Width (m): 0.70	Logged By ACV		
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
	0.15	D		0.50			TOPSOIL: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone.			
							Firm orange mottled grey CLAY.			
		1.20	D		2.00					
							End of Pit at 2.00m			
							1			
							2			
							3			
							4			
							5			
Remarks: Trial Pit backfilled with arisings to ground level. Mexecones at 0.85m; 2, 2, 3, 3, 4, 3, refused. Trial pit extended as trench in NW direction. No groundwater encountered.										
Pit Stability: Stable										

Date

24/04/2018

Scale
1:25

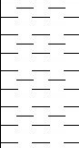
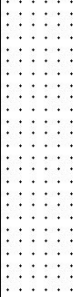
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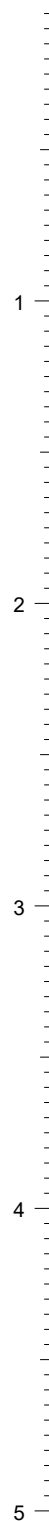
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
	Depth (m bgl)	Type	Results					
▼	0.10	D		0.25			TOPSOIL: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone.	1
	0.60	D					Firm orange mottled grey CLAY.	
					2.30			End of Pit at 2.30m
								4
								5

Remarks:	Slight water seepage at 1.7m begl. Trial Pit backfilled with arisings to ground level. Mexecones at 0.65m; 1, 1, 2, 2.5, 5, 7, refused. Trial pit extended as trench in NW direction.
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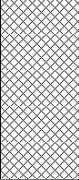
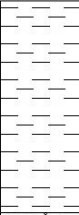
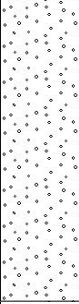
Pit Stability:	Stable
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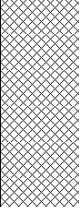
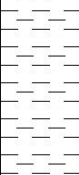
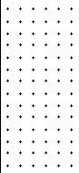
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Project Name: Healey Lane				Project No. H17075		Co-ords:		Date 24/04/2018		
						Level (m AOD):				
Location: Batley						Final Depth (m):	Pit Length (m): 2.90	Scale 1:25		
Client: Planned Contracts Ltd						2.00	Pit Width (m): 0.70	Logged By ACV		
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
	0.30	D		0.50			TOPSOIL: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone.			
							Firm browny orange CLAY.			
	1.20	D		1.00			Medium strong to strong, thinly bedded, orange mottled grey, well cemented, fine grained SANDSTONE. Recovered as medium to coarse angular gravel of sandstone.			
				2.00			End of Pit at 2.00m			
Remarks: Trial Pit backfilled with arisings to ground level. Mexecone at 0.65m; 1.5, 2.5, 4, 11, refused. No groundwater encountered. No further progress possible below 2m bgl.										
Pit Stability: Stable										

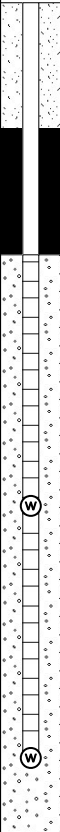
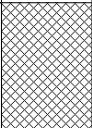
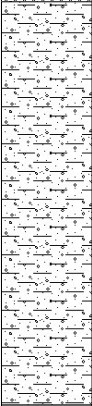
				Trial Pit Log			FINAL		Trial Pit No. TP08 Sheet 1 of 1	
Project Name: Healey Lane				Project No. H17075		Co-ords:		Date 24/04/2018		
						Level (m AOD):				
Location: Batley						Final Depth (m):	Pit Length (m): 3.60	Scale 1:25		
Client: Planned Contracts Ltd						1.80	Pit Width (m): 0.80	Logged By ACV		
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
	0.30	D		0.10			MADE GROUND: Dark brown sandy slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone and brick.			
				0.50			MADE GROUND: Firm dark brown sandy, gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone and brick. Contains wood fragments. (old water pipe at 0.4m bgl)			
	0.80	D				MADE GROUND: Firm brownish orange gravelly CLAY. Gravel is medium to coarse of angular sandstone.				
	0.90					Firm to stiff brownish orange gravelly CLAY. Gravel is medium to coarse, angular of mudstone and sandstone.				
	1.10			Medium strong to strong, thinly bedded, yellow mottled orange, well cemented, fine grained SANDSTONE. Recovered as medium to coarse angular gravel of sandstone.						
	1.50	B								
	1.80					End of Pit at 1.80m				
Remarks: Trial Pit backfilled with arisings to ground level. Water pipe and cable encountered at 0.40m and 0.80m bgl respectively. No groundwater encountered. No further progress possible below 1.80m bgl.										
Pit Stability: Stable										



				Trial Pit Log			FINAL		Trial Pit No. TP09 Sheet 1 of 1	
Project Name: Healey Lane				Project No. H17075		Co-ords: Level (m AOD):		Date 24/04/2018		
Location: Batley						Final Depth (m): 2.30		Pit Length (m): 3.30 Pit Width (m): 0.70		Scale 1:25 Logged By ACV
Client: Planned Contracts Ltd										
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
	0.40	D		0.60			MADE GROUND: Firm dark brown sandy, gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone concrete and brick.			
	1.10	D		1.30			Firm to stiff yellowy orange CLAY.			
				2.30			Medium strong to strong, very thinly bedded, orange mottled grey, well cemented, fine grained SANDSTONE. Recovered as medium to coarse angular gravel of sandstone.			
							End of Pit at 2.30m			
Remarks: Trial Pit backfilled with arisings to ground level. Remnant brick and concrete foundations proved to 0.80m bgl on SW and SE faces. No groundwater encountered. No further progres possible below 2.30m bgl.										
Pit Stability: Stable										



				Trial Pit Log			FINAL		Trial Pit No. TP10 Sheet 1 of 1	
Project Name: Healey Lane				Project No. H17075		Co-ords:		Date 24/04/2018		
						Level (m AOD):				
Location: Batley						Final Depth (m):	Pit Length (m): 3.40	Scale 1:25		
Client: Planned Contracts Ltd						1.90	Pit Width (m): 0.70	Logged By ACV		
Water Strike	Samples & In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
	Depth (m bgl)	Type	Results							
	0.30	D		0.70			MADE GROUND: firm dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone and brick. <i>Sand and Gravel. Gravel is fine to coarse, angular of brick.</i>		1	
	0.90	D					Firm to stiff brown slightly gravelly CLAY. Gravel is medium to coarse, angular of mudstone.			
							Medium strong to strong, very thinly bedded, orange mottled grey, well cemented, fine grained SANDSTONE. Recovered as medium to coarse angular gravel of sandstone.			
				1.90			End of Pit at 1.90m		2	
									3	
									4	
									5	
Remarks: Trial Pit backfilled with arisings to ground level. No groundwater encountered. No further progress possible below 1.90m bgl.										
Pit Stability: Stable										
										

				Window Sample Hole Log FINAL			Borehole No. WS01 Sheet 1 of 1	
Project Name: Healey Lane				Project No. H17075		Co-ords:		Hole Type WS
Location: Batley						Level (m AOD):		Scale 1:30
Client: Planned Contracts Ltd						Dates: 24/04/2018		Logged By ACV
Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description
		Depth (m bgl)	Type	Results				
					0.50		 MADE GROUND: Firm brown sandy, gravelly clay. Sand is fine to coarse. Gravel is fine to coarse angular of sandstone and brick.	
		1.00	SPT	N=18 (1,2/3,4,5,6)			 Stiff yellow brown sandy, gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular of mudstone and sandstone.	1
		1.70	HSV	82kPa				
		2.00	SPT	N=20 (5,5/7,4,4,5)	2.10		 Weak grey MUDSTONE.	2
		3.00	SPT	50 (11,8/50 for 125mm)	3.30		End of Borehole at 3.30m	3
								4
								5
								6
Remarks: No groundwater encountered. Monitoring well installed at 3.00m bgl.								

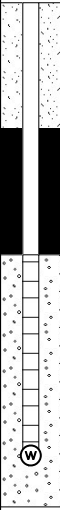
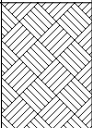
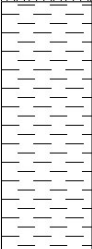
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WS

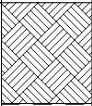
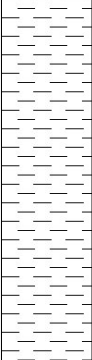
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Logged By
ACV

Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description			
		Depth (m bgl)	Type	Results							
		1.00	SPT	N=17 (3,3/4,4,5,4)	0.30			TOPSOIL: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone.			
					0.90			Firm brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular of mudstone and sandstone.			
					1.60		HSV	>120kPa			Stiff orange brown becoming brown mottled grey gravelly CLAY. Gravel is fine to coarse angular of mudstone.
					2.00		SPT	N=23 (4,3/4,4,7,8)			
					2.35			Weak grey MUDSTONE.			
3.00	SPT	N=40 (5,8/9,11,8,12)	3								
					3.45		End of Borehole at 3.45m	4			
								5			
								6			

Remarks:	No groundwater encountered. Monitoring well installed at 3.00m bgl.
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				Window Sample Hole Log FINAL			Borehole No. WS03 Sheet 1 of 1		
Project Name: Healey Lane				Project No. H17075		Co-ords:		Hole Type WS	
Location: Batley						Level (m AOD):		Scale 1:30	
Client: Planned Contracts Ltd						Dates: 24/04/2018		Logged By ACV	
Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
					0.50		 TOPSOIL: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone.	1	
		0.90 1.00	HSV SPT	78kPa N=10 (1,1/2,2,3,3)			 Stiff yellow brown mottled grey slightly gravelly CLAY. Gravel is fine to coarse angular of sandstone and mudstone.		
					1.50		 Stiff grey slightly sandy CLAY.		
		1.80	SPT	50 (21,4/50 for 115mm)	1.80		 Weak sandy MUDSTONE.	2	
					2.00		End of Borehole at 2.00m		
Remarks: No groundwater encountered. Monitoring well installed at 1.80m bgl.									
									

				Window Sample Hole Log FINAL			Borehole No. WS04 Sheet 1 of 1		
Project Name: Healey Lane				Project No. H17075		Co-ords:		Hole Type WS	
Location: Batley						Level (m AOD):		Scale 1:30	
Client: Planned Contracts Ltd						Dates: 24/04/2018		Logged By ACV	
Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
					0.40			TOPSOIL: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone.	
		0.85	HSV	80kPa				Stiff yellow brown mottled grey slightly gravelly CLAY. Gravel is fine to coarse angular of sandstone and mudstone.	1
		1.00	SPT	N=15 (2,3/5,3,4,3)					
		1.75	HSV	84kPa					
		1.90	SPT	50 (30 for 135mm/50 for 115mm)	1.85			Weak mottled grey and brown MUDSTONE.	2
					2.15			End of Borehole at 2.15m	
									3
									4
									5
									6
Remarks: Backfilled with arisings to ground level. Groundwater strike at 1.90m bgl.									

Project Name:	Healey Lane
---------------	-------------

Project No.
H17075

Co-ords:

Hole Type	WS
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	33
34	34
35	35
36	36
37	37
38	38
39	39
40	40
41	41
42	42
43	43
44	44
45	45
46	46
47	47
48	48
49	49
50	50
51	51
52	52
53	53
54	54
55	55
56	56
57	57
58	58
59	59
60	60
61	61
62	62
63	63
64	64
65	65
66	66
67	67
68	68
69	69
70	70
71	71
72	72
73	73
74	74
75	75
76	76
77	77
78	78
79	79
80	80
81	81
82	82
83	83
84	84
85	85
86	86
87	87
88	88
89	89
90	90
91	91
92	92
93	93
94	94
95	95
96	96
97	97
98	98
99	99
100	100

Location: Batley

Level (m AOD):

Scale
1:30

Client: Planned Contracts Ltd

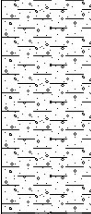
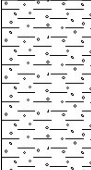
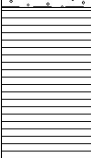
Dates: 24/04/2018

Logged By
ACV

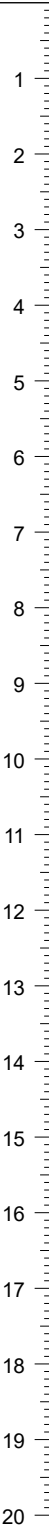
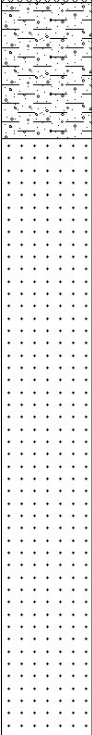
[illegible]

Remarks:	Backfilled with arisings to ground level. Groundwater strike at 1.00m bgl.
----------	--



				Window Sample Hole Log FINAL			Borehole No. WS06 Sheet 1 of 1		
Project Name: Healey Lane				Project No. H17075		Co-ords:		Hole Type WS	
Location: Batley						Level (m AOD):		Scale 1:30	
Client: Planned Contracts Ltd						Dates: 24/04/2018		Logged By ACV	
Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
					0.15		 TOPSOIL: Dark brown sandy, slightly gravelly clay. Sand is fine to coarse. Gravel is fine of sandstone.	1	
					1.11		 Stiff friable brown sandy gravelly CLAY. Sand is fine to coarse. Gravel is fine to coarse angular of sandstone and mudstone.		
		1.00	SPT	N=14 (2,4/3,3,4,4)		1.80		 Stiff grey brown gravelly CLAY. Gravel is fine to coarse angular of mudstone.	2
		2.00	SPT	N=50 (3,6/50 for 225mm)		2.40		 Weak grey shaly MUDSTONE.	
							End of Borehole at 2.40m	3	
								4	
								5	
								6	
Remarks: No groundwater encountered. Monitoring well installed at 2.00m bgl.									

				Rotary Open Hole Log			FINAL		Borehole No. BH01 Sheet 1 of 2	
Project Name: Healey Lane				Project No. H17075		Co-ords:			Hole Type RO	
Location: Batley						Level (m AOD):			Scale 1:100	
Client: Planned Contracts Ltd						Dates: 27/04/2018			Logged By ACV	

Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description		
		Depth (m bgl)	Type	Results						
					0.50			MADE GROUND		
								Orange CLAY		
										Orange brown SANDSTONE
					10.20			Grey MUDSTONE with sandstone beds		

Remarks: No elevated gases detected at exploratory hole. Exploratory hole backfilled with arisings and cement (with a bentonite seal at rockhead).



				Rotary Open Hole Log			FINAL		Borehole No. BH01 Sheet 2 of 2	
Project Name: Healey Lane				Project No. H17075		Co-ords:			Hole Type RO	
Location: Batley						Level (m AOD):			Scale 1:100	
Client: Planned Contracts Ltd						Dates: 27/04/2018			Logged By ACV	
Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description		
		Depth (m bgl)	Type	Results						
					21.30			Grey MUDSTONE with sandstone beds	21	
					22.10			Black COAL (intact)	22	
							Grey MUDSTONE		23	
									24	
									25	
									26	
									27	
									28	
									29	
					30.00			End of Borehole at 30.00m	30	
									31	
									32	
									33	
									34	
									35	
									36	
									37	
									38	
									39	
									40	
Remarks: No elevated gases detected at exploratory hole. Exploratory hole backfilled with arisings and cement (with a bentonite seal at rockhead).										

Project Name: Healey Lane

Project No.
H17075

Co-ords:

Hole Type
RO

Location: Batley

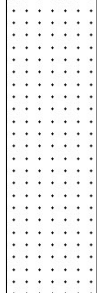
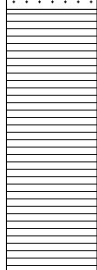
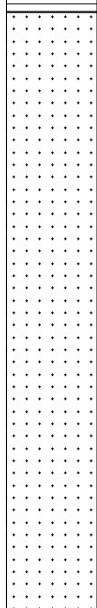
Level (m AOD):

Scale
1:100

Client: Planned Contracts Ltd

Dates: 27/04/2018

Logged By
ACV

Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
					0.60			MADE GROUND	
					1.00			Orange CLAY	1
								Orange SANDSTONE	2
									3
									4
					5.10			Grey MUDSTONE	5
									6
									7
									8
					8.70			Orange SANDSTONE	9
									10
									11
									12
									13
									14
									15
									16
					16.80			Grey MUDSTONE	17
									18
									19
									20

Remarks: No elevated gases detected at exploratory hole. Exploratory hole backfilled with arisings and cement (with a bentonite seal at rockhead).

				Rotary Open Hole Log			FINAL		Borehole No. BH02 Sheet 2 of 2	
Project Name: Healey Lane				Project No. H17075		Co-ords:			Hole Type RO	
Location: Batley						Level (m AOD):			Scale 1:100	
Client: Planned Contracts Ltd						Dates: 27/04/2018			Logged By ACV	
Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description		
		Depth (m bgl)	Type	Results						
								Grey MUDSTONE	21	
										22
										23
										24
										25
										26
										27
										28
										29
										30
					26.10			Dark grey carbonaceous MUDSTONE	26	
					26.90			Grey MUDSTONE	27	
									28	
									29	
					30.00			End of Borehole at 30.00m	30	
									31	
									32	
									33	
									34	
									35	
									36	
									37	
									38	
									39	
									40	

Remarks: No elevated gases detected at exploratory hole. Exploratory hole backfilled with arisings and cement (with a bentonite seal at rockhead).



Project Name: Healey Lane

Project No.
H17075

Co-ords:

Hole Type
RO

Location: Batley

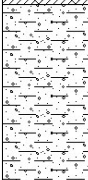
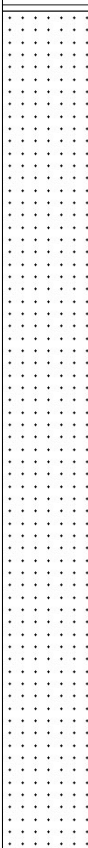
Level (m AOD):

Scale
1:100

Client: Planned Contracts Ltd

Dates: 27/04/2018

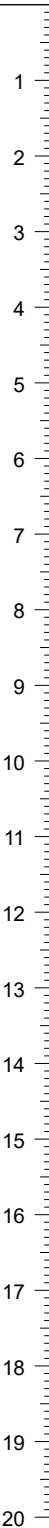
Logged By
ACV

Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description				
		Depth (m bgl)	Type	Results								
					0.50			TOPSOIL	1			
								Orange CLAY				
					2.90			Grey MUDSTONE	3			
										4		
											5	
												6
					7.20			Orange SANDSTONE	8			
										9		
											10	
11												
	12											
		13										
			14									
				15								
16												
	17											
18												
	19											
20												

Remarks: No elevated gases detected at exploratory hole. Exploratory hole backfilled with arisings and cement (with a bentonite seal at rockhead).

				Rotary Open Hole Log			FINAL		Borehole No. BH03 Sheet 2 of 2	
Project Name: Healey Lane				Project No. H17075		Co-ords:			Hole Type RO	
Location: Batley						Level (m AOD):			Scale 1:100	
Client: Planned Contracts Ltd						Dates: 27/04/2018			Logged By ACV	
Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description		
		Depth (m bgl)	Type	Results						
								Grey MUDSTONE	21	
									22	
									23	
									24	
					26.10			Dark grey carbonaceous MUDSTONE	26	
					27.60			Grey MUDSTONE	27	
									28	
									29	
					30.00			End of Borehole at 30.00m	30	
									31	
									32	
									33	
									34	
									35	
									36	
									37	
									38	
									39	
									40	
Remarks: No elevated gases detected at exploratory hole. Exploratory hole backfilled with arisings and cement (with a bentonite seal at rockhead).										

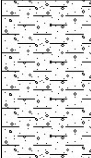
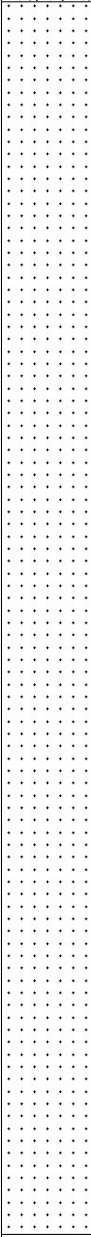
				Rotary Open Hole Log			FINAL		Borehole No. BH04 Sheet 1 of 1	
Project Name: Healey Lane				Project No. H17075		Co-ords:			Hole Type RO	
Location: Batley						Level (m AOD):			Scale 1:100	
Client: Planned Contracts Ltd						Dates: 27/04/2018			Logged By ACV	

Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
					0.60		MADE GROUND		
					Orange CLAY				
					Orange SANDSTONE				
					Solid Strata (probable fractured SANDSTONE - lost flush returns)				
					15.00		End of Borehole at 15.00m		

Remarks: Flush returns lost below 5.0m in fractured sandstone. No elevated gases detected at exploratory hole. Exploratory hole backfilled with arisings and cement (with a bentonite seal at rockhead).



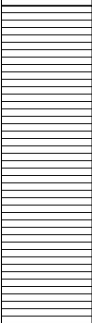
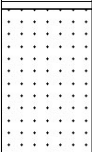
					Rotary Open Hole Log			FINAL		Borehole No. BH05 Sheet 1 of 2	
Project Name: Healey Lane					Project No. H17075		Co-ords:			Hole Type RO	
Location: Batley					Level (m AOD):			Scale 1:100			
Client: Planned Contracts Ltd					Dates: 27/04/2018			Logged By ACV			

Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
					0.40			TOPSOIL	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
								Orange CLAY	
								Orange SANDSTONE	
								Grey MUDSTONE	
					18.80				

Remarks: No elevated gases detected at exploratory hole. Exploratory hole backfilled with arisings and cement (with a bentonite seal at rockhead).

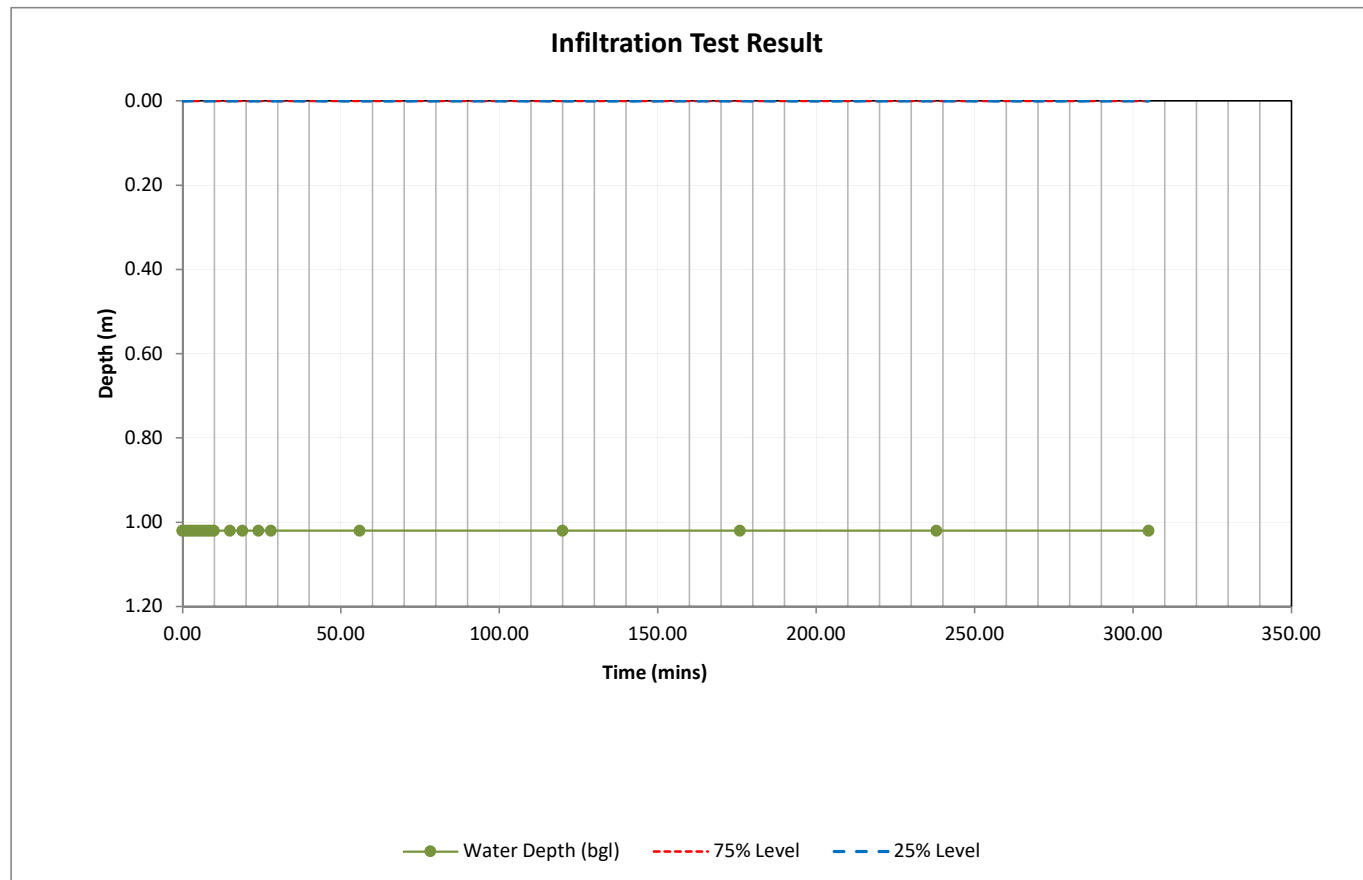


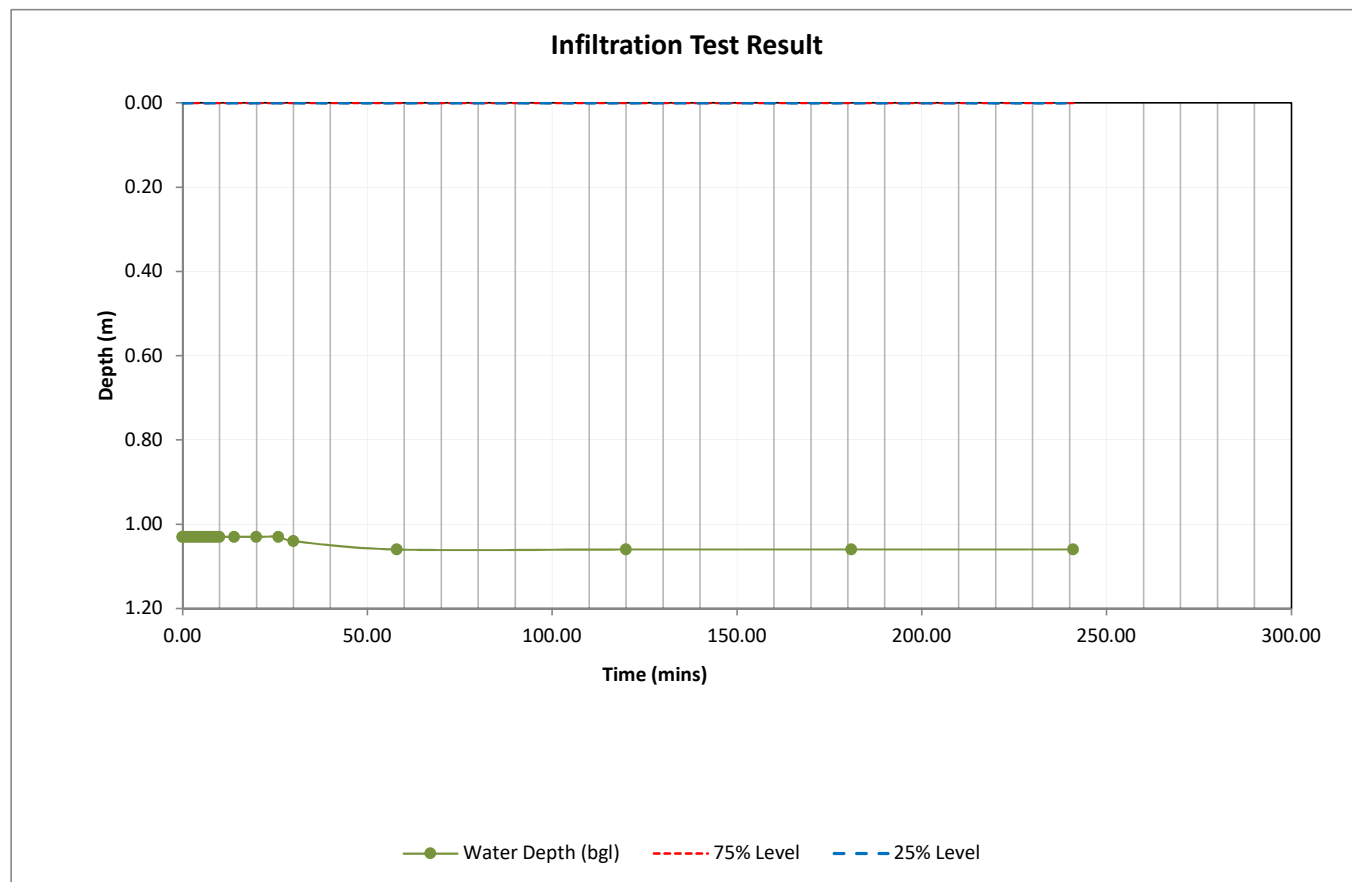
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Project Name: Healey Lane				Project No. H17075		Co-ords:		Hole Type RO		
Location: Batley						Level (m AOD):		Scale 1:100		
Client: Planned Contracts Ltd						Dates: 27/04/2018		Logged By ACV		

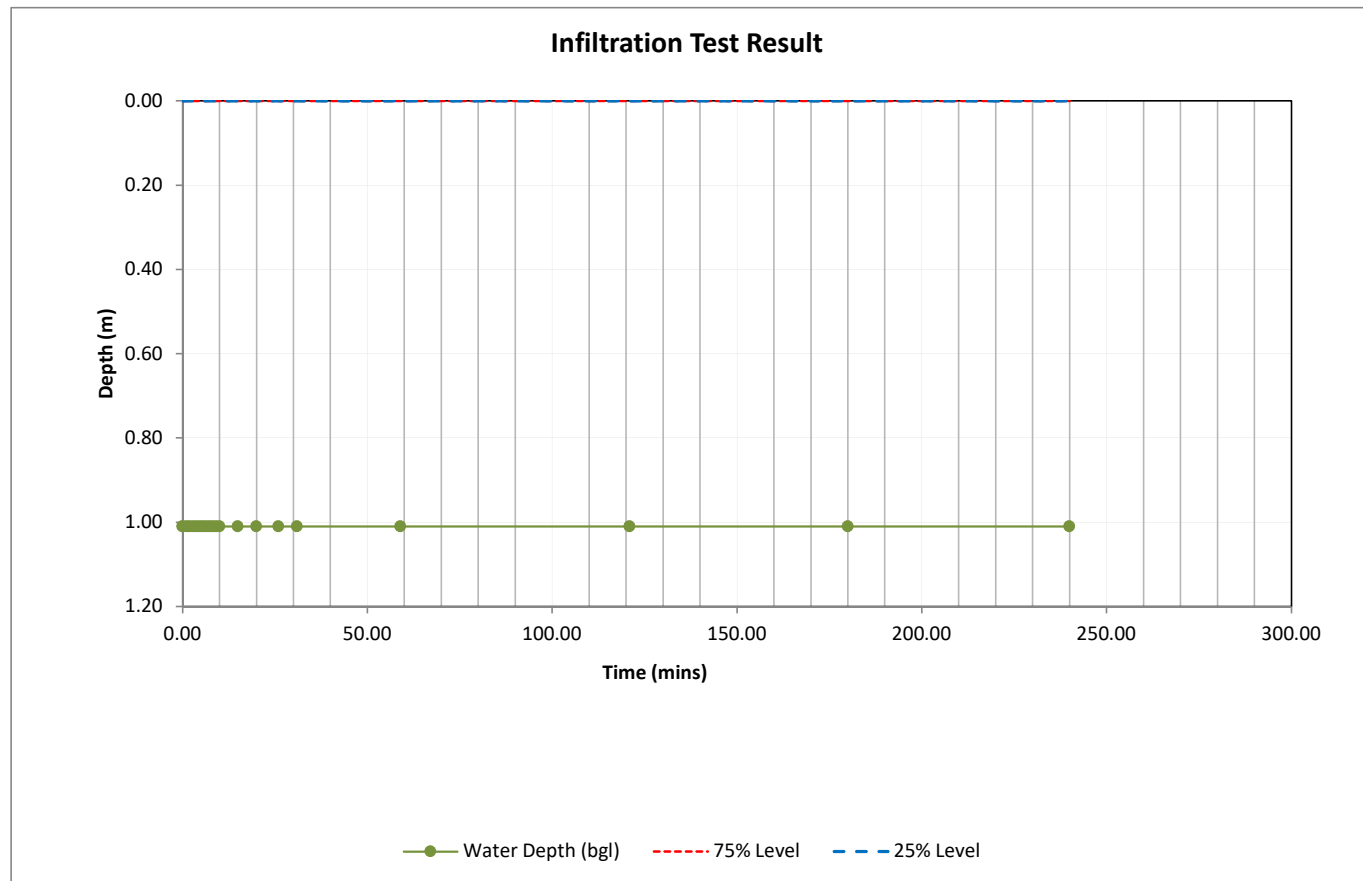
Well	Water Strikes	Sample and In Situ Testing			Depth (m bgl)	Level (m AOD)	Legend	Stratum Description	
		Depth (m bgl)	Type	Results					
					20.20			Grey MUDSTONE Dark grey carbonaceous MUDSTONE	21
					22				
					23				
					24				
					25				
					26				
					27				
					28				
					29				
					30				
					23.80			Grey MUDSTONE	31
					32				
					33				
					34				
					35				
					36				
					37				
					38				
					39				
					40				
					28.10			Orange SANDSTONE	31
					32				
					33				
					34				
					35				
					36				
					37				
					38				
					39				
					40				
					30.00			End of Borehole at 30.00m	31
					32				
					33				
					34				
					35				
					36				
					37				
					38				
					39				
					40				

Remarks: No elevated gases detected at exploratory hole. Exploratory hole backfilled with arisings and cement (with a bentonite seal at rockhead).									
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Appendix C – Field Infiltration Testing Results

[illegible]

[illegible]

[illegible]

Appendix D – Geotechnical Test Results



LABORATORY REPORT



4043

Contract Number: PSL18/2012

Report Date: 14 May 2018
Client's Reference: H17075
Client Name: Patrick Parsons
5 Waverley Road
Huddersfield
West Yorkshire
HD1 5NA

For the attention of: Andrea Chaverra Valencia

Contract Title: Healey Lane, Batley
Date Received: 30/4/2018
Date Commenced: 30/4/2018
Date Completed: 14/5/2018

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)

S Eyre
(Senior Technician)

A Fry
(Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

PSL
Professional Soils Laboratory

Healey Lane, Batley

Contract No:

PSL18/2012

Client Ref:**HI7075**

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

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



4043

PSL

Professional Soils Laboratory

Healey Lane, Batley

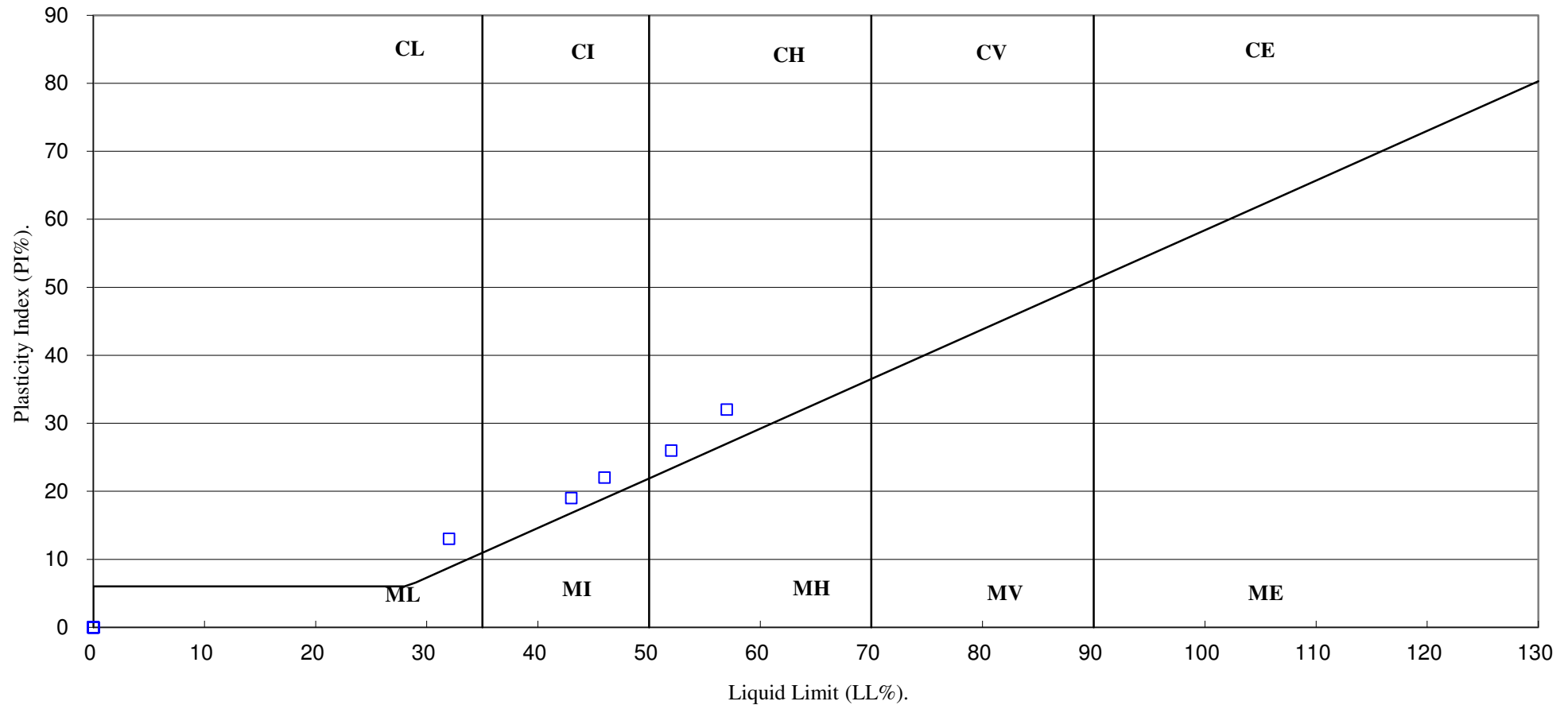
Contract No:

PSL18/2012

Client Ref:

H17075

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



4043

PSL
Professional Soils Laboratory

Healey Lane, Batley

Contract No:

PSL18/2012

Client Ref:

H17075

CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

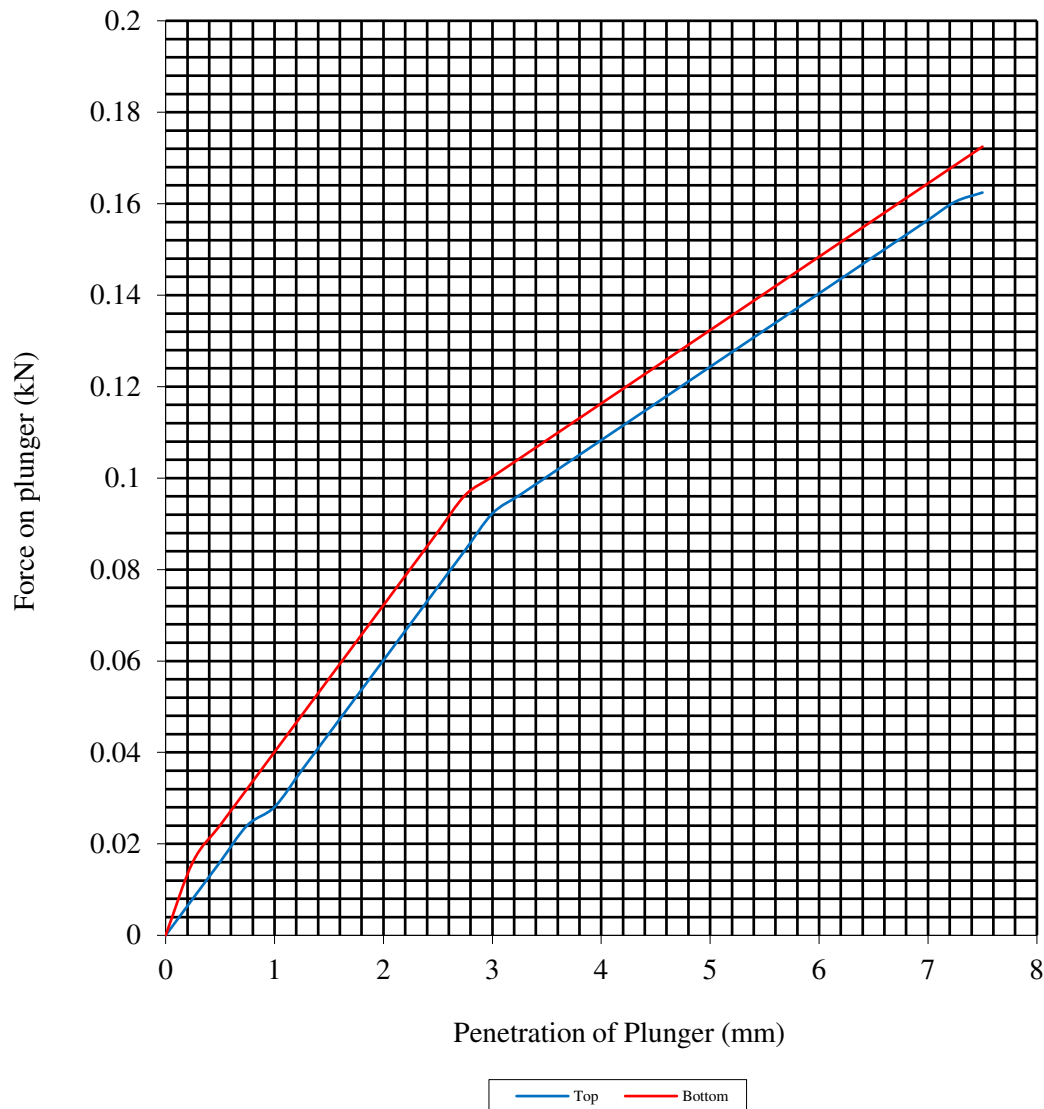
Hole Number: TP01

Top Depth (m): 0.80

Sample Number:

Base Depth (m):

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	27	Surcharge Kg:	4.20	Sample Top	27	Sample Top	0.6
Bulk Density Mg/m ³ :	1.86	Soaking Time hrs	0	Sample Bottom	27	Sample Bottom	0.7
Dry Density Mg/m ³ :	1.47	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:			5				
Compaction Conditions		4.5kg					



PSL
Professional Soils Laboratory

Healey Lane, Batley

Contract No:
PSL18/2012
Client Ref:
H17075

CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

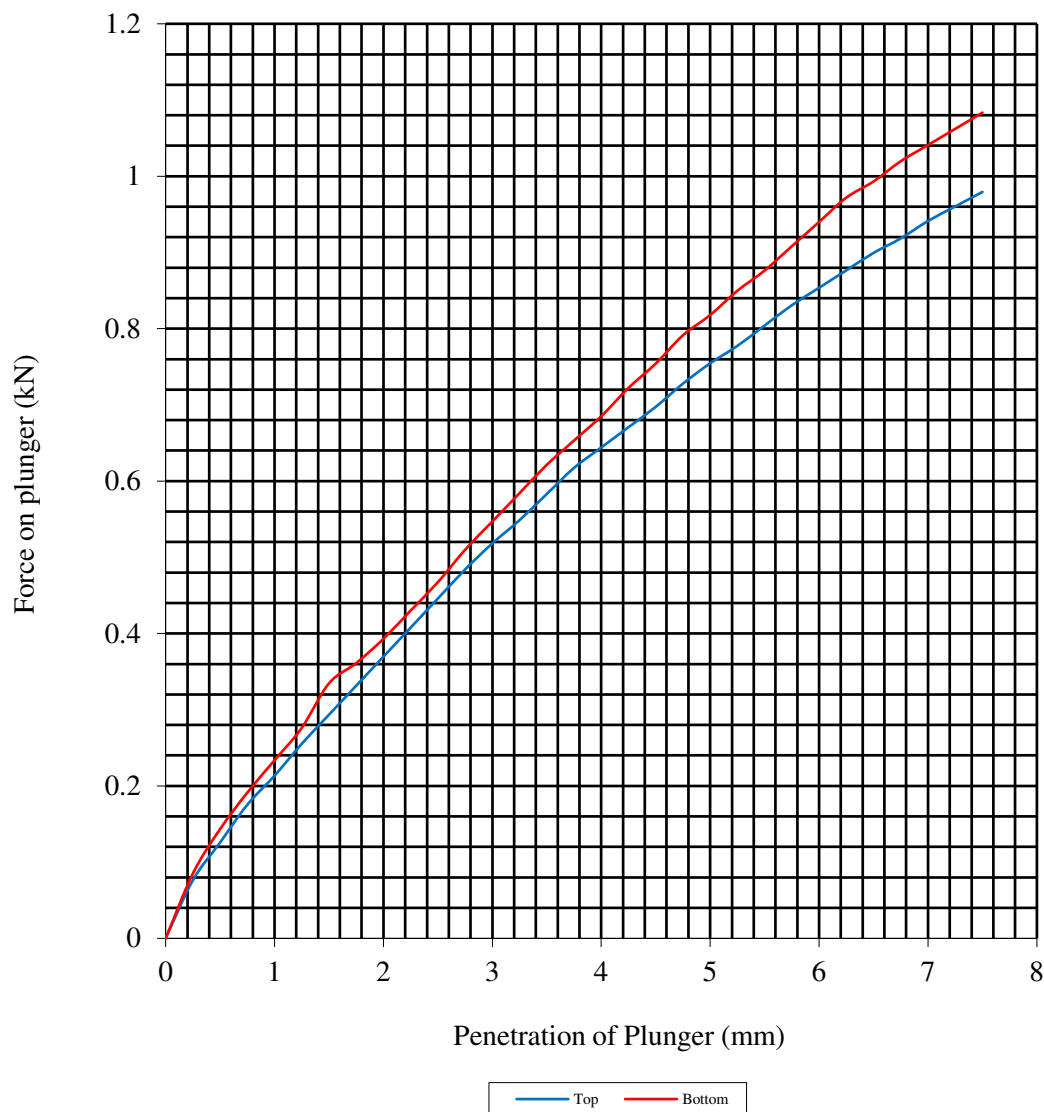
Hole Number: TP02

Top Depth (m): 0.60

Sample Number:

Base Depth (m):

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	19	Surcharge Kg:	4.20	Sample Top	19	Sample Top	3.8
Bulk Density Mg/m3:	2.10	Soaking Time hrs	0	Sample Bottom	19	Sample Bottom	4.1
Dry Density Mg/m3:	1.77	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		8					
Compaction Conditions		4.5kg					



PSL
Professional Soils Laboratory

Healey Lane, Batley

Contract No:
PSL18/2012
Client Ref:
H17075

CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

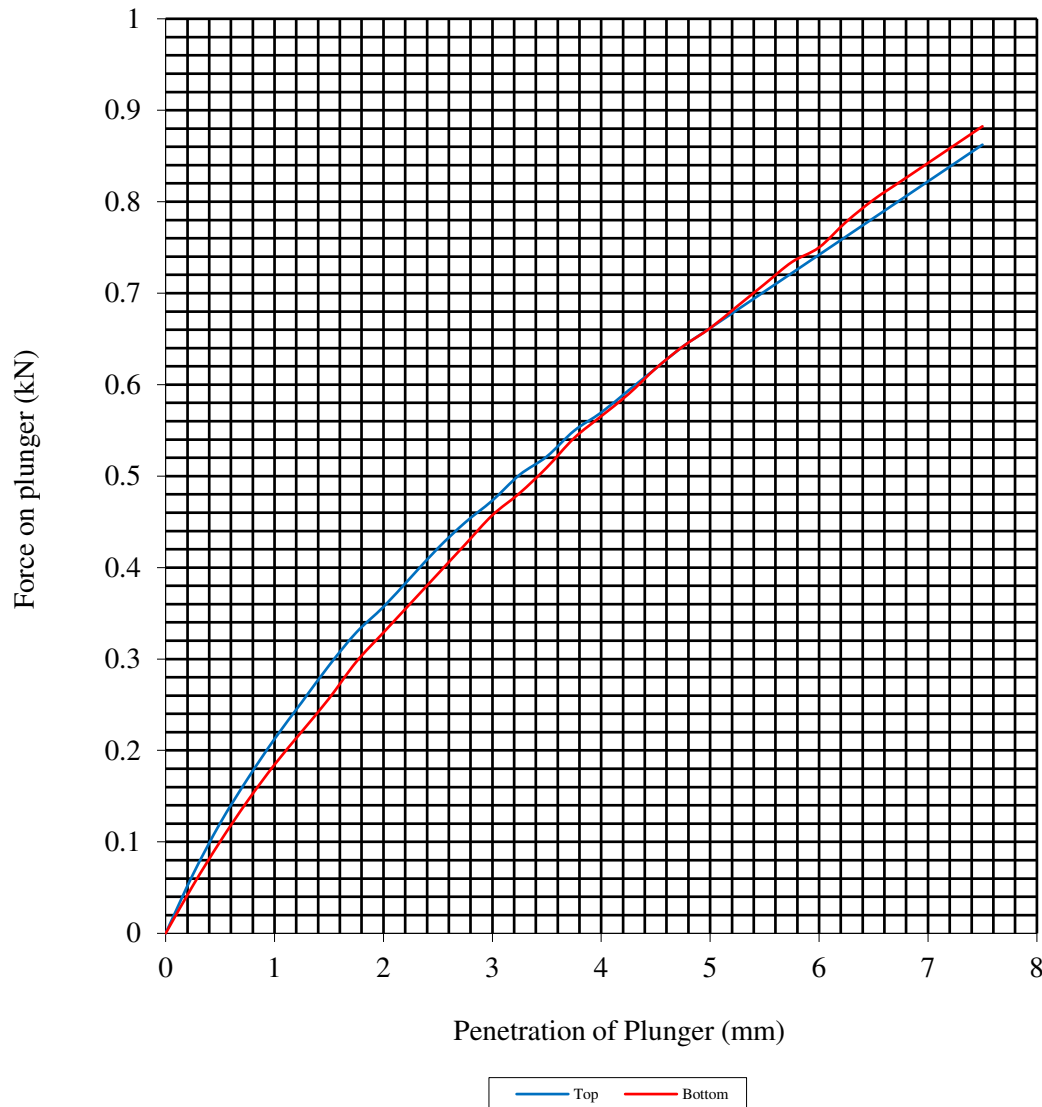
Hole Number: TP03

Top Depth (m): 1.00

Sample Number:

Base Depth (m):

Sample Type: B



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	21	Surcharge Kg:	4.20	Sample Top	21	Sample Top	3.3
Bulk Density Mg/m3:	2.07	Soaking Time hrs	0	Sample Bottom	21	Sample Bottom	3.3
Dry Density Mg/m3:	1.71	Swelling mm:	0	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		5					
Compaction Conditions		4.5kg					



PSL
Professional Soils Laboratory

Healey Lane, Batley

Contract No:
PSL18/2012
Client Ref:
H17075

Appendix E – Chemical Test Results



Certificate of Analysis

Certificate Number 18-09970

03-May-18

Client Patrick Parsons
5 Waverley Road
Huddersfield
HD1 5NA

Our Reference 18-09970

Client Reference H17075

Order No H17075/ACV/3049

Contract Title Healey Lane, Batley

Description 11 Soil samples.

Date Received 27-Apr-18

Date Started 27-Apr-18

Date Completed 03-May-18

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

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

Approved By



Adam Fenwick
Contracts Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 18-09970

Client Ref H17075

Contract Title Healey Lane, Batley

Sample ID	Depth	Lab No	Completed	Matrix Description
TP03	0.4	1330661	03/05/2018	Brown gravelly, sandy CLAY
TP04	0.5	1330663	03/05/2018	Dark brown gravelly, clayey SAND (Made ground - brick)
TP07	0.3	1330666	03/05/2018	Dark brown gravelly, clayey SAND
TP08	0.3	1330668	03/05/2018	Brown very gravelly, clayey SAND (Possible made ground - brick)
TP09	0.4	1330669	03/05/2018	Dark brown very gravelly, clayey and SAND (Made ground - brick)
TP10	0.3	1330671	03/05/2018	Dark brown very gravelly, clayey (sample matrix outside MCERTS scope of accreditation)

Summary of Chemical Analysis

Soil Samples

Our Ref 18-09970

Client Ref H17075

Contract Title Healey Lane, Batley

Lab No	1330661	1330662	1330663	1330664	1330665	1330666	1330667
Sample ID	TP03	TP03	TP04	TP04	TP05	TP07	TP07
Depth	0.40	1.30	0.50	1.80	1.20	0.30	1.20
Other ID							
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	24/04/18	24/04/18	24/04/18	24/04/18	24/04/18	24/04/18	24/04/18
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	15		45			36	
Cadmium	DETSC 2301#	0.1	mg/kg	0.1		0.2			0.6	
Chromium	DETSC 2301#	0.15	mg/kg	19		17			16	
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0		< 1.0			< 1.0	
Copper	DETSC 2301#	0.2	mg/kg	21		49			41	
Lead	DETSC 2301#	0.3	mg/kg	31		52			61	
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05		0.14			0.10	
Nickel	DETSC 2301#	1	mg/kg	16		18			27	
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5		< 0.5			< 0.5	
Zinc	DETSC 2301#	1	mg/kg	68		76			120	
Inorganics										
pH	DETSC 2008#			6.3	6.3	6.2	6.4	6.5	5.7	6.7
Total Organic Carbon	DETSC 2084#	0.5	%	1.3		12			11	
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	19	29	43	16	19	20	< 10
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.04		0.07			0.07	
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01			< 0.01	
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01			< 0.01	
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01			< 0.01	
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5			< 1.5	
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2		< 1.2			< 1.2	
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5			< 1.5	
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4		< 3.4			< 3.4	
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10		< 10			< 10	
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01			< 0.01	
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01			< 0.01	
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01			< 0.01	
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9		< 0.9			< 0.9	
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5		< 0.5			< 0.5	
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6		< 0.6			< 0.6	
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4		< 1.4			< 1.4	
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10		< 10			< 10	
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10		< 10			< 10	
PAHs										
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1		0.1			< 0.1	
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1		< 0.1			< 0.1	
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1		0.7			0.2	
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1		0.5			0.1	
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1		3.6			0.3	
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1		0.7			< 0.1	
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1		4.1			0.4	

Summary of Chemical Analysis

Soil Samples

Our Ref 18-09970

Client Ref H17075

Contract Title Healey Lane, Batley

Lab No	1330661	1330662	1330663	1330664	1330665	1330666	1330667
Sample ID	TP03	TP03	TP04	TP04	TP05	TP07	TP07
Depth	0.40	1.30	0.50	1.80	1.20	0.30	1.20
Other ID							
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	24/04/18	24/04/18	24/04/18	24/04/18	24/04/18	24/04/18	24/04/18
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1		3.7			0.4
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1		1.6			0.2
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1		1.7			0.2
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1		1.2			0.3
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1		0.7		< 0.1	
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1		1.5			0.3
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1		0.8			0.2
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1		0.1		< 0.1	
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1		0.8		< 0.1	
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6		22			2.8

Summary of Chemical Analysis

Soil Samples

Our Ref 18-09970

Client Ref H17075

Contract Title Healey Lane, Batley

Lab No	1330668	1330669	1330670	1330671
Sample ID	TP08	TP09	TP09	TP10
Depth	0.30	0.40	1.10	0.30
Other ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sampling Date	24/04/18	24/04/18	24/04/18	24/04/18
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	24	23		29
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.3		0.3
Chromium	DETSC 2301#	0.15	mg/kg	14	16		25
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0		< 1.0
Copper	DETSC 2301#	0.2	mg/kg	24	33		44
Lead	DETSC 2301#	0.3	mg/kg	32	39		74
Mercury	DETSC 2325#	0.05	mg/kg	0.10	0.11		0.12
Nickel	DETSC 2301#	1	mg/kg	16	21		24
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5		0.7
Zinc	DETSC 2301#	1	mg/kg	56	93		85
Inorganics							
pH	DETSC 2008#			7.3	8.7	5.7	7.0
Total Organic Carbon	DETSC 2084#	0.5	%	1.7	2.1		3.1
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	48	45	61	11
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.29	0.05		0.08
Petroleum Hydrocarbons							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5		< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2		< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5		< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4		< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10		< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01		< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9		< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5		< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6		< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4		< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10		< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10		< 10
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.5	< 0.1		0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.6	< 0.1		< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	3.0	< 0.1		0.3
Fluorene	DETSC 3301	0.1	mg/kg	6.5	< 0.1		0.3
Phenanthrene	DETSC 3301	0.1	mg/kg	64	0.3		1.6
Anthracene	DETSC 3301	0.1	mg/kg	18	0.1		0.3
Fluoranthene	DETSC 3301	0.1	mg/kg	68	1.1		2.0

Summary of Chemical Analysis Soil Samples

Our Ref 18-09970

Client Ref H17075

Contract Title Healey Lane, Batley

Lab No	1330668	1330669	1330670	1330671
Sample ID	TP08	TP09	TP09	TP10
Depth	0.30	0.40	1.10	0.30
Other ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sampling Date	24/04/18	24/04/18	24/04/18	24/04/18
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
Pyrene	DETSC 3301	0.1	mg/kg	53	1.1		1.9
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	22	0.7		0.9
Chrysene	DETSC 3301	0.1	mg/kg	19	0.6		0.9
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	16	0.4		0.7
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	8.9	0.3		0.4
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	20	0.7		0.8
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	12	0.4		0.5
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	1.6	0.1		0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	11	0.4		0.4
PAH Total	DETSC 3301	1.6	mg/kg	320	6.3		11

Summary of Asbestos Analysis

Soil Samples

Our Ref 18-09970

Client Ref H17075

Contract Title Healey Lane, Batley

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1330661	TP03 0.40	SOIL	NAD	none	Michael Rutherford
1330663	TP04 0.50	SOIL	NAD	none	Michael Rutherford
1330666	TP07 0.30	SOIL	NAD	none	Michael Rutherford
1330668	TP08 0.30	SOIL	NAD	none	Michael Rutherford
1330669	TP09 0.40	SOIL	NAD	none	Michael Rutherford
1330671	TP10 0.30	SOIL	NAD	none	Michael Rutherford

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 18-09970
 Client Ref H17075
 Contract Healey Lane, Batley

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1330661	TP03 0.40 SOIL	24/04/18	GJ 250ml, GJ 60ml, PT 1L		
1330662	TP03 1.30 SOIL	24/04/18	PT 1L		
1330663	TP04 0.50 SOIL	24/04/18	GJ 250ml, GJ 60ml, PT 1L		
1330664	TP04 1.80 SOIL	24/04/18	PT 1L		
1330665	TP05 1.20 SOIL	24/04/18	PT 1L		
1330666	TP07 0.30 SOIL	24/04/18	GJ 250ml, GJ 60ml, PT 1L		
1330667	TP07 1.20 SOIL	24/04/18	PT 1L		
1330668	TP08 0.30 SOIL	24/04/18	GJ 250ml, GJ 60ml, PT 1L		
1330669	TP09 0.40 SOIL	24/04/18	GJ 250ml, GJ 60ml, PT 1L		
1330670	TP09 1.10 SOIL	24/04/18	PT 1L		
1330671	TP10 0.30 SOIL	24/04/18	GJ 250ml, GJ 60ml, PT 1L		

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

Appendix A - Details of Analysis

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

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

Appendix F – Gas and Groundwater Monitoring Results

Ground Gas and Groundwater Monitoring Records



Job No: H17075
Site: Healey Lane, Batley
Client: Planned Contracts Ltd

Visit No: 1 of 6
Date: 03/05/2018
Operator: ACV

Monitoring Point	GAS CONCENTRATIONS												VOCs		GAS FLOWS				WELL AND GROUNDWATER DATA					Comments
	Methane (%v/v)		Carbon dioxide (%v/v)		LEL (%)		Carbon monoxide (ppm)		Hydrogen sulphide (ppm)		Oxygen (%)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Diff. borehole Pressure (Pa)	Time for flow to equalise (sec)	Water level (m bgl)	Depth of well (m bgl)	Reduced level (m AOD)	Water level (m AOD)	Response Zone	
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady			Peak	Steady								
WS01	0.0	0.0	1.8	1.7	0.0	0.0	0	0	0	0	18.1	17.8			0.0	0.0			2.50	2.93				
WS02	0.0	0.0	0.7	0.6	0.0	0.0	0	0	0	0	19.6	19.6			0.0	0.0			2.60	3.22				
WS03	0.0	0.0	0.6	0.6	0.0	0.0	0	0	0	0	19.1	19.1			0.0	0.0			Dry	1.99				
WS06	0.0	0.0	1.0	0.2	0.0	0.0	1	0	0	0	20.3	20.2			0.0	0.0			Dry	2.07				
Max	0.0	0.0	1.8	1.7	0.0	0.0	1	0	0	0	20.3	20.2			<0.1	<0.1			2.60	3.22				
Min	0.0	0.0	0.6	0.2	0.0	0.0	0	0	0	0	18.1	17.8			<0.1	<0.1			2.50	1.99				

METEOROLOGICAL AND SITE INFORMATION:

State of ground:

X

Dry

Moist

Wet

Snow

Frozen

Wind:

Calm

X

Light

Moderate

Strong

Cloud cover:

None

X

Slight

Cloudy

Overcast

Precipitation:

X

None

Slight

Moderate

Heavy

Barometric pressure (mbar)

Before

999

After

Pressure trend:

Falling

X

Steady

Rising

Air Temperature (Deg. C):

Before

After

Ground Gas and Groundwater Monitoring Records



Job No: H17075
Site: Healey Lane, Batley
Client: Planned Contracts Ltd

Visit No: 2 of 6
Date: 15/05/2018
Operator: ACV

Monitoring Point	GAS CONCENTRATIONS												VOCs		GAS FLOWS			WELL AND GROUNDWATER DATA					Comments	
	Methane (%v/v)		Carbon dioxide (%v/v)		LEL (%)		Carbon monoxide (ppm)		Hydrogen sulphide (ppm)		Oxygen (%)		PID Peak (ppm)	Product thickness (mm)	Flow rate (l/hr)		Diff. borehole Pressure (Pa)	Time for flow to equalise (sec)	Water level (m bgl)	Depth of well (m bgl)	Reduced level (m AOD)	Water level (m AOD)		Response Zone
	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady	Peak	Steady			Peak	Steady								
WS01	0.0	0.0	1.5	1.5	0.0	0.0	0	0	0	0	19.5	18.7			0.0	0.0			2.66	2.96				
WS02	0.0	0.0	1.2	1.1	0.0	0.0	0	0	0	0	19.0	19.0			0.0	0.0			2.77	3.25				
WS03	0.0	0.0	1.2	1.2	0.0	0.0	0	0	0	0	17.1	16.9			0.0	0.0			Dry	2.00				
WS06	0.0	0.0	3.1	3.0	0.0	0.0	0	0	0	0	17.0	16.0			0.0	0.0			Dry	2.06				
Max	0.0	0.0	3.1	3.0	0.0	0.0	0	0	0	0	19.5	19.0			<0.1	<0.1			2.77	3.25				
Min	0.0	0.0	1.2	1.1	0.0	0.0	0	0	0	0	17.0	16.0			<0.1	<0.1			2.66	2.00				

METEOROLOGICAL AND SITE INFORMATION:

State of ground:

X

Dry

Moist

Wet

Snow

Frozen

Wind:

X

Calm

Light

Moderate

Strong

Cloud cover:

X

None

Slight

Cloudy

Overcast

Precipitation:

X

None

Slight

Moderate

Heavy

Barometric pressure (mbar)

998

Before

After

Pressure trend:

X

Falling

Steady

Rising

Air Temperature (Deg. C):

Before

After

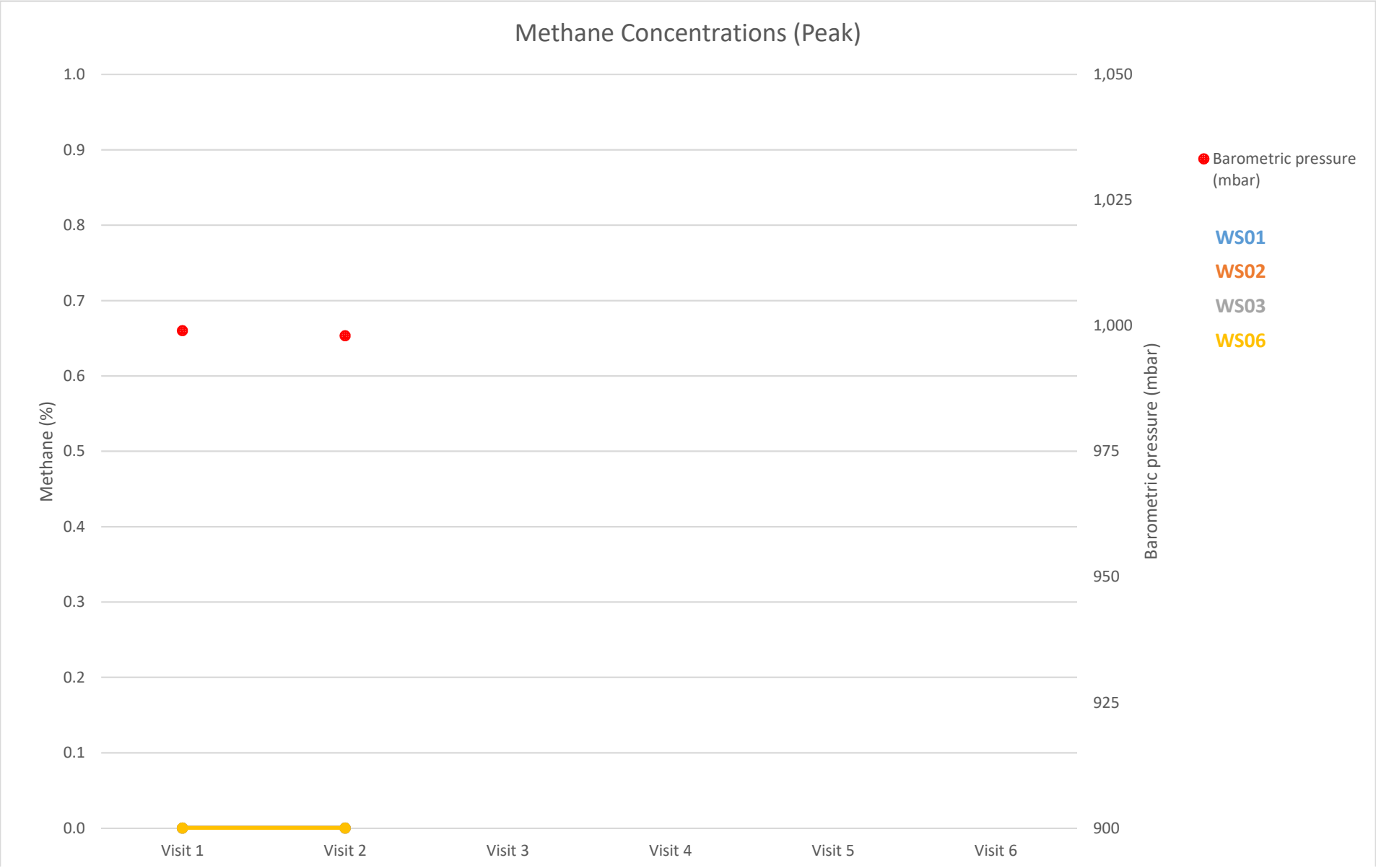
Summary Table

[illegible]

Ground Gas and Groundwater Monitoring Records



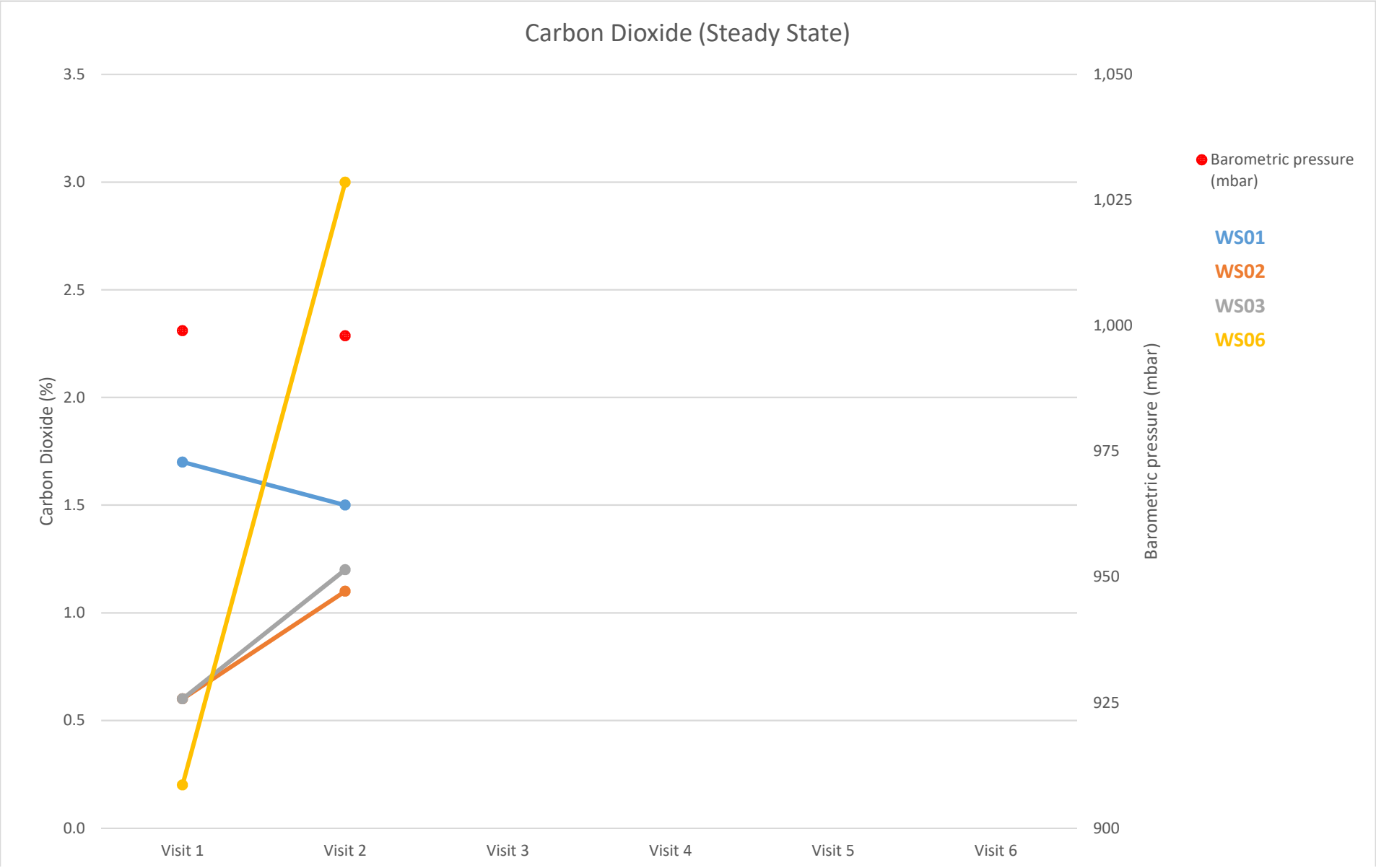
Job No: H17075
Site: Healey Lane, Batley
Client: Planned Contracts Ltd



Ground Gas and Groundwater Monitoring Records



Job No: H17075
Site: Healey Lane, Batley
Client: Planned Contracts Ltd



Ground Gas and Groundwater Monitoring Records



Job No: H17075
Site: Healey Lane, Batley
Client: Planned Contracts Ltd

[illegible]

Appendix G – PPL Generic Assessment Criteria

Soil GACs - Residential With Homegrown Produce

					
* 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
Tributyltin oxide					
Polycyclic Aromatic 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)

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