
GROUND INVESTIGATION REPORT

Mearley Croft
Woone Lane
Clitheroe
Lancashire




Client: Beck Developments Limited

J11218A

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EXECUTIVE SUMMARY

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

BRIEF

This report presents the findings of a review of a site investigation carried out by Geotechnical and Environmental Associates Limited (GEA) on behalf of Beck Developments Limited, in respect of the construction of a new residential development. Since completion of a desk study and ground investigation by GEA in 2011 and 2012, the development proposals have been altered, and this report comprises a review of the historical and environmental setting of the site with respect to possible contaminative uses, discussion of the ground conditions, and extent of any contamination and information to assist with the design of spread foundations for the proposed structures.

DESK STUDY FINDINGS

The desk study carried out by GEA in November 2011 indicated that the site has a potentially contaminative history and assessed that there was a moderate risk of there being a significant contaminant linkage at this site, which would result in a requirement for any remediation work.

GROUND CONDITIONS

The investigation has found a variable thickness of made ground extending to depths of between 0.3 m and 2.0 m and generally comprises black and brown silty sandy clay and clayey sand with extraneous material including limestone gravel, cobbles of sandstone and brick, fragments of coal, ash, clinker, tile, plastic wood and slate. Beneath the made ground, stiff sandy gravelly clay is present, extending to depths of up to 5.45 m and considered to represent Glacial Till. Groundwater was not encountered during the investigation but was present in subsequent monitoring at a depth of roughly 1.5 m. The contamination analyses have indicated that the ash and clinker scattered through the made ground contains elevated concentrations of arsenic, lead, total PAH and species thereof that are of concern to a residential end use. Laboratory analysis has confirmed that fragments of cementitious sheeting encountered on site contain white (chrysotile) asbestos.

RECOMMENDATIONS

Shallow spread foundations could be used for Block Nos 7 to 10 with deep trench filled foundations expected to be used for Block Nos 1 to 6. Ground floor slabs suspended from the foundations are recommended where trench filled foundations are used but lightly loaded ground bearing slabs may be used where the Till is present at shallow depths.

NHBC guidelines should be followed in respect of minimum foundation depths, voids beneath ground floor slabs and restrictions on new planting.

Shallow soakaways are not considered to be a suitable means of disposing of surface water.

Pavements formed in the made ground may be designed on the basis of 'less than 2 %' but if formed within the Glacial Till then a CBR value of 5 % may be adopted.

Elevated concentrations of arsenic, lead and PAH contaminants have been measured such that importing clean material for gardens and soft landscaping is considered necessary.

Part 1: INVESTIGATION REPORT

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

1.0 INTRODUCTION

Geotechnical and Environmental Associates (GEA) has been instructed by Beck Developments Limited, to reinterpret the findings of a site investigation carried out previously at this site on Woone Lane, Clitheroe in Lancashire in the light of revised development proposals. The site investigation was carried out by GEA and comprised a desk study (report ref J11218, dated November 2011) and subsequent ground investigation (report ref J11218A Rep Issue 1, dated October 2012).

1.1 Proposed Development

Consideration is being given to the redevelopment of part of the site for residential purposes. The proposed development comprises ten new two-storey dwellings with associated infrastructure, gardens and landscaping. Development of the remainder of the site is now not proposed.

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

1.2 Purpose of Work

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

- ☐ to review the environmental and historical settings of the site;
- ☐ to determine the ground conditions and their engineering properties
- ☐ to provide advice with respect to the design of spread foundations;
- ☐ to provide advice with respect to retaining walls;
- ☐ to provide advice with respect to pavement design;
- ☐ to provide an indication of the degree of soil contamination present; and
- ☐ to assess the risk that any such contamination may pose to the proposed development, its users or the wider environment and the effect it would have on the waste classification of spoil removed from site.

1.3 Scope of Work

In order to meet the above objectives, the previous desk study was reviewed along with a brief check of publicly available Environment Agency data, and an intrusive ground investigation was carried out which comprised, in summary, the following activities:

- ☐ a series of 12 mechanically excavated trial pits to a maximum depth of 2.90 m;

- ❑ four boreholes, advanced by open-drive methods to a maximum depth of 5.45 m;
- ❑ three boreholes, advanced by cable percussion methods to a maximum depth of 10.8 m;
- ❑ standard penetration tests (SPTs), carried out at regular intervals in the boreholes, to provide additional quantitative data on the strength of the soils;
- ❑ installation and monitoring of four standpipes for soil gas and groundwater;
- ❑ laboratory testing of selected soil samples for geotechnical purposes and for the presence of contamination; and
- ❑ provision of a report presenting and interpreting the above data, together with our advice and recommendations with respect to the proposed development.

The investigation and previous report covered the whole of the site but this report, which reflects a smaller development proposal, covers the southwestern part of the site, a relatively small part of that investigated, and draws only on the data relevant to the reduced development. However for the sake of clarity the full fieldwork and laboratory data is included.

The report includes a contaminated land assessment which has been undertaken in accordance with the methodology presented in Contaminated Land Report (CLR) 11¹ and involves identifying, making decisions on, and taking appropriate action to deal with, land contamination in a way that is consistent with government policies and legislation within the United Kingdom. The risk assessment is thus divided into three stages comprising Preliminary Risk Assessment, Generic Quantitative Risk Assessment, and Site-Specific Risk Assessment.

1.4 Limitations

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

2.0 THE SITE

2.1 Site Description

The site was visited as part of the work carried out in 2011 and 2012 but has not been revisited as part of this reappraisal. It is located approximately 1.2 km southwest of Clitheroe town centre and fronts onto Woone Lane to the northwest. The site is bounded to the north by lock-up garages and various outbuildings that belong to houses that front onto Woone Lane.

1 *Model Procedures for the Management of Land Contamination* issued jointly by the Environment Agency and the Department for Environment, Food and Rural Affairs (DEFRA) Sept 2004

To the southeast, the site is bounded by Mearley Brook, which flows in a southwesterly direction. The northeastern boundary is formed by woodland and dilapidated buildings which are noted on historic maps as works.

The remaining boundary to the southwest is open to woodland. The site is irregular in shape measuring 165 m southwest to northeast and 70 m northwest to southeast in maximum dimensions; it may additionally be located by National Grid Reference 373990, 441140 and is shown on the map extract, right.

When visited previously the site was in an overgrown and untidy state with fly tipped waste covering much of the surface. Part of the site to the rear of the houses that front onto Woone Lane was, at the time of walkover, being used to keep poultry.

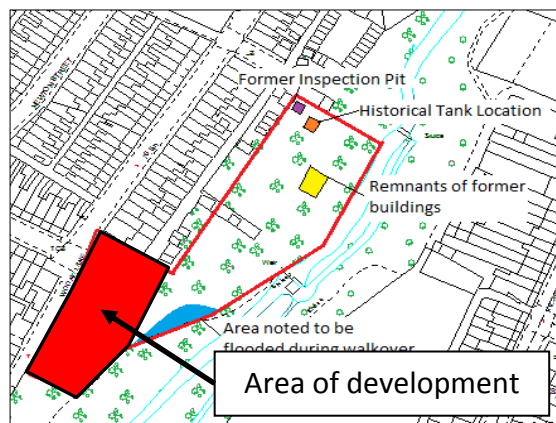
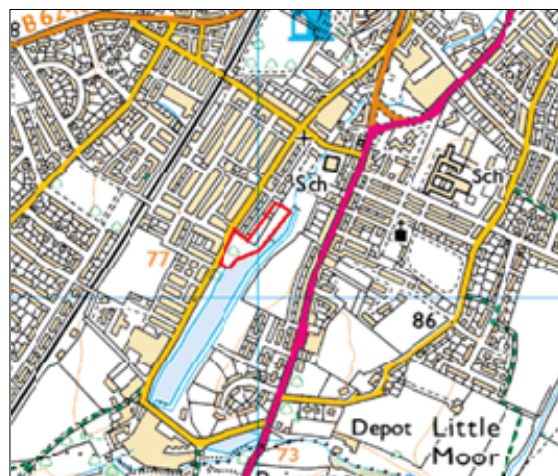
The site slopes steeply down from Woone Lane towards Mearley Brook and the gradient reduces with increasing proximity to the brook.

It appears that the site was once accessed from Woone Lane as entrances for pedestrians and vehicles have been bricked up and 'Keep Out' and 'Deep Water' warning signs are displayed. Some remnants of former buildings were noted in the north of the site, including what appears to have been a vehicle inspection pit.

The fly tipped material noted at the site was generally observed to be demolition rubble; this rubble contained some fragments of corrugated cementitious panels which may contain asbestos. The site contained numerous mature and semi-mature trees; the majority of these trees were noted to be ash.

At the time of investigation, Japanese Knotweed was observed to have covered a large part of both areas of the site although at the time of intrusive investigation the chickens had kept large areas free of growth. During subsequent monitoring visits new shoots were noted across much of the area formerly occupied by coups. In addition an extensive area of Himalayan Balsam plants was noted close to the area of the former vehicle inspection pit noted above.

From hereon the report will refer to 'the site' as being the solely the development area shown in red on the plan extract above. This area comprises the area that lies alongside Woone Lane but does not extend behind the existing terraced properties of Woone Lane. It is understood that the majority of trees in this area were cut down in this area during 2012 and 2013.



2.2 Site History

The site history was researched during the desk study and indicated that in 1847 the site was on the edge of Primrose Lodge mill reservoir. The site is shown to have been covered by woodland.

No significant changes to the site itself or its immediate surroundings were noted on subsequent maps up to the time of the desk study site walkover.

2.3 Other Information

The Geological Survey map of the area indicates the site is underlain by Glacial Till and Alluvium overlying the Clitheroe Limestone Formation and Hodder Mudstone Formation.

2.4 Preliminary Risk Assessment

Part IIA of the Environmental Protection Act 1990, which was inserted into that Act by Section 57 of the Environment Act 1995, provides the main regulatory regime for the identification and remediation of contaminated land. The determination of contaminated sites is based on a "suitable for use" approach which involves managing the risks posed by contaminated land by making risk-based decisions. This risk assessment is carried out on the basis of a source-pathway-receptor approach.

2.4.1 Source

The findings of the desk study indicated that significant contamination is unlikely to present from the historical woodland use but scattered fly tipped material including what appeared to be asbestos containing material was noted during the walkover are potential contamination sources.

The environmental search revealed a number of pollution incidents to the nearby Mearley Brook although being several metres lower than the site is highly unlikely to have detrimentally affected the site. A single historical landfill is located 228 m to the southwest and possibly within influencing distance of the site.

2.4.2 Receptor

As the usage of the site will become residential with garden areas, the human health of end-users will be considered as a sensitive target. The site is underlain by a Glacial Till which is classified as non-productive strata and therefore groundwater is not considered to be a sensitive receptor. Mearley Brook, which is located at a lower elevation and less than 50 m from the site boundary, is considered to be a moderately sensitive receptor.

2.4.3 Pathway

End users of the site may be exposed to any potential near surface contamination in gardens and landscaped areas through direct soil and dust inhalation, consumption of homegrown produce, consumption of soil adhering to homegrown produce and skin contact with soils and dust.

The site is likely to be directly underlain by Glacial Till which is designated as unproductive strata, over the Clitheroe Limestone Formation and Hodder Mudstone Formation which are designated a Secondary 'A' Aquifers. Given the environmental setting of this site it is unlikely that potential near surface contamination will impact the aquifer but would instead migrate to the adjacent Mearley Brook via surface water run off or leaching. Buried services may be exposed to any contaminants present within the soil through direct contact and site workers will come into contact with the soils during construction works.

2.4.4 Preliminary Risk Appraisal

On the basis of the above it is considered that there is a low risk of there being a contaminant linkage at this site which would result in a requirement for major remediation work.

3.0 EXPLORATORY WORK

In order to meet the objectives described in Section 1.2, a series of 12 trial pits was advanced using a 3 tonne tracked mini-excavator to a maximum depth of 2.9 m; the JCB originally delivered to site could not gain access following a period of heavy rain. In addition, four boreholes were advanced to a maximum depth of 5.45 m using a tracked open-drive sampling rig and three boreholes were advanced to a maximum depth of 10.7 m using cable percussion equipment. The trial pits and shallow boreholes were advanced under the supervision of a geotechnical engineer from GEA. During the boring of the shallow boreholes, a continuous soil core was recovered and examined by the engineer and Standard Penetration Tests (SPTs) were carried out at regular intervals.

A selection of the samples recovered from the trial pits and boreholes was submitted to a soil mechanics laboratory for a programme of geotechnical testing and an analytical laboratory for a programme of contamination testing.

The borehole records and the results of the laboratory analyses are appended, together with a site plan indicating the exploratory positions. The Ordnance Datum (OD) levels shown on the borehole records have been interpolated from spot levels shown on a topographic survey of the site that was provided by the client.

3.1 Sampling Strategy

The sampling strategy was designed to provide an indication of the thickness of made ground and to provide parameters for foundation design in the proposed location of the new houses, along with determining the nature and consistency of the made ground in the areas planned as gardens and pavements.

A total of 24 samples recovered from the made ground was subjected to analysis for a range of common industrial contaminants and contamination indicative parameters although eight are relevant to this assessment. For this investigation the analytical suite for the soil included a range of metals, speciation of total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide and monohydric phenols. In addition, three samples of the cementitious sheeting roof material obtained from fragments lying on the ground were screened for the presence of asbestos.

The soil samples were largely selected from the upper 1.0 m of soil to provide a general view of the chemical conditions of the soils that are likely to be involved in a human exposure pathway and to provide advice in respect of re-use or for waste disposal classification. The contamination analyses were carried out at an MCERTs accredited laboratory with the majority of the testing suite accredited to MCERTS standards. Details of the MCERTs accreditation and test methods are included in the Appendix together with the analytical results.

4.0 GROUND CONDITIONS

A variable thickness of made ground is present across the site and was found to be underlain by firm becoming stiff gravelly clay representing Glacial Till.

4.1 Made Ground

The made ground was found to extend to depths of between 0.3 m and 2.0 m with the smallest thicknesses measured in Borehole Nos 1 and 2 closest to Woone Lane and the depth increasing to about 2.0 m in the eastern corner of the site. The made ground generally comprised black and brown silty sandy clay and clayey sand with extraneous material including limestone gravel, cobbles of sandstone and brick, fragments of coal, ash, clinker, tile, plastic wood, slate and tarmac. Scattered fragments of cementitious, possibly asbestos - cement board were observed on the surface across the site.

Evidence of potentially contaminated material was observed within these soils, in that ash and clinker, which commonly contain elevated concentrations of arsenic, copper, lead, nickel, zinc and Poly-aromatic hydrocarbons (PAH), was found as fragments scattered throughout the fill materials. No evidence of significant oil staining or spillage was observed in any of the exploratory locations. Samples of the made ground were analysed for a range of contaminants and the results are summarised in Section 4.4.

4.2 Glacial Till

Beneath the made ground, firm and stiff brown and greyish brown silty sandy clay with scattered limestone gravel was encountered and proved to the maximum depth investigated in that area of 5.45 m (68.95 mOD). Laboratory testing of these deposits has indicated that the material is of intermediate plasticity and therefore has low to medium volume change potential. The moisture content of samples of this material suggests that at relatively shallow depths, the material may be partially desiccated due to the numerous mature trees in this area however the relatively low plasticity index values and clay fraction values suggest that the results are also attributable to the nature of the Till and its limestone gravel content.

These soils were observed to be free of any evidence of soil contamination

4.3 Groundwater

Groundwater was not encountered during the investigation but was present in subsequent monitoring at a depth of roughly 1.5 m.

4.4 Soil Contamination

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

Determinant	Maximum concentration recorded (mg/kg)	Minimum concentration recorded (mg/kg)	Number of samples below detection limit
pH	8.7	7.6	-
Arsenic	56	12	None
Cadmium	1.3	0.25	None

Determinant	Maximum concentration recorded (mg/kg)	Minimum concentration recorded (mg/kg)	Number of samples below detection limit
Chromium	40	8.9	None
Copper	160	17	None
Mercury	0.76	<0.10	2
Nickel	62	10	None
Lead	290	74	None
Selenium	1.1	<0.2	2
Zinc	330	74	None
Total Cyanide	<0.5	<0.5	All
Total Phenols	<0.3	<0.3	All
Sulphide	6.2	2.0	None
Total TPH	130	<10	2
Naphthalene	2.2	<0.1	2
Benzo(a)pyrene	9.8	<0.1	1
Total PAH	110	<2	1
Total organic carbon %	11	5.3	None

Note: Figure in **bold** indicates concentration in excess of risk-based soil guideline values, as discussed below

The contamination testing has indicated elevated concentrations of arsenic, lead and of benzo(a)pyrene as well as of total PAH. In addition white (chrysotile) asbestos was identified within two of the three samples of cementitious sheeting tested.

4.4.1 Generic Quantitative Risk Assessment

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site-specific risk assessments. To this end the table below indicates those contaminants of concern that have values in excess of a generic human health risk based guideline values which are either that of the CLEA² Soil Guideline Value where available, or is a Generic Screening Value calculated using the CLEA UK Version 1.06³ software assuming a residential end use without plant uptake, or is based on the DEFRA Category 4 Screening values⁴. The key generic assumptions for this end use are as follows:

- ☐ that groundwater will not be a critical risk receptor;
- ☐ that the critical receptor for human health will be young female children aged zero to six years old;
- ☐ that the exposure duration will be six years;

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

³ Contaminated Land Exposure Assessment (CL)EA) Software Version 1.06 Environment Agency 2009

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

- ❑ that the critical exposure pathways will be direct soil and indoor dust ingestion, skin contact with soils and indoor dust, and inhalation of indoor and outdoor dust and vapours; and
- ❑ that the building type equates to a two-storey small terraced house.

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

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

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

The concentration ranges of the contaminants of concern highlighted by a comparison of the measured concentrations against the generic screening values are tabulated below. This assessment is based upon the potential for risk to human health, which at this site is considered to be the critical risk receptor.

Contaminant of Concern	Maximum concentration recorded (mg/kg)	Minimum concentration recorded (mg/kg)	Mean concentration (mg/kg)	Generic Risk-Based Screening Value
Arsenic	56	12	23.5	37
Lead	290	74	181	200
Benzo(a)pyrene	4.9	<0.1	3.9	5.0
Total PAH	110	<2	34	71.4

The elevated concentrations have been recorded in three samples of the made ground recovered from Trial Pit Nos 1 and 3 at 0.9 m depth and 0.3 m depth respectively and from Borehole No 1 at 0.2 m from ash and clinker rich material. The significance of these results is discussed further in Part 2 of the report.

4.5 Soil Gas

The results of the five rounds of gas monitoring undertaken indicated very high concentrations of methane and elevated concentrations of carbon dioxide within boreholes close to Mearley Brook on the part of the site that is not going to be developed. The results from Borehole No 2, on the site that is to be developed, suggest that normal aerobic conditions prevail with no evidence of gas migration from either the lower part of the site or from the historic landfill southwest of the site.

Part 2: DESIGN BASIS REPORT

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

5.0 INTRODUCTION

It is understood that consideration is being given to the construction of ten new two-storey dwellings in three blocks. In addition new paths, car parking and small gardens are to be provided with each house. It is anticipated that the proposed development is likely to impose relatively light to moderate loadings.

6.0 GROUND MODEL

The previous desk study indicates that the site does not have a potentially contaminative history. On the basis of the fieldwork, the ground conditions at this site can be characterised as follows.

- A variable thickness of made ground is present to depths of between 0.3 m and 2.0 m;
- the made ground generally comprises black and brown silty sandy clay and clayey sand with extraneous material including limestone gravel, cobbles of sandstone and brick, fragments of coal, ash, clinker, tile, plastic wood and slate;
- beneath the made ground stiff sandy gravelly clay is present and was proved to extend to depths of up to 5.45 m;
- groundwater has been measured at approximately 1.5 m;
- the contamination analyses have indicated that the ash and clinker scattered through the made ground contains elevated concentrations of arsenic, lead, total PAH and species thereof that are of concern to a residential end use; and
- laboratory analysis has confirmed that fragments of corrugated cementitious boarding contain white (chrysotile) asbestos.

7.0 ADVICE AND RECOMMENDATIONS

The competent natural soils encountered at shallow depths should provide suitable bearing strata for the support of the anticipated light loads by means of spread foundations.

7.1 Spread Foundations

Moderate width strip or pad foundations bearing on the firm Glacial Till should be placed at a minimum depth of 1.25 m, assuming that no restrictions are applied on planting of shrubs in the vicinity of foundations, and that a no planting zone is applied in accordance with Table 4 of NBHC Standards Chapter 4.2 (2014). If trees are excluded within the zone of influence

shown in Table 2 of the NHBC guidance, the minimum depth can be reduced to 0.9 m, subject also to the further advice on new tree and shrub planting as detailed in the NHBC guidelines. Medium volume change potential has been adopted to remain conservative given the proximity of the more mature trees. The foundations may be designed to apply a net allowable bearing pressure of 150 kN/m². This value incorporates an adequate factor of safety against bearing capacity failure and should ensure that settlement remains within normal tolerable limits. The recommended bearing pressure takes account of the variable nature of the soils and any foundations should be nominally reinforced where they span clay and granular material to protect against differential settlement.

If trees are to be planted in close proximity to the new buildings founding depths should be deepened in accordance with NHBC guidelines and using the mature height of the tree. Medium shrinkability clay should be assumed.

The deeper made ground in the vicinity of Plot Nos 1 to 4 will prohibit shallow foundations but with the Glacial Till present at between 1.8 m and 2.0 m then consideration could be given to trench filled foundations bearing within the Glacial Till. A similar bearing pressure to the above may be adopted and the same restrictions in respect of NHBC guidelines will need to be provided for.

Since the plot layout has changed since the original investigation it would be prudent to undertake further investigation in between Plot Nos 4 and 5 to confirm the thickness of made ground and to determine whether shallow or trench-filled foundations will be necessary.

7.2 Retaining Walls

In order to level the site or to reduce its gradient, a retaining wall is proposed to be located roughly mid-slope. It is understood that consideration is being given to either traditional gravity or gabion basket retaining walls. The following parameters are suggested for the design of these retaining walls.

Stratum	Bulk Density (kg/m ³)	Effective Cohesion (c' – kN/m ²)	Effective Friction Angle (φ' – degrees)
Made ground	1700	Zero	27
Glacial Till	1950	Zero	25

7.3 Excavations

On the basis of the observations made on site, it is anticipated that shallow and moderate depth excavations within the Glacial Till are likely to remain stable in the short and medium term. Groundwater ingress may be expected in the medium to long term but conventional sump pumping techniques should be able to control such inflows.

However, if deeper excavations are necessary or if excavations are to remain open for prolonged periods it is recommended that provision be made for battered side slopes or lateral support. Where personnel are required to enter excavations, a risk assessment should be carried out and temporary lateral support or battering of the excavation sides considered in order to comply with normal safety requirements.

7.4 Ground Floor Slabs

For Block Nos 7 to 10, where trees will have been removed, the floor slabs may need to be suspended over a void in accordance with NHBC guidelines.

For the remaining blocks, where deep trench filled foundations are necessary then fully suspended floor slabs should be adopted.

7.5 Pavement Design

Pavements formed in the made ground should be designed on a California Bearing Ratio (CBR) value of 'less than 2 %'. Formation levels should be subject to a proof rolling exercise and any soft spots revealed should be excavated and replaced with suitably compacted granular fill or lean mix concrete. .

Where pavements are to be formed within the Glacial Till then a CBR value of 5 % may be adopted.

7.6 Effect of Sulphates

Low concentrations of soluble sulphate have been measured within the made ground and natural soils.

It is suggested that in the natural soils, buried concrete could be designed in accordance with Class DS-1 conditions of Table C2 of BRE Special Digest 1: SD1 Third Edition (2005). The measured pH conditions are mildly alkaline and on the basis of static groundwater conditions being assumed for buried concrete an ACEC classification of AC-1s may be adopted.

In any case, the guidelines contained in the above digest should be followed in the design of foundation concrete.

7.7 Disposal of Surface Water

The depth and nature of the cohesive essentially impermeable Glacial Till indicate that shallow soakaway drainage will not be possible for this site and surface water should be directed into the main pumped drainage system or indeed into Mearley Brook if the appropriate consents can be obtained.

7.8 Contamination Risk Assessment

The desk study findings indicate the site not to have had a potentially contaminative history as the site has apparently been woodland as far back as records are available. The results of the chemical analyses have indicated elevated concentrations of arsenic, lead and PAH within the samples of the made ground tested. The source of the contamination is considered to be the ash and clinker rich made ground. In addition fragments of cementitious asbestos sheeting were observed across the site surface.

The proposed residential end-usage of the site with domestic gardens represents a risk to end users from the contaminants measured. These risks, as well as groundwater and site workers are further assessed below.

7.8.1 End Users

Elevated concentrations of arsenic PAH and its carcinogenic constituent species have been measured within the made ground and are considered to represent typical post-war ash and clinker-rich made ground. The use of such material was widespread in capping cohesive deposits during the 1960s and 1970s as it was an economical use of waste material. The affected material is of variable thickness and is widespread over the areas of the site proposed for gardens. The measured concentrations pose a risk to human health and it is therefore recommended that the affected material is removed from these relatively small areas and replaced or covered with certified clean imported material.

If covered, a cover of imported subsoil and topsoil of 600 mm in thickness should be specified to ensure successful plant growth, in accordance with recommendations from BRE⁵. It may be possible to reduce the final thickness of cover required, but this will need to be determined once final levels have been established and the concentrations of potential contaminants within the imported material are known.

In addition the presence of cementitious asbestos roofing has been confirmed and this material requires removal. Further there remains the potential for localised zones of oil stained soils to be present arising from illegal disposal; it would be prudent to allow a contingency for localised 'dig and dump' to deal with such pockets of contamination.

7.8.2 Groundwater

Groundwater has not been encountered within the investigation and is considered to be protected by the thickness of essentially impermeable Glacial Till. Further the risk posed to surface waters will be eliminated if the made ground is removed from garden areas and areas of soft landscaping.

7.8.3 Site Workers

Concentrations of potentially carcinogenic PAH have been measured in the soils that contain ash and clinker and chrysotile asbestos has been identified within the fragments of sheeting scattered over the site. Site workers should be made aware of the contamination and a programme of working should be identified to protect workers handling any soil. This would typically avoiding skin contact with the soil and providing facilities for workers to wash prior to consuming food or smoking in clean designated areas. In addition specialist advice should be sought in respect of the removal and disposal of the asbestos-cement fragments and boards. This may typically involve the hand-picking and double bagging of fragments during an initial site walkover during the early stages of site preparation. The method of site working should be in accordance with guidelines set out by HSE⁶ and CIRIA⁷ and the requirements of the Local Authority Environmental Health Officer.

7.8.4 Services

Consideration will need to be given to the protection of buried plastic services if they are to be laid within the made ground which contains ash and clinker. Such protective measures could comprise the over digging of the service trenches and their backfilling with clean material or the adoption of barrier pipe to provide protection for potable water supplies. Details of the proposed protection measures for buried services will in any case need to be approved by the EHO and the relevant service authority prior to the adoption of any scheme.

⁵ BRE (2004) *Cover systems for land regeneration. Thickness of cover systems for contaminated land*. BRE pub 465

⁶ HSE (1992) HS(G)66 *Protection of workers and the general public during the development of contaminated land*
HMSO

⁷ CIRIA (1996) *A guide for safe working on contaminated sites* Report 132, Construction Industry Research and Information Association

It should be noted that it is possible that even if such ash and clinker rich material is to be removed from service trenches that barrier pipe may be required or that additional testing will need to be carried out to satisfy the Water Authority.

7.8.5 Invasive Species

Whilst the widespread presence of Japanese Knotweed and more localised presence of Himalayan Balsam were identified during the site investigation fieldwork, it is understood that the species have been eradicated by others and is therefore outside the scope of this report.

7.9 Waste Disposal

Under the European Waste Directive, waste is classified as being either Hazardous or Non-Hazardous and landfills receiving waste are classified as accepting hazardous or non-hazardous wastes or the non-hazardous sub-category of inert waste in accordance with the Waste Directive. Waste classification is a staged process and this investigation represents the preliminary sampling exercise of that process. Once the extent and location of the waste that is to be removed has been defined, further sampling and testing may be necessary. The results from this ground investigation should be used to help define the sampling plan for such further testing, which could include WAC leaching tests where the totals analysis indicates the soil to be a hazardous waste or inert waste from a contaminated site. It should however be noted that the Environment Agency guidance WM3⁸ states that landfill WAC analysis, specifically leaching test results, must not be used for waste classification purposes.

Any spoil arising from excavations or landscaping works, which is not to be re-used in accordance with the CL:AIRE⁹ guidance, will need to be disposed of to a licensed tip. Waste going to landfill is subject to landfill tax at either the standard rate of £82.60 per tonne (about £150 per m³) or at the lower rate of £2.60 per tonne (roughly £5 per m³). However, the classifications for tax purposes and disposal purposes differ and currently all made ground and topsoil is taxable at the 'standard' rate and only naturally occurring soil and stones, which are accurately described as such in terms of the 2011 Order, would qualify for the 'lower rate' of landfill tax.

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

Soil Type	Waste Classification (Waste Code)	WAC Testing Required Prior to Landfill Disposal?	Comments
Made ground	Non-hazardous (17 05 04)	No	
Glacial Till	Inert (17 05 04)	Should not be required but confirm with receiving landfill	

Under the requirements of the European Waste Directive all waste needs to be pre-treated prior to disposal. The pre-treatment process must be physical, thermal, chemical or biological, including sorting. It must change the characteristics of the waste in order to reduce its volume, hazardous nature, facilitate handling or enhance recovery. The waste producer can carry out the treatment but they will need to provide documentation to prove that this has been carried out. Alternatively, the treatment can be carried out by an approved contractor. The

8 Environment Agency 2015. *Guidance on the classification and assessment of waste*. Technical Guidance WM3 First Edition
9 CL:AIRE March 2011. *The Definition of Waste: Development Industry Code of Practice* Version 2

Environment Agency has issued a position paper¹⁰ which states that in certain circumstances, segregation at source may be considered as pre-treatment and thus excavated material may not have to be treated prior to landfilling if the soils can be segregated onsite prior to excavation by sufficiently characterising the soils insitu prior to excavation.

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

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

8.0 OUTSTANDING RISKS AND ISSUES

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

The ground is a heterogeneous natural material and variations will inevitably be present between the locations at which it is investigated. This report has provided an assessment of the ground conditions based on the discrete points at which the ground was sampled and thus the ground conditions should be subject to review during the groundworks to ensure that any variations from the Ground Model are properly assessed by a suitably qualified person.

The site does not have a potentially contaminative history and on the basis of the investigation and the proposed development it has been assessed that the risk of significant areas of gross soil contamination being present is relatively low. As shown by the test results, there remains a potential for localised areas of contamination to be present within the fill material. If during groundworks any zones of odorous, discoloured or suspect materials are encountered it is recommended that further investigation be carried out and that the risk assessment should be reviewed.

Asbestos containing cementitious sheet fragments have been observed on site and there is thus a potential for pockets of asbestos containing material (ACM) to be present in the made ground particularly if localised disposal has been carried out. Should any suspected ACM be encountered during the works it should either be removed as an asbestos waste or covered or damped down to prevent dusting pending further analyses.

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

APPENDIX

Borehole Records

Trial Pit Records

SPT results

Laboratory Test Results

: Index Properties

: Particle Size Distribution Test Results












: Sulphate Analyses















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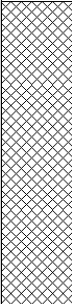



Gas Monitoring Results









Site Specific Screening Criteria


Site Plan



<div><div>GEA</div><div>Geotechnical & Environmental Associates</div></div>				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Number BH01	
Excavation Method Percussive lined open-drive sampler (terrier rig)		Dimensions		Ground Level (mOD) 75.40		Client Beck Developments Limited		Job Number J11218A	
		Location		Dates 03/07/2012		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.20	D1		10,8/7,8,10,9	75.10	(0.30) 0.30	Made Ground (Cement asbestos board noted amongst rubble and rubbish at the surface beneath which was dark brown humic very sandy clay)			
0.60	D2				Stiff pale brown, occasionally grey, silty sandy CLAY with scattered gravel and occasional cobbles of sandstone and limestone; gravel is fine medium and coarse, sub angular to angular; slightly desiccated to 0.5 m				
0.90	D3								
1.00-1.45	SPT(C) N=34								
1.20	D4								
1.50-1.95	SPT(C) N=43								
1.50	D5								
2.00	D6								
2.50	D7								
3.00-3.45	SPT(C) N=30								
3.00	D8								
3.60	D9	3,5/6,5,7,8	70.95	4.45	Complete at 4.45m				
4.00-4.45	SPT N=26								
Remarks Sample ACM1 was taken from close to Borehole No 1. Sampling barrel refusal occurred at 1.5 m; CPT undertaken and smaller barrel used from 2.0 m to 4.0 m. Groundwater not encountered.							Scale (approx) 1:50	Logged By MC	
							Figure No. J11218A.BH01		


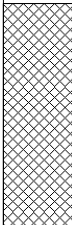

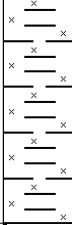
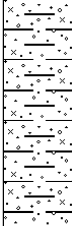
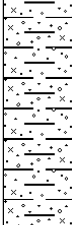
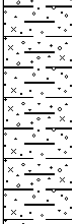
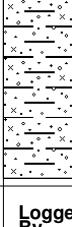
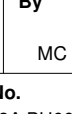

 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Number BH02
Excavation Method Percussive lined open-drive sampler (terrier rig)		Dimensions		Ground Level (mOD) 74.40		Client Beck Developments Limited		Job Number J11218A
		Location		Dates 03/07/2012		Engineer		Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	D1			74.10	(0.30) 0.30	Made Ground (Black and dark brown very sandy clay with roots and rootlets)		
0.50	D2				(0.60)	Stiff pale brown, becoming brownish grey by 1.9 m silty sandy CLAY with scattered gravel of sandstone and limestone; gravel is fine medium and coarse, sub angular to angular		
0.90 1.00-1.45	D3 SPT N=30		3,6/7,7,8,8	73.50	0.90			
1.30	D4					Stiff grey silty sandy gravelly CLAY, gravel is fine medium and coarse, sub angular to angular of limestone and sandstone		
1.70	D5							
2.00-2.45	SPT N=23		2,4/6,5,6,6					
2.20	D6							
2.70	D7							
3.00-3.45	SPT N=23		4,4/4,6,7,6		(4.55)			
3.20	D8							
4.00-4.45	SPT N=39		11,7/15,8,6,10					
4.20	D9							
5.00-5.45	SPT N=46		6,12/15,13,9,9					
				68.95	5.45	Complete at 5.45m		
Remarks Groundwater not encountered. 50 mm combined gas and groundwater standpipe installed to a depth of 5.0 m with a resonance zone from 1.0 m to 5.0 m							Scale (approx) 1:50	Logged By MC
							Figure No. J11218A.BH02	


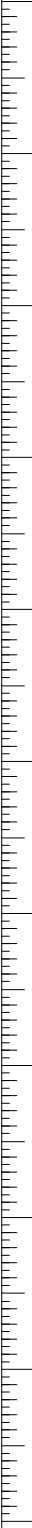
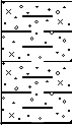
 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Number BH03	
Excavation Method Percussive lined open-drive sampler (terrier rig)		Dimensions		Ground Level (mOD) 74.60		Client Beck Developments Limited		Job Number J11218A	
		Location		Dates 03/07/2012		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.50	D1					Made Ground (Brown silty sandy clay with abundant limestone gravel, scattered fragments of brick to 0.5 m, fragments of coal and ash to 1.8 m cobble jammed in the end of the sampling tube to 2.0 m)			
1.00-1.45	SPT N=13		5,3/3,3,4,3		(2.00)				
1.80	D2								
2.00-2.45	SPT(C) N=25		1,4/8,4,6,7	72.60	2.00	Stiff pale brown, becoming brownish grey by 1.9 m silty sandy CLAY with scattered gravel of sandstone and limestone; gravel is fine medium and coarse, sub angular to angular			
2.30	D3				(1.00)				
2.80	D4								
3.00-3.45	SPT(C) N=22		2,4/4,6,6,6	71.60	3.00	Stiff grey silty sandy gravelly CLAY, gravel is fine medium and coarse, sub angular to angular of limestone and sandstone			
3.30	D5				(1.45)				
3.80	D6								
4.00-4.45	SPT N=24		3,3/3,4,10,7	70.15	4.45	Complete at 4.45m			
Remarks Groundwater not encountered. Sample ACM2 was taken from close to Borehole No 3.								Scale (approx)	
								1:50	
								Logged By MC	
								Figure No. J11218A.BH03	

 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Number BH04	
Excavation Method Percussive lined open-drive sampler (terrier rig)		Dimensions		Ground Level (mOD) 71.80		Client Beck Developments Limited		Job Number J11218A	
		Location		Dates 03/07/2012		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.20	D1			71.40	(0.40) 0.40	Made Ground (Black and very dark brown very sandy clay with fragments of wood, brick, slate, sandstone, ash and clinker)			
0.60	D2			70.90	(0.50) 0.90	'Stiff' brown and occasionally orange-brown silty sandy CLAY with scattered shell fragments			
1.00-1.45	SPT N=1		0,0/0,0,0,1		(0.80)	Soft, occasionally very soft grey and black clayey sandy SILT with scattered shell fragments			
1.60	D3			70.10	1.70	Soft pale greyish brown silty very sandy CLAY with layers of clayey sand			
2.00-2.45	SPT N=2		0,0/0,0,1,1		(1.49)				
2.60	D4								
3.00-3.19	SPT 50/35		2,5/50	68.61	3.19	Complete at 3.19m			
Remarks Groundwater was not encountered within the casing on completion of the borehole but collapse had occurred in withdrawal of the casing; observation of the soils retrieved suggests groundwater ingress between 2.0 m and 3.0 m. Sample ACM3 was taken from close to Borehole No 4.								Scale (approx) 1:50	Logged By MC
								Figure No. J11218A.BH04	


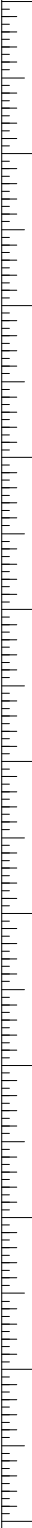

 Geotechnical & Environmental Associates					Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Borehole Number BH05
Boring Method Cable percussion		Casing Diameter 150mm cased to 9.00m		Ground Level (mOD) 71.70		Client Beck Developments Limited		Job Number J11218A	
		Location		Dates 13/07/2012		Engineer		Sheet 1/2	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10 0.20-1.50 0.50	D1 B4 D2				71.60	0.10	Made Ground (Tarmac) Made Ground (Brown and dark brown sandy very gravelly clay fragments of brick, concrete, ash and clinker)		
1.50 1.50 1.50-1.95 1.50-1.54 1.50-3.00	D3 W21 C5 SPT(C) 25*/25 50/16 B7			Slow(1) at 1.50m, rose to 1.30m in 20 mins. 25/50		(3.40)			▼1 ▽1
2.50-2.95 2.50-2.95	SPT(C) N=55 C6			7,9/10,11,15,19					
3.50-3.95 3.50-3.95 3.50-4.50	SPT N=19 S8 B9			3,4/4,5,5,5	68.20	3.50	Medium dense grey gravelly SAND		
4.50-4.95 4.50-4.95 4.50-5.50	SPT N=43 S10 B11			7,9/10,10,11,12	67.15	4.55	Stiff dark greyish brown silty sandy CLAY with sand partings and scattered sub-angular medium gravel		▼2
5.50-5.95	U12								
6.00-6.45 6.00-6.45 6.00-7.50	SPT N=76 S13 B14			9,14/19,19,12,26 medium(2) at 6.30m, rose to 4.95m in 20 mins.					▽2
7.50-7.88 7.50-7.95 7.50-9.00	SPT 71/225 S15 B16			9,14/21,24,26		(5.65)			
9.00-9.45 9.00-10.20	U17 B20								
9.70-9.72	SPT 25*/20 50/1			25/50					
Remarks 50 mm combined gas and groundwater monitoring standpipe installed to a depth of 5.0 m with a response zone from 5.0 m to 1.0 m. Chiselling on brick and concrete from 1.5 m to 1.7 m for 30 minutes. Excavating from 1.50m.								Scale (approx) 1:50	Logged By MC
								Figure No. J11218A.BH05	


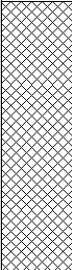
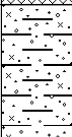
 Geotechnical & Environmental Associates					Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Borehole Number BH05	
Boring Method Cable percussion		Casing Diameter 150mm cased to 9.00m		Ground Level (mOD) 71.70		Client Beck Developments Limited		Job Number J11218A		
		Location		Dates 13/07/2012		Engineer		Sheet 2/2		
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
9.70-10.00 10.10-10.10 10.10-70.75	S18 SPT 25*/0 S19			25/50	61.50	10.20	Complete at 10.20m			
<div> <div> Remarks 50 mm combined gas and groundwater monitoring standpipe installed to a depth of 5.0 m with a response zone from 5.0 m to 1.0 m. Chiselling on brick and concrete from 1.5 m to 1.7 m for 30 minutes. </div> <div> Scale (approx) 1:50 </div> <div> Logged By MC </div> <div> Figure No. J11218A.BH05 </div> </div>										



				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Borehole Number BH06		
Boring Method Cable percussion		Casing Diameter 150mm cased to 9.00m			Ground Level (mOD) 71.90		Client Beck Developments Limited		Job Number J11218A	
		Location			Dates 14/07/2012		Engineer		Sheet 1/2	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.10 0.20-1.50 0.50	D1 B4 D2					(1.50)	Made Ground (Black slightly gravelly sand, clayey in places and with fragments of glass, brick and pockets of clay, fragment of polystyrene at 1.5 m)			
1.50 1.50-1.95 2.00	D3 U5 D6			6 blows	70.40	1.50	Soft brown and black very silty CLAY with pockets of organic silt			
2.50-2.95 3.00	U7 D8			4 blows		(2.90)			▼1	
3.50-3.95 3.50 3.50-3.95 3.50-4.00	SPT N=0 W1 S9 B10			1,0/0,0,0,0 Water strike(1) at 3.56m, rose to 3.15m in 20 mins.					▽1	
4.50-4.95 4.50-4.95 4.50-5.10	SPT(C) N=29 C11 B12			3,4/6,15,4,4	67.50	4.40	Stiff dark greyish brown silty sandy CLAY with sand partings and abundant sub-angular medium gravel and occasional cobbles			
5.40-5.49 5.40	SPT(C) 13*/75 50/15 C13			13/50			Cobble obstruction encountered			
6.50-6.95 6.50-6.95 6.50-7.00	SPT N=35 S14 B15			5,7/7,8,8,12						
7.50	D16					(6.40)				
8.00	U18									
8.50-8.95 8.50-8.95 8.50-10.00	SPT N=43 S19 B20			4,8/10,10,11,12						
10.00-10.27	SPT 50/115			4,8/12,38						
Remarks Soft site surface required the rig to be winched into position taking 45 minutes and off the position on completion taking 1 hour. Services inspection pit excavated to a depth of 1.2 m. Chiselling from 10.7 m to 10.8 m for 1 hour. 50 mm combined gas and groundwater standpipe installed to a depth of 4.0 m with a response zone from 1.0 m to 4.0 m. Excavating from 1.50m.								Scale (approx)	Logged By	
								1:50	MC	
								Figure No. J11218A.BH06		


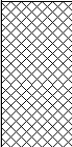

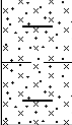

 Geotechnical & Environmental Associates					Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Borehole Number BH06		
Boring Method Cable percussion		Casing Diameter 150mm cased to 9.00m			Ground Level (mOD) 71.90		Client Beck Developments Limited		Job Number J11218A		
		Location			Dates 14/07/2012		Engineer		Sheet 2/2		
Depth (m) 10.00 10.00-10.80	Sample / Tests S21 B22	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD) 61.10	Depth (m) (Thickness) 10.80	Description Complete at 10.80m		Legend	Water	
<div> <div>  </div> </div>											
Remarks								Scale (approx) 1:50		Logged By MC	
								Figure No. J11218A.BH06			




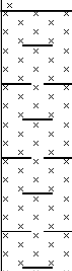

<div>GEA</div> <div>Geotechnical & Environmental Associates</div>				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Borehole Number BH07		
Boring Method Cable percussion		Casing Diameter 150mm cased to 9.00m			Ground Level (mOD) 70.50		Client Beck Developments Limited		Job Number J11218A	
		Location			Dates 13/07/2012- 14/07/2012		Engineer		Sheet 1/2	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.10 0.20-1.50 0.50	D1 B4 D2					(1.00)	Made Ground (Soft silty clay with occasional brick fragments, limestone gravel and pockets of slightly peaty clay)			
					69.50	1.00	Soft brown and black very silty CLAY with pockets of grey organic silt			
1.50 1.50-1.95	D3 U5									
2.00 2.30	D6 W1			Water strike(1) at 2.30m, rose to 2.15m in 20 mins. 0,0/0,0,0,0					▼1 ▽1	
2.50 2.50-2.95 2.50-3.45	S7 SPT N=0 B9					(3.40)				
3.50	U8								▼2	
4.50-4.95 4.50-4.95 4.50-5.50	C10 SPT(C) N=38 B11			Water strike(2) at 4.30m, rose to 3.17m in 20 mins. 4,9/10,10,11,7	66.10	4.40	Dense silty sandy GRAVEL with occasional cobbles, gravel is sub-angular		▽2	
						(1.10)				
5.50-5.95 5.50-6.00	U12 B13				65.00	5.50	Stiff dark greyish brown silty sandy CLAY with sand partings and abundant sub-angular medium gravel and occasional cobbles			
6.00-6.45 6.00-7.50	S14 B15									
6.45-6.90	SPT N=35			4,7/8,8,9,10						
7.50 7.50-9.00	U16 B19									
8.00-8.27 8.00-8.40	SPT 50/117 S18			9,13/17,33		(5.00)				
9.50-9.53 9.50 9.50-10.50	SPT(C) 25*/25 C20 B22			25/50						
Remarks Soft site surface required the rig to be winched off the position on completion taking 30 minutes. Services inspection pit excavated to a depth of 1.2 m. Chiselling from 10.3 m to 10.5 m for 30 minutes. 50 mm combined gas and groundwater standpipe installed to a depth of 4.0 m with a response zone from 1.0 m to 4.0 m. Excavating from 1.50m.								Scale (approx) 1:50	Logged By MC	
								Figure No. J11218A.BH07		






 <div> <div>Geotechnical & Environmental Associates</div> <div>Widbury Barn Widbury Hill Ware, Herts SG12 7QE</div> </div>					Site Mearley Croft, Clitheroe, Lancashire		Borehole Number BH07			
Boring Method Cable percussion		Casing Diameter 150mm cased to 9.00m		Ground Level (mOD) 70.50		Client Beck Developments Limited		Job Number J11218A		
		Location		Dates 13/07/2012- 14/07/2012		Engineer		Sheet 2/2		
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
10.30-10.30 10.30	SPT(C) 25*/0 C21			25/50	60.00		Complete at 10.50m			
Remarks							Scale (approx) 1:50		Logged By MC	
							Figure No. J11218A.BH07			






 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Trial Pit Number TP01	
Excavation Method 3 t Mini Excavator		Dimensions 2.5 m x 0.45 m		Ground Level (mOD) 73.60		Client Beck Developments Limited		Job Number J11218A	
		Location		Dates 02/07/2012		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.50	D1					Made Ground (Brown and dark brown, occasionally black sandy clay with scattered fragments of brick, tile, glass, plastic, concrete; rare fragments of wood and tarmac)			
0.90	D2				(1.80)				
2.00	D3			71.80	1.80	Firm greyish brown silty sandy CLAY, slightly friable with shell fragments			
					(0.90)				
						70.90	2.70	Complete at 2.70m	
Plan <div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> </div>						Remarks Groundwater not encountered			
						Scale (approx) 1:50		Logged By MC	
						Figure No. J11218A.TP01			







 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Trial Pit Number TP03	
Excavation Method 3 t Mini Excavator		Dimensions 2.5 m x 0.45 m		Ground Level (mOD) 72.50		Client Beck Developments Limited		Job Number J11218A	
		Location		Dates 02/07/2012		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.50	D1			71.80	0.70	Made Ground (Black and dark brown friable very sandy clay with abundant roots, rare bricks, ash, clinker, pottery, glass and slate)			
1.00	D2				(1.10)	'Stiff' pale brown and occasionally orange-brown very sandy CLAY (evidence of desiccation observed); sandstone boulder at 1.1 m and became very gravelly and cobbly at 1.5 m			
1.30	D3				1.80	Complete at 1.80m			
1.60	D4			70.70					
Plan						Remarks			
.						Groundwater not encountered. Difficulty in excavation beyond 1.8 m due to cobbles.			
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.						Scale (approx) 1:50		Logged By MC	
								Figure No. J11218A.TP03	


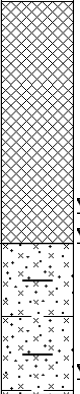
 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Trial Pit Number TP04		
Excavation Method 3 t Mini Excavator		Dimensions 2.0 m x 0.45 m		Ground Level (mOD) 70.00		Client Beck Developments Limited		Job Number J11218A		
		Location		Dates 02/07/2012		Engineer		Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water	
0.20	D1		Fast(1) at 1.20m.	<div> <div></div> <div>69.00</div> <div>68.60</div> <div>67.70</div> </div>	<div> <div>(1.00)</div> <div>1.00 (0.40)</div> <div>1.40 (0.90)</div> <div>2.30</div> </div>	<div> <div>Made Ground (Very dark grey humic sandy clay with roots and rootlets to 0.7 m)</div> <div>Soft black silty SAND interbedded with brown sandy clay</div> <div>Soft black organic clayey sandy SILT with occasional layers of brown sand</div> <div>Complete at 2.30m</div> </div>		<div>    </div>	<div>  </div>	
Plan					Remarks Fast groundwater ingress at 1.2 m.					
<div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> </div>					<div> <div>Scale (approx)</div> <div>1:50</div> </div>				<div> <div>Logged By</div> <div>MC</div> </div>	<div> <div>Figure No.</div> <div>J11218A.TP04</div> </div>


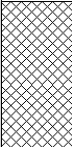




 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Trial Pit Number TP05	
Excavation Method 3 t Mini Excavator		Dimensions 2.5 m x 0.45 m		Ground Level (mOD) 70.50		Client Beck Developments Limited		Job Number J11218A	
		Location		Dates 02/07/2012		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.05	D1			70.40	0.10	Made Ground (Black and dark brown very clayey sand with fragments of wire, wood and fragments of cement asbestos sheeting)			
0.50	D2				(1.00)	Soft very dark brown and black silty CLAY with scattered shell fragments, roots and layers or pockets of brown silty sandy clay			
			Seepage(1) at 1.20m.	69.40	1.10	Soft dark grey organic SILT with layers and pockets of grey claye silt and pale brown fine silty sand			∇ ₁
			Medium(2) at 2.90m.	67.60	2.90	Complete at 2.90m			∇ ₂
Plan						Remarks Groundwater encountered as a seepage at 1.2 m and as a medium inflow at 2.9 m.			
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				Scale (approx) 1:50		Logged By MC		Figure No. J11218A.TP05	

 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Trial Pit Number TP06	
Excavation Method 3 t Mini Excavator		Dimensions 2.5 m x 0.45 m		Ground Level (mOD) 72.00		Client Beck Developments Limited		Job Number J11218A	
		Location		Dates 02/07/2012		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.30	D1			71.50	(0.50)	Made Ground (Dark brown humic sandy clay with scattered roots, gravel and rare fragments of brick and glass)			
0.70	D2			71.10	(0.40)	Soft pale brown very sandy CLAY with scattered shell fragments and pockets of orange-brown sand			
			Medium(1) at 1.50m.		(1.40)	Grey and greyish brown very clayey SAND, layers of black organic silt between 1.1 m and 1.5 m			▽1
				69.70	2.30	Complete at 2.90m			
Plan						Remarks			
.						Groundwater ingress at 1.5 m; side collapse observed below 1.5 m; pit terminated at 2.3 m due to the collapse.			
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						Scale (approx) 1:50	Logged By MC	Figure No. J11218A.TP06	

 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Trial Pit Number TP07	
Excavation Method 3 t Mini Excavator		Dimensions 2.5 m x 0.45 m		Ground Level (mOD) 72.30		Client Beck Developments Limited		Job Number J11218A	
		Location		Dates 02/07/2012		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.30	D1			72.20	0.10	Made Ground (Black and dark brown very clayey sand with fragments of wood)			
1.00	D2		Fast but brief(1) at 1.20m.		(1.30)	Soft black and dark brown very sandy CLAY with scattered shell fragments, rootlets and pockets of orange-brown sand			
				70.90	1.40	Soft bluish grey and black clayey sandy SILT with pockets of pale brown sand, shells and shell fragments and pockets of grey sandy clay			∇ ₁
			seepage(2) at 2.30m.	70.00	2.30	Complete at 2.30m			∇ ₂
Plan						Remarks			
.						Pit sides stable during excavation.			
.						Fast but brief ingress of groundwater at a depth of 1.2 m, further seepages at 2.3 m.			
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						Scale (approx) 1:50	Logged By MC	Figure No. J11218A.TP07	

 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Trial Pit Number TP09		
Excavation Method 3 t Mini Excavator		Dimensions 2.0 m x 0.45 m		Ground Level (mOD) 71.70		Client Beck Developments Limited		Job Number J11218A		
		Location		Dates 02/07/2012		Engineer		Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water	
0.20	D1		seepages(1) at 1.20m.	71.30	(0.40) 0.40	Made Ground (Black and dark brown friable sandy clay with abundant fragments of ash and clinker, pockets of pale brown sand, bricks and fragments of brick, tile and slate)				
0.90	D2				(1.10)	Firm becoming stiff by 0.8 m dark greyish brown and occasionally dark orange-brown mottled very sandy CLAY with rare shell fragments				
					70.20	1.50	Greenish brown clayey SAND			
					69.70	(0.50) 2.00	Complete at 2.30m			
Plan						Remarks				
.						Pit sides collapsed below 1.5 m; excavation terminated at 2.0 m. Groundwater encountered at 1.2 m as three ingresses.				
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				Scale (approx) 1:50		Logged By MC		Figure No. J11218A.TP09		

 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Trial Pit Number TP10	
Excavation Method 3 t Mini Excavator		Dimensions 2.0 m x 0.45 m		Ground Level (mOD) 71.30		Client Beck Developments Limited		Job Number J11218A	
		Location		Dates 02/07/2012		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.60	D1				(1.60)	Made Ground (Black and dark brown very silty clay with abundant fragments of ash, brick, concrete and occasionally tile)			
1.80	D2		Medium seepage(1) at 1.40m. Medium (2) at 1.60m.	69.70	1.60	Soft black and bluish grey clayey sandy organic SILT with scattered shell fragments			∇1 ∇2
			Fast(3) at 2.50m.	68.70	2.60	Complete at 2.60m			∇3
Plan						Remarks			
.						Pits remained stable for the period that the pit was left open; 2 hours. Groundwater encountered as medium seepage at 1.4 m and 1.6 m and as a fast inflow at 2.5 m.			
.									
.									
.									
.									
.									
						Scale (approx) 1:50	Logged By MC	Figure No. J11218A.TP10	

 Geotechnical & Environmental Associates				Widbury Barn Widbury Hill Ware, Herts SG12 7QE		Site Mearley Croft, Clitheroe, Lancashire		Trial Pit Number TP11	
Excavation Method 3 t Mini Excavator		Dimensions 2.5 m x 0.45 m		Ground Level (mOD) 71.20		Client Beck Developments Limited		Job Number J11218A	
		Location		Dates 02/07/2012		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.40	D1				(1.00)	Made Ground (Black sandy clay with scattered fragments of glass, plastic, wire, wood, roots, rootlets and plastic coated wire)			
1.10	D2			70.20	1.00	Firm becoming soft by 1.3 m greyish brown and occasionally orange-brown mottled very sandy CLAY			
1.40	D3				(0.80)				
			Seepage(1) at 1.80m.	69.40	1.80	Greenish grey clayey silty SAND			▽1
				69.00	(0.40)				
					2.20	Complete at 2.20m			
Plan						Remarks			
.						Groundwater encountered as a seepage at 1.8 m.			
.									
.									
.									
.									
.									
				Scale (approx) 1:50		Logged By MC		Figure No. J11218A.TP11	



Geotechnical &
Environmental
Associates

Widbury Barn
Widbury Hill
Ware, Herts
SG12 7QE

Standard Penetration Test Results

Site : Mearley Croft, Clitheroe, Lancashire



Client : Beck Developments Limited


Engineer :

Job Number
J11218A


Sheet
1 / 1

Borehole Number	Base of Borehole (m)	End of Seating Drive (m)	End of Test Drive (m)	Test Type	Seating Blows per 75mm		Blows for each 75mm penetration				Result	Comments
					1	2	1	2	3	4		
BH01	1.00	1.15	1.45	CPT	10	8	7	8	10	9	N=34	
BH01	1.50	1.65	1.95	CPT	5	7	8	13	11	11	N=43	
BH01	3.00	3.15	3.45	CPT	3	5	7	7	8	8	N=30	
BH01	4.00	4.15	4.45	SPT	3	5	6	5	7	8	N=26	
BH02	1.00	1.15	1.45	SPT	3	6	7	7	8	8	N=30	Gravel in STL Split spoon
BH02	2.00	2.15	2.45	SPT	2	4	6	5	6	6	N=23	
BH02	3.00	3.15	3.45	SPT	4	4	4	6	7	6	N=23	
BH02	4.00	4.15	4.45	SPT	11	7	15	8	6	10	N=39	
BH02	5.00	5.15	5.45	SPT	6	12	15	13	9	9	N=46	
BH03	1.00	1.15	1.45	SPT	5	3	3	3	4	3	N=13	
BH03	2.00	2.15	2.45	CPT	1	4	8	4	6	7	N=25	
BH03	3.00	3.15	3.45	CPT	2	4	4	6	6	6	N=22	
BH03	4.00	4.15	4.45	SPT	3	3	3	4	10	7	N=24	
BH04	1.00	1.15	1.45	SPT	0	0	0	0	0	1	N=1	
BH04	2.00	2.15	2.45	SPT	0	0	0	0	1	1	N=2	
BH04	3.00	3.15	3.19	SPT	2	5	50				50/35mm	
BH05	1.50	1.53	1.54	CPT	25		50				25*/25mm 50/16mm N=55	
BH05	2.50	2.65	2.95	CPT	7	9	10	11	15	19	N=19	
BH05	3.50	3.65	3.95	SPT	3	4	4	5	5	5	N=43	
BH05	4.50	4.65	4.95	SPT	7	9	10	10	11	12	N=76	
BH05	6.00	6.15	6.45	SPT	9	14	19	19	12	26	71/225mm	
BH05	7.50	7.65	7.88	SPT	9	14	21	24	26		25*/20mm 50/1mm 25*/0mm	
BH05	9.70	9.72	9.72	SPT	25		50					
BH05	10.10	10.10	10.10	SPT	25		50					
BH06	3.50	3.65	3.95	SPT	1	0	0	0	0	0	N=0	Pushing cobble down the borehole
BH06	4.50	4.65	4.95	CPT	3	4	6	15	4	4	N=29	
BH06	5.40	5.48	5.49	CPT	13		50				13*/75mm 50/15mm N=35	
BH06	6.50	6.65	6.95	SPT	5	7	7	8	8	12	N=43	
BH06	8.50	8.65	8.95	SPT	4	8	10	10	11	12	50/115mm	
BH06	10.00	10.15	10.27	SPT	4	8	12	38				
BH07	2.50	2.65	2.95	SPT	0	0	0	0	0	0	N=0	
BH07	4.50	4.65	4.95	CPT	4	9	10	10	11	7	N=38	
BH07	6.45	6.60	6.90	SPT	4	7	8	8	9	10	N=35	
BH07	8.00	8.15	8.27	SPT	9	13	17	33			50/117mm	
BH07	9.50	9.53	9.53	CPT	25		50				25*/25mm	
BH07	10.30	10.30	10.30	CPT	25		50				25*/0mm	

Project Name: Mearley Croft, Clitheroe, Lancashire					Samples Received:		19/07/2012		<div>K4 SOILS</div> <div></div>
					Project Started:		01/08/2012		
Client: GEA					Testing Started:		06/08/2012		
Project No: J11218A			Our job/report no: 13119		Date Reported:		13/08/2012		
Borehole No:	Sample No:	Depth (m)	Description	Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425 mm (%)	Remarks
BH01	D3	0.90	Greyish brown slightly gravelly CLAY with occasional roots and rootlets (gravel is fm and angular to sub-angular)	18					
BH01	D4	1.20	Greyish brown slightly silty gravelly CLAY (gravel is fm and angular to sub-angular)	12					
BH01	D5	1.50	Brownish grey gravelly CLAY (gravel is fm and angular to sub-rounded)	11	26	13	13	60	
BH01	D6	2.00	Grey silty slightly gravelly CLAY (gravel is fm and angular to sub-angular)	12					
BH01	D7	2.50	Grey silty slightly gravelly CLAY (gravel is fm and angular to sub-angular)	11					
BH01	D8	3.00	Grey gravelly CLAY with traces of rootlets (gravel is fmc and angular to sub-angular)	10	25	12	13	58	
BH01	D9	3.60	Grey gravelly CLAY (gravel is fmc and angular to sub-angular)	9.5					
BH02	D2	0.50	Greyish brown gravelly CLAY with occasional roots (gravel is fmc and angular to sub-angular)	32	52	26	26	59	
BH02	D3	0.90	Greyish brown silty slightly gravelly CLAY (gravel is fm and angular to sub-angular)	20					
BH02	D4	1.30	Greyish brown silty slightly gravelly CLAY (gravel is fm and angular to sub-angular)	12					
BH02	D5	1.70	Greyish brown silty gravelly CLAY (gravel is fmc and angular to sub-angular)	13	29	15	14	61	
BH02	D6	2.20	Grey slightly silty gravelly CLAY (gravel is fm and angular to sub-angular)	14					
BH02	D7	2.70	Grey gravelly CLAY (gravel is fmc and angular to sub-angular)	9.6					
BH02	D8	3.20	Grey silty gravelly CLAY (gravel is fmc and angular to sub-angular)	10	25	12	13	63	
BH02	D9	4.20	Grey gravelly CLAY (gravel is fmc and angular to sub-angular)	8.5					
BH03	D3	2.30	Greyish brown slightly gravelly CLAY (gravel is fmc and angular to sub-rounded)	14	51	24	27	69	
BH03	D4	2.80	Grey gravelly CLAY (gravel is fmc and angular to sub-angular)	10					
BH06	D6	2.00	Dark grey slightly gravelly CLAY (gravel is fm and angular to sub-angular)	50	56	31	25	95	
BH06	B15	6.50	Grey slightly gravelly CLAY (gravel is fmc and sub-angular to angular)	19	29	14	15	93	
<div><div></div><div><div>Summary of Test Results</div><div>BS 1377 : Part 2 : Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method. BS 1377 : Part 2 : Clause 5 : 1990 Determination of the plastic limit and plasticity index. BS 1377 : Part 2 : Clause 3.2 : 1990 Determination of the moisture content by the oven-drying method.</div></div></div> <div><div>Checked and Approved</div><div>Initials: K.P Date: 13/08/2012</div></div>									
Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU									
Test Results relate only to the sample numbers shown above. Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)									
All samples connected with this report ,incl any on 'hold' will be stored and disposed off according to Company policy.Acoppy of this policy is available on request.									
MSF-11/R2									

Project Name: Mearley Croft, Clitheroe, Lancashire						Samples Received: 19/07/2012		K4 SOILS 	
						Project Started: 01/08/2012			
Client: GEA						Testing Started: 06/08/2012			
Project No: J11218A				Our job/report no: 13119		Date Reported: 13/08/2012			

Borehole No:	Sample No:	Depth (m)	Description	Moisture content (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 0.425 mm (%)	Remarks
BH07	U5	1.50	Dark grey silty/sandy CLAY	81	91	51	40	100	
TP3	D3	1.00	Greyish brown silty slightly gravelly CLAY (gravel is fm and angular to sub-angular)	17	30	17	13	75	
TP5	D2	0.50	Dark grey slightly gravelly CLAY (gravel is fm and angular to sub-angular)	60	64	38	26	90	
TP8	D2	0.80	Dark grey slightly peaty slightly gravelly CLAY with occasional shell fragments (gravel is fine)	51	65	37	28	97	
TP10	D2	1.80	Dark grey clayey PEAT with shell fragments	81	97	51	46	100	
TP11	D2	1.10	Grey CLAY	41	54	27	27	100	


	Summary of Test Results								Checked and Approved Initials: K.P Date: 13/08/2012
	BS 1377 : Part 2 : Clause 4.4 : 1990 Determination of the liquid limit by the cone penetrometer method.								
	BS 1377 : Part 2 : Clause 5 : 1990 Determination of the plastic limit and plasticity index.								
	BS 1377 : Part 2 : Clause 3.2 : 1990 Determination of the moisture content by the oven-drying method.								

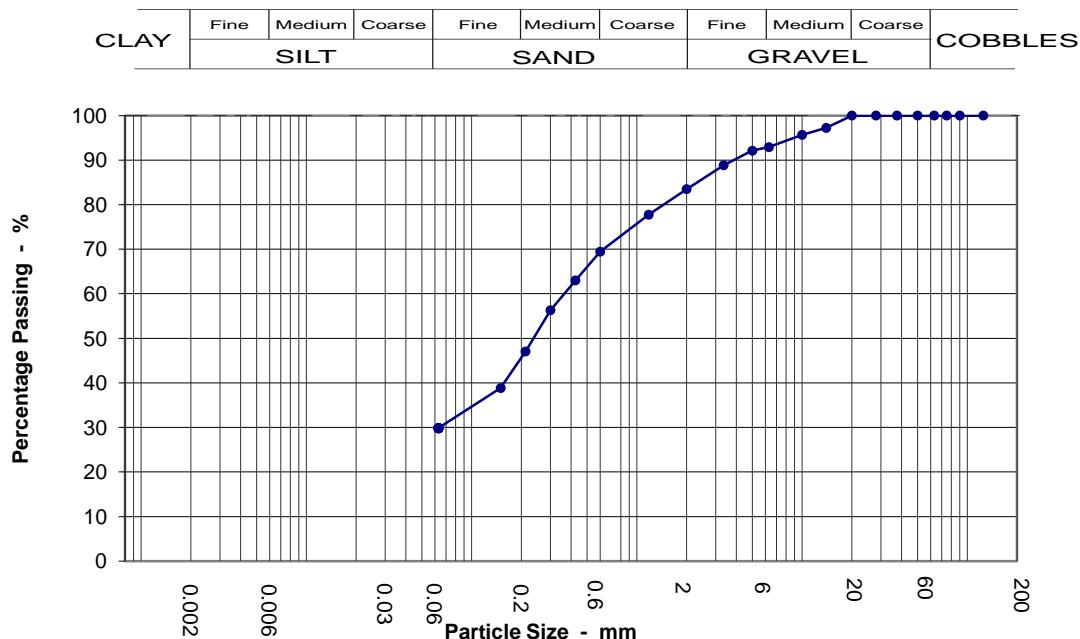
Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford Herts WD18 9RU

Test Results relate only to the sample numbers shown above. Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

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MSF-11/R2

K4 SOILS 	PARTICLE SIZE DISTRIBUTION BS 1377 : Part 2 : 1990 : Clause 9	Our Report No:	13119
		Project No:	J11218A
Location	Mearley Croft, Clitheroe, Lancashire	Borehole / Trial Pit No:	BH05
		Depth	3.50 m
Visual Soil Description	Dark grey slightly gravelly sandy CLAY (gravel is fm and sub-angular to sub-rounded)	Sample Type/No	B - 9



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	97		
10	96		
6.3	93		
5	92		
3.35	89		
2	83		
1.18	78		
0.6	69		
0.425	63		
0.3	56		
0.212	47		
0.15	39		
0.063	30		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause
Sedimentation	N/A
Suitable Amount Of Sample Received	Yes

Sample Proportions	
Cobbles	0.0
Gravel	16.5
Sand	53.6
Silt & Clay	29.8

Grading Analysis	
D100	125.0
D60	0.4
D10	
Uniformity Coefficient	N/A

K4 SOILS LABORATORY

Unit 8 Olds Close Olds Approach
Watford Herts WD18 9RU.
E-mail: k4soils@aol.com

Approved Signatories:

K.Phaure(Tech.Mgr) J.Phaure(Lab.Mgr)

Test results relate only to the sample numbers shown above

Checked and Approved

Initials: kp

Date: 13/08/2012



The logo for K4 SOILS, featuring a stylized 'K4' inside an oval with the word 'SOILS' below it.

Test details

Depth within original sample	m :	1.60	Orientation within original sample	:	Vertical
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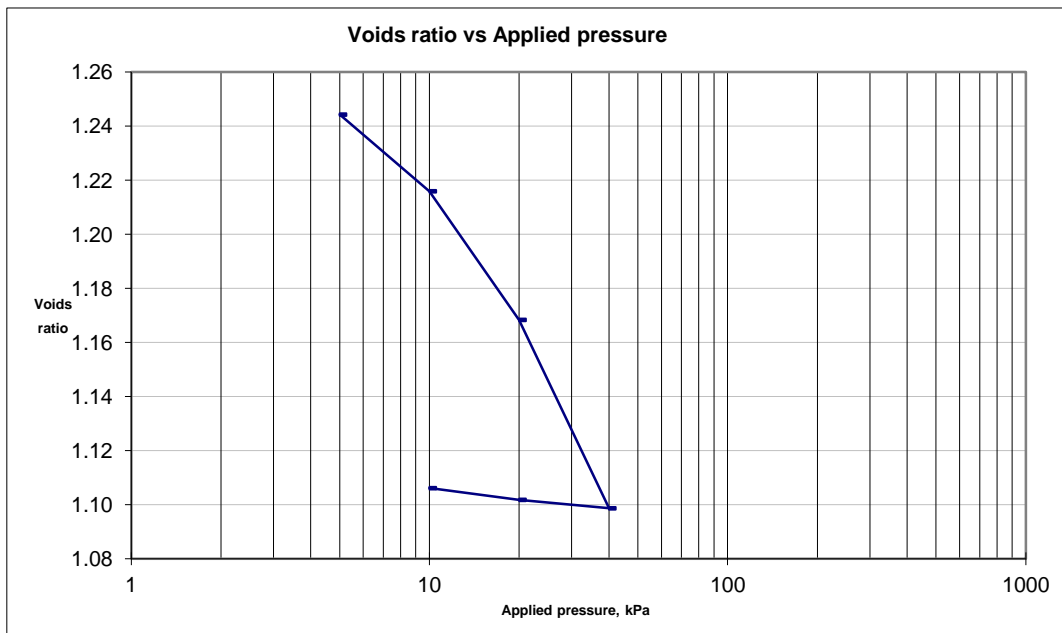
Lab Vane 11kpa

Specimen details

Specimen details		Initial	Final
Height	mm :	19	17.6
Diameter	mm :	75	-
Bulk density	Mg/m3 :	1.70	1.76
Moisture content	% :	45	38
Dry density	Mg/m3 :	1.17	1.27
Voids Ratio	:	1.28	1.11
Degree of saturation	% :	93.6	-
Particle density	Mg/m3 :	2.68	-
Swelling pressure	kPa :	0	-

Consolidation Stage

Stage number	Applied Pressure	Voids Ratio	Coefficient of Consolidation m2/year	Coefficient of Compressibility m2/MN	Stage number	Applied Pressure	Voids Ratio	Coefficient of Consolidation m2/year	Coefficient of Compressibility m2/MN
	kPa					kPa			
1	5	1.2442	0.62	3.368	11				
2	10	1.2159	0.40	2.527	12				
3	20	1.1683	0.44	2.147	13				
4	40	1.0986	0.41	1.607	14				
5	20	1.1017	0.60	0.074	15				
6	10	1.1061	0.66	0.206	16				
7					17				
8					18				
9					19				
10					20				



One-Dimensional Consolidation Test

BS 1377 : Part 5 : Clause 3 & 4 : 1990

Determination of the one-dimensional consolidation properties

Approved by

Initials : kp


Date : 13/08/2012

Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford WD18 9RU

Sheet 2/2

Test Results relate only to the sample numbers shown above. Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

All samples connected with this report ,incl any on 'hold' will be stored and disposed off according to Company policy.Acopy of this policy is available on request.

Client name & address:		Samples Received	19/07/2012	K4 SOILS 	
GEA		Project Started	01/08/2012		
Project Name: Mearley Croft, Clitheroe, Lancashire		Testing Started	02/08/2012		
Project No: J11218A	Our Job / report no: 13119	Date Reported:	13/08/2012		
Sample description:		Sample no/ type:	U	BH no:	BH06
Dark grey silty fine sandy CLAY with rare gravel and traces of glass (gravel is fine)			Depth (m):	2.50	

Test details

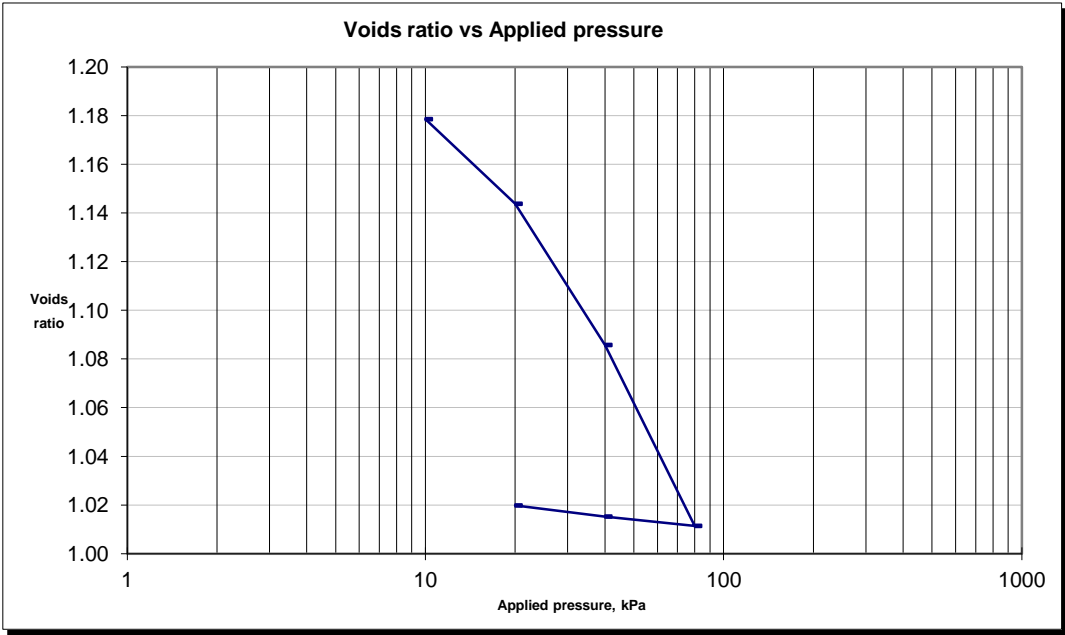
Depth within original sample m : 2.60 Orientation within original sample : Vertical
 Lab Vane 12kpa


Specimen details

		Initial	Final
Height	mm :	19	16.8
Diameter	mm :	75	-
Bulk density	Mg/m3 :	1.77	1.85
Moisture content	% :	47	36
Dry density	Mg/m3 :	1.20	1.36
Voids Ratio	:	1.28	1.02
Degree of saturation	% :	100.6	-
Particle density	Mg/m3 :	2.74	-
Swelling pressure	kPa :	0	-

Consolidation Stage

Stage number	Applied Pressure kPa	Voids Ratio	Coefficient of Consolidation m2/year	Coefficient of Compressibility m2/MN	Stage number	Applied Pressure kPa	Voids Ratio	Coefficient of Consolidation m2/year	Coefficient of Compressibility m2/MN
1	10	1.1786	0.68	4.368	11				
2	20	1.1438	0.23	1.596	12				
3	40	1.0858	0.39	1.353	13				
4	80	1.0114	0.46	0.891	14				
5	40	1.0153	0.06	0.048	15				
6	20	1.0198	0.61	0.113	16				
7					17				
8					18				
9					19				
10					20				




	One-Dimensional Consolidation Test BS 1377 : Part 5 : Clause 3 & 4 : 1990 Determination of the one-dimensional consolidation properties	Approved by Initials : kp Date : 13/08/2012
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Test Report by K4 SOILS LABORATORY Unit 8 Olds Close Olds Approach Watford WD18 9RU

Sheet 2/2

Test Results relate only to the sample numbers shown above. Approved Signatories: K.Phaure (Tech.Mgr) J.Phaure (Lab.Mgr)

All samples connected with this report ,incl any on 'hold' will be stored and disposed off according to Company policy.Acopy of this policy is available on request.

Client name & address:		Samples Received	19/07/2012	K4 SOILS 	
GEA		Project Started	01/08/2012		
Project Name: Mearley Croft, Clitheroe, Lancashire		Testing Started	02/08/2012		
Project No: J11218A	Our Job / report no: 13119	Date Reported:	13/08/2012		
Sample description:		Sample no/ type:	U	BH no:	BH07
Very soft dark grey silty/sandy CLAY		Depth (m):	1.50		

Test details

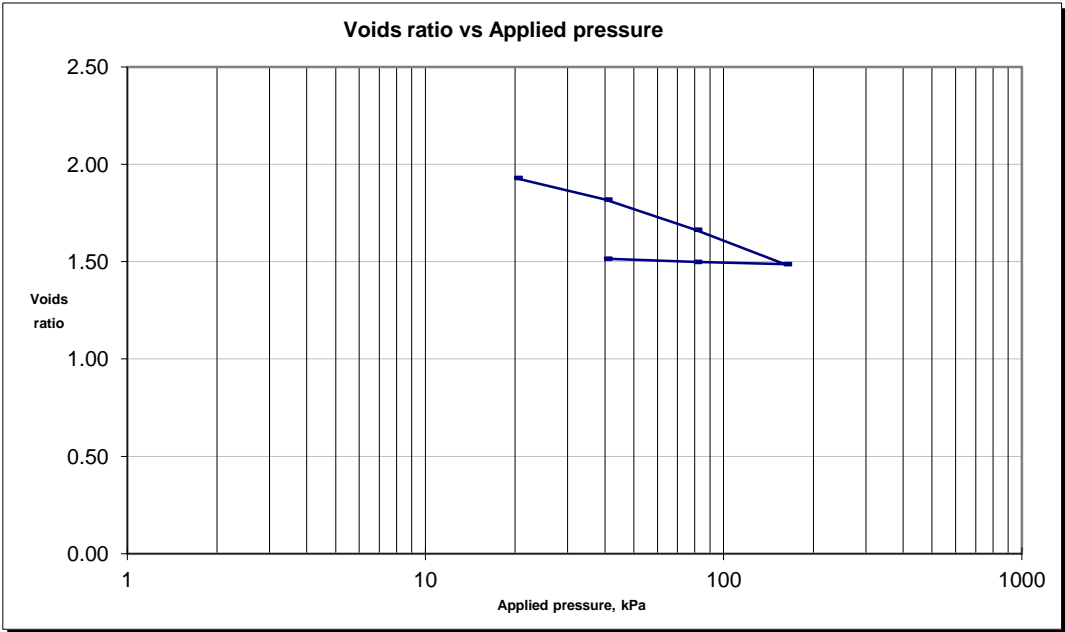
Depth within original sample m : 1.60 Orientation within original sample : Vertical
 Lab Vane 9kpa


Specimen details


		Initial	Final
Height	mm :	19	14.8
Diameter	mm :	75	-
Bulk density	Mg/m3 :	1.53	1.70
Moisture content	% :	79	54
Dry density	Mg/m3 :	0.86	1.10
Voids Ratio	:	2.19	1.49
Degree of saturation	% :	98.3	-
Particle density	Mg/m3 :	2.74	-
Swelling pressure	kPa :	0	-

Consolidation Stage

Stage number	Applied Pressure kPa	Voids Ratio	Coefficient of Consolidation m2/year	Coefficient of Compressibility m2/MN	Stage number	Applied Pressure kPa	Voids Ratio	Coefficient of Consolidation m2/year	Coefficient of Compressibility m2/MN
1	20	1.9299	1.47	4.121	11				
2	40	1.8189	1.41	1.893	12				
3	80	1.6640	1.28	1.374	13				
4	160	1.4872	1.04	0.830	14				
5	80	1.4986	1.53	0.057	15				
6	40	1.5151	1.72	0.165	16				
7					17				
8					18				
9					19				
10					20				



	<h2>One-Dimensional Consolidation Test</h2>	Approved by
	BS 1377 : Part 5 : Clause 3 & 4 : 1990	Initials : kp
	Determination of the one-dimensional consolidation properties	Date : 13/08/2012

Project Name: Mearley Croft, Clitheroe, Lancashire					<div>K4 SOILS</div> <div></div>
Client: GEA		Project no: J11218A			
Our job no: 13119					
Borehole No:	Sample No:	Depth m	Description	pH	Sulphate content (g/l)
BH01	D3	0.90	Greyish brown slightly gravelly CLAY with occasional roots and rootlets (gravel is fm and angular to sub-angular)	7.8	0.17
BH01	D7	2.50	Grey silty slightly gravelly CLAY (gravel is fm and angular to sub-angular)	7.8	0.38
BH02	D4	1.30	Greyish brown silty slightly gravelly CLAY (gravel is fm and angular to sub-angular)	7.6	0.16
BH03	D3	2.30	Greyish brown slightly gravelly CLAY (gravel is fmc and angular to sub-rounded)	7.9	0.16
BH05	D10	4.50	Dark grey slightly sandy gravelly CLAY gravel is fm and sub-angular)	8.0	0.27
BH06	B10	3.50	Dark grey slightly gravelly slightly peaty CLAY (gravel is fm and sub-angular)	7.9	0.16
BH06	D16	7.50	Dark grey slightly sandy slightly gravelly silty CLAY (gravel is fm and sub-angular)	8.0	0.32
BH07	D6	2.00	Dark grey slightly peaty CLAY	7.9	0.35
BH07	B10	5.50	Dark grey slightly sandy slightly gravelly CLAY (gravel is fmc and sub-angular to sub-rounded)	7.8	0.30
BH07	C20	9.50	Dark grey slightly sandy slightly gravelly CLAY (gravel is fmc and sub-angular to sub-rounded)	8.0	0.23
TP2	D4	1.80	Brown slightly gravelly silty CLAY (gravel is fm and sub-angular)	8.0	0.06
TP5	D2	0.50	Dark grey slightly gravelly CLAY (gravel is fm and angular to sub-angular)	7.9	0.21
TP11	D3	1.40	Dark grey slightly peaty CLAY	8.0	0.15

GEA
Tyttenhanger House
Coursers Road
St Albans Herts
AL4 0PG

LABORATORY TEST REPORT



Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP↓ Determinand↓

CAS No↓

Units↓

*

2030	Moisture		%	n/a	7.63	18	15.6	27.4	24.5	24.6
	Stones content (>50mm)		%	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2040	Soil colour			n/a	brown	brown	brown	brown	brown	brown
	Soil texture			n/a	sand	sand	sand	sand	loam	loam
	Other material			n/a	stones	stones	stones	stones	none	stones
2010	pH			M	8.7	8.3	8.3	7.8	8.1	7.9
2300	Cyanide (total)	57125	mg kg ⁻¹	M	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2325	Sulfide (Easily Liberatable)	18496258	mg kg ⁻¹	M	5.5	3.9	5.1	2.6	3.7	3.2
2625	Total Organic Carbon		%	M	7.4	6.2	5.3	8.9	5.6	8.7
2220	Chloride (extractable)	16887006	g l ⁻¹	M	0.011	<0.010	<0.010	<0.010	<0.010	<0.010
2430	Sulfate (total) as SO4		mg kg ⁻¹	M	1300	100	1300	200	1400	2900
2450	Arsenic	7440382	mg kg ⁻¹	M	12	16	21	23	19	17
	Cadmium	7440439	mg kg ⁻¹	M	0.25	0.70	0.63	1.2	1.8	1.7
	Chromium	7440473	mg kg ⁻¹	M	8.9	15	22	25	23	23
	Copper	7440508	mg kg ⁻¹	M	17	57	160	98	87	86
	Mercury	7439976	mg kg ⁻¹	M	<0.10	0.23	0.33	0.76	1.1	0.59
	Nickel	7440020	mg kg ⁻¹	M	10	19	55	41	38	31
	Lead	7439921	mg kg ⁻¹	M	74	290	140	250	250	400
	Selenium	7782492	mg kg ⁻¹	M	<0.20	<0.20	0.25	0.85	0.95	0.93
	Zinc	7440666	mg kg ⁻¹	M	110	240	160	260	250	400
2670	TPH >C5-C6		mg kg ⁻¹	U	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}
	TPH >C6-C7		mg kg ⁻¹	U	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}
	TPH >C7-C8		mg kg ⁻¹	M	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}

¹The sample container/fill level was not appropriate for the specified analysis - these results may be compromised and will not be accredited (UKAS/MCerts)

²The stability time for this analyte has been exceeded - these results may be compromised and will not be accredited (UKAS/MCerts)

³No sampling date was specified, stability times for this analyte may have been exceeded and these results may be compromised and will not be accredited (UKAS/MCerts)

All tests undertaken between 30/07/2012 and 07/08/2012

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page.

Column page 1

Report page 1 of 4

LIMS sample ID range AH57651 to AH57680

LABORATORY TEST REPORT

Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP↓ Determinand↓

CAS No↓

Units↓

*

210266

					AH57657	AH57658	AH57659	AH57660	AH57661	AH57662
					TP6	TP7	TP8	TP9	TP10	TP11
					D1	D1	D1	D1	D1	D1
					2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012
					0.30m	0.30m	0.30m	0.20m	0.60m	0.40m
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2030	Moisture		%	n/a	22.9	24.7	16.7	18.8	20.4	21.3
	Stones content (>50mm)		%	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2040	Soil colour			n/a	brown	brown	black	red	brown	brown
	Soil texture			n/a	loam	loam	sand	sand	sand	sand
	Other material			n/a	stones	none	stones	stones	none	none
2010	pH			M	7.9	7.9	8.1	8.0	8.2	7.9
2300	Cyanide (total)	57125	mg kg ⁻¹	M	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2325	Sulfide (Easily Liberatable)	18496258	mg kg ⁻¹	M	3.1	3.3	7.7	5.3	4.6	4.9
2625	Total Organic Carbon		%	M	6.7	12	7.8	29	2.8	12
2220	Chloride (extractable)	16887006	g l ⁻¹	M	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2430	Sulfate (total) as SO ₄		mg kg ⁻¹	M	2600	2900	800	2900	800	1000
2450	Arsenic	7440382	mg kg ⁻¹	M	28	18	17	95	20	25
	Cadmium	7440439	mg kg ⁻¹	M	1.7	1.5	1.1	0.39	1.2	1.1
	Chromium	7440473	mg kg ⁻¹	M	31	19	14	22	19	25
	Copper	7440508	mg kg ⁻¹	M	150	74	64	140	78	100
	Mercury	7439976	mg kg ⁻¹	M	0.89	1.1	0.29	0.16	0.35	0.37
	Nickel	7440020	mg kg ⁻¹	M	38	33	20	60	33	38
	Lead	7439921	mg kg ⁻¹	M	730	230	200	170	210	500
	Selenium	7782492	mg kg ⁻¹	M	0.62	0.95	0.57	0.83	0.57	0.68
	Zinc	7440666	mg kg ⁻¹	M	700	220	200	340	240	490
2670	TPH >C5-C6		mg kg ⁻¹	U	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}
	TPH >C6-C7		mg kg ⁻¹	U	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}
	TPH >C7-C8		mg kg ⁻¹	M	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}

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²The stability time for this analyte has been exceeded - these results may be compromised and will not be accredited (UKAS/MCerts)

³No sampling date was specified, stability times for this analyte may have been exceeded and these results may be compromised and will not be accredited (UKAS/MCerts)

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page.

Column page 2

Report page 1 of 4

LIMS sample ID range AH57651 to AH57680

GEA
Tyttenhanger House
Coursers Road
St Albans Herts
AL4 0PG

LABORATORY TEST REPORT



Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP↓ Determinand↓

CAS No↓

Units↓

*

210266

					AH57663	AH57664	AH57665	AH57666	AH57667	AH57668
					TP12	BH1	BH2	BH3	BH3	BH4
					D1	D1	D1	D1	D2	D1
					2/7/2012	3/7/2012	3/7/2012	3/7/2012	3/7/2012	3/7/2012
					0.10m	0.20m	0.10m	0.50m	1.80m	0.20m
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2030	Moisture		%	n/a	53.8	32.2	27.9	11.8	16.6	22.4
	Stones content (>50mm)		%	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2040	Soil colour			n/a	black	brown	brown	brown	black	brown
	Soil texture			n/a	sand	sand	sand	loam	sand	sand
	Other material			n/a	none	none	stones	stones	stones	stones
2010	pH			M	6.4	7.6	7.7	8.1	8.1	7.7
2300	Cyanide (total)	57125	mg kg ⁻¹	M	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2325	Sulfide (Easily Liberatable)	18496258	mg kg ⁻¹	M	2.9	2.4	2.0	6.2	4.0	5.5
2625	Total Organic Carbon		%	M	31	8.3	7.0	5.4	11	6.5
2220	Chloride (extractable)	16887006	g l ⁻¹	M	0.011	<0.010	<0.010	<0.010	<0.010	<0.010
2430	Sulfate (total) as SO ₄		mg kg ⁻¹	M	2700	1600	800	1900	700	1300
2450	Arsenic	7440382	mg kg ⁻¹	M	4.6	56	20	20	20	23
	Cadmium	7440439	mg kg ⁻¹	M	0.21	1.3	0.94	0.82	0.86	1.8
	Chromium	7440473	mg kg ⁻¹	M	9.9	40	26	16	18	19
	Copper	7440508	mg kg ⁻¹	M	34	93	66	36	80	46
	Mercury	7439976	mg kg ⁻¹	M	0.13	0.49	0.27	<0.10	0.37	0.16
	Nickel	7440020	mg kg ⁻¹	M	7.8	62	48	31	36	29
	Lead	7439921	mg kg ⁻¹	M	120	260	150	90	190	440
	Selenium	7782492	mg kg ⁻¹	M	0.72	1.1	0.97	0.27	0.35	0.28
	Zinc	7440666	mg kg ⁻¹	M	130	330	210	170	170	1300
2670	TPH >C5-C6		mg kg ⁻¹	U	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}
	TPH >C6-C7		mg kg ⁻¹	U	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}
	TPH >C7-C8		mg kg ⁻¹	M	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}

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* Accreditation status

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Column page 3

Report page 1 of 4

LIMS sample ID range AH57651 to AH57680

GEA
Tyttenhanger House
Coursers Road
St Albans Herts
AL4 0PG

LABORATORY TEST REPORT



Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP↓ Determinand↓

CAS No↓

Units↓

*

210266

					AH57670	AH57671	AH57673	AH57675	AH57677	AH57678
					BH5	BH5	BH6	BH6	BH7	BH7
					E2	E3	E1	E3	E1	E2
					Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
					0.50m	1.50m	0.10m	1.50m	0.10m	0.50m
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2030	Moisture		%	n/a	14.7	12.1	27.6	24.5	30.2	33.2
	Stones content (>50mm)		%	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2040	Soil colour			n/a	brown	brown	brown	brown	brown	brown
	Soil texture			n/a	sand	loam	sand	loam	clay	clay
	Other material			n/a	stones	stones	stones	stones	stones	stones
2010	pH			M	8.5	10.6	7.9	7.7	8.0	7.9
2300	Cyanide (total)	57125	mg kg ⁻¹	M	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
2325	Sulfide (Easily Liberatable)	18496258	mg kg ⁻¹	M	5.9	4.9	1.8	3.8	4.6	4.2
2625	Total Organic Carbon		%	M	4.3	7.0	12	9.1	5.8	5.9
2220	Chloride (extractable)	16887006	g l ⁻¹	M	0.016	0.032	<0.010	<0.010	<0.010	<0.010
2430	Sulfate (total) as SO ₄		mg kg ⁻¹	M	1100	900	1800	1000	800	700
2450	Arsenic	7440382	mg kg ⁻¹	M	7.5	11	12	68	30	42
	Cadmium	7440439	mg kg ⁻¹	M	0.55	0.54	0.57	1.2	1.00	1.3
	Chromium	7440473	mg kg ⁻¹	M	9.8	14	15	41	26	34
	Copper	7440508	mg kg ⁻¹	M	170	41	39	140	130	160
	Mercury	7439976	mg kg ⁻¹	M	<0.10	0.10	<0.10	0.56	0.57	0.77
	Nickel	7440020	mg kg ⁻¹	M	12	15	16	39	31	41
	Lead	7439921	mg kg ⁻¹	M	410	470	430	470	420	510
	Selenium	7782492	mg kg ⁻¹	M	<0.20	<0.20	<0.20	0.60	0.53	0.70
	Zinc	7440666	mg kg ⁻¹	M	410	410	450	480	460	480
2670	TPH >C5-C6		mg kg ⁻¹	U	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}
	TPH >C6-C7		mg kg ⁻¹	U	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}
	TPH >C7-C8		mg kg ⁻¹	M	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}

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²The stability time for this analyte has been exceeded - these results may be compromised and will not be accredited (UKAS/MCerts)

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* Accreditation status

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Column page 4

Report page 1 of 4

LIMS sample ID range AH57651 to AH57680

LABORATORY TEST REPORT

Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

					210266					
					AH57651	AH57652	AH57653	AH57654	AH57655	AH57656
					TP1	TP1	TP2	TP3	TP4	TP5
					D1	D2	D1	D1	D1	D1
					2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012
					0.50m	0.90m	0.40m	0.30m	0.40m	0.05m
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2670	TPH >C8-C10		mg kg ⁻¹	M	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}
	TPH >C10-C12		mg kg ⁻¹	M	1.2 ^{1 2}	0.83 ^{1 2}	0.23 ^{1 2}	0.25 ^{1 2}	0.68 ^{1 2}	0.62 ^{1 2}
	TPH >C12-C16		mg kg ⁻¹	M	5.4 ^{1 2}	3.8 ^{1 2}	2.3 ^{1 2}	1.9 ^{1 2}	2.5 ^{1 2}	3.2 ^{1 2}
	TPH >C16-C21		mg kg ⁻¹	M	13 ^{1 2}	11 ^{1 2}	6.2 ^{1 2}	5.2 ^{1 2}	9.3 ^{1 2}	16 ^{1 2}
	TPH >C21-C35		mg kg ⁻¹	M	40 ^{1 2}	52 ^{1 2}	13 ^{1 2}	11 ^{1 2}	21 ^{1 2}	66 ^{1 2}
	Total Petroleum Hydrocarbons		mg kg ⁻¹	U	60 ^{1 2}	69 ^{1 2}	22 ^{1 2}	18 ^{1 2}	34 ^{1 2}	86 ^{1 2}
2700	Naphthalene	91203	mg kg ⁻¹	M	< 0.1	0.74	0.5	0.66	0.82	0.9
	Acenaphthylene	208968	mg kg ⁻¹	M	< 0.1	1.2	0.33	0.34	0.27	0.6
	Acenaphthene	83329	mg kg ⁻¹	M	< 0.1	0.47	0.16	0.28	0.27	0.47
	Fluorene	86737	mg kg ⁻¹	M	< 0.1	0.39	0.11	< 0.1	0.11	0.3
	Phenanthrene	85018	mg kg ⁻¹	M	2.3	3.4	0.73	1.1	2.2	3.7
	Anthracene	120127	mg kg ⁻¹	M	0.39	0.8	0.17	0.26	0.67	1
	Fluoranthene	206440	mg kg ⁻¹	M	5.3	7.7	1.5	2.3	5.9	10
	Pyrene	129000	mg kg ⁻¹	M	5.4	7.3	1.6	2.4	5.4	9.7
	Benzo[a]anthracene	56553	mg kg ⁻¹	M	3.3	3.9	0.93	0.19	3.6	5.9
	Chrysene	218019	mg kg ⁻¹	M	3.7	4.7	1.1	1.6	3.8	7
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	M	4.6	3.5	1	1.3	2.9	6.7
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	M	2.1	2.2	0.67	1.2	3.1	5.7
	Benzo[a]pyrene	50328	mg kg ⁻¹	M	4.1	7.9	3.3	2.1	6.7	11
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	M	< 0.1	0.43	0.43	0.15	0.7	0.96
	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M	< 0.1	3.8	1.1	0.98	2.9	5.3
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M	< 0.1	3.4	0.96	0.56	2.7	5.1
	Total (of 16) PAHs		mg kg ⁻¹	M	31	52	15	15	42	74
2800	Naphthalene	91203	mg kg ⁻¹	M						

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All tests undertaken between 30/07/2012 and 07/08/2012

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page.

Column page 1

Report page 2 of 4

LIMS sample ID range AH57651 to AH57680

LABORATORY TEST REPORT

Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

					210266					
					AH57657	AH57658	AH57659	AH57660	AH57661	AH57662
					TP6	TP7	TP8	TP9	TP10	TP11
					D1	D1	D1	D1	D1	D1
					2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012
					0.30m	0.30m	0.30m	0.20m	0.60m	0.40m
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2670	TPH >C8-C10		mg kg ⁻¹	M	< 0.1 ^{1 2}	< 0.1 ^{1 2}	8.2 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}
	TPH >C10-C12		mg kg ⁻¹	M	0.70 ^{1 2}	0.46 ^{1 2}	86 ^{1 2}	0.49 ^{1 2}	1.1 ^{1 2}	0.84 ^{1 2}
	TPH >C12-C16		mg kg ⁻¹	M	3.9 ^{1 2}	2.3 ^{1 2}	1800 ^{1 2}	2.6 ^{1 2}	5.7 ^{1 2}	3.2 ^{1 2}
	TPH >C16-C21		mg kg ⁻¹	M	23 ^{1 2}	8.5 ^{1 2}	2500 ^{1 2}	3.9 ^{1 2}	38 ^{1 2}	17 ^{1 2}
	TPH >C21-C35		mg kg ⁻¹	M	61 ^{1 2}	21 ^{1 2}	890 ^{1 2}	4.4 ^{1 2}	120 ^{1 2}	39 ^{1 2}
	Total Petroleum Hydrocarbons		mg kg ⁻¹	U	89 ^{1 2}	32 ^{1 2}	5200 ^{1 2}	11 ^{1 2}	170 ^{1 2}	60 ^{1 2}
2700	Naphthalene	91203	mg kg ⁻¹	M	1.2	1.2		< 0.1	2.3	0.61
	Acenaphthylene	208968	mg kg ⁻¹	M	0.96	1.2		< 0.1	1.4	1.1
	Acenaphthene	83329	mg kg ⁻¹	M	0.33	0.52		< 0.1	2.3	< 0.1
	Fluorene	86737	mg kg ⁻¹	M	0.39	0.26		< 0.1	2	0.45
	Phenanthrene	85018	mg kg ⁻¹	M	5.3	2.6		< 0.1	18	5.6
	Anthracene	120127	mg kg ⁻¹	M	1.4	0.71		0.44	5.6	1.3
	Fluoranthene	206440	mg kg ⁻¹	M	14	5.8		0.99	30	12
	Pyrene	129000	mg kg ⁻¹	M	13	5.8		0.72	23	9.9
	Benzo[a]anthracene	56553	mg kg ⁻¹	M	6.4	3.1		0.38	14	4.8
	Chrysene	218019	mg kg ⁻¹	M	7.3	3.6		0.61	16	5.9
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	M	4.9	3.5		0.62	13	4.8
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	M	5.2	2.2		0.13	6.6	2.3
	Benzo[a]pyrene	50328	mg kg ⁻¹	M	9.7	6.2		0.46	14	5.5
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	M	0.9	0.77		0.24	2.1	0.9
	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M	5.2	2.9		0.42	9.5	3.9
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M	5.3	3		0.25	9.8	3.7
Total (of 16) PAHs		mg kg ⁻¹	M	81	43		5.3	170	63	
2800	Naphthalene	91203	mg kg ⁻¹	M			0.3			

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LABORATORY TEST REPORT

Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

				210266					
				AH57663	AH57664	AH57665	AH57666	AH57667	AH57668
				TP12	BH1	BH2	BH3	BH3	BH4
				D1	D1	D1	D1	D2	D1
				2/7/2012	3/7/2012	3/7/2012	3/7/2012	3/7/2012	3/7/2012
				0.10m	0.20m	0.10m	0.50m	1.80m	0.20m
				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2670	TPH >C8-C10		mg kg ⁻¹	M	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}	< 0.1 ^{1 2}
	TPH >C10-C12		mg kg ⁻¹	M	< 0.1 ^{1 2}	0.80 ^{1 2}	0.43 ^{1 2}	0.53 ^{1 2}	0.52 ^{1 2}
	TPH >C12-C16		mg kg ⁻¹	M	< 0.1 ^{1 2}	5.9 ^{1 2}	2.2 ^{1 2}	1.9 ^{1 2}	2.8 ^{1 2}
	TPH >C16-C21		mg kg ⁻¹	M	3.7 ^{1 2}	38 ^{1 2}	8.6 ^{1 2}	3.9 ^{1 2}	19 ^{1 2}
	TPH >C21-C35		mg kg ⁻¹	M	2.2 ^{1 2}	87 ^{1 2}	18 ^{1 2}	3.4 ^{1 2}	0.16 ^{1 2}
	Total Petroleum Hydrocarbons		mg kg ⁻¹	U	< 10 ^{1 2}	130 ^{1 2}	29 ^{1 2}	< 10 ^{1 2}	60 ^{1 2}
2700	Naphthalene	91203	mg kg ⁻¹	M	< 0.1	1.3	2.2	0.46	< 0.1
	Acenaphthylene	208968	mg kg ⁻¹	M	< 0.1	1.1	0.3	0.43	< 0.1
	Acenaphthene	83329	mg kg ⁻¹	M	< 0.1	0.83	0.5	0.41	< 0.1
	Fluorene	86737	mg kg ⁻¹	M	< 0.1	1.2	0.42	0.69	< 0.1
	Phenanthrene	85018	mg kg ⁻¹	M	0.32	10	4.4	0.61	0.33
	Anthracene	120127	mg kg ⁻¹	M	0.11	3.6	1.3	0.4	0.2
	Fluoranthene	206440	mg kg ⁻¹	M	1.6	20	7	1.4	0.25
	Pyrene	129000	mg kg ⁻¹	M	1.2	16	5.6	1.1	0.22
	Benzo[a]anthracene	56553	mg kg ⁻¹	M	0.18	8.3	2.7	0.63	0.14
	Chrysene	218019	mg kg ⁻¹	M	0.19	10	3.3	0.61	0.15
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	M	< 0.1	7.5	2.5	0.66	< 0.1
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	M	< 0.1	5.8	1.8	0.43	< 0.1
	Benzo[a]pyrene	50328	mg kg ⁻¹	M	< 0.1	9.8	3.4	0.52	< 0.1
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	M	< 0.1	1.1	0.66	< 0.1	< 0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M	< 0.1	6.4	2.2	0.41	< 0.1
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M	< 0.1	2.2	1.7	0.28	< 0.1
	Total (of 16) PAHs		mg kg ⁻¹	M	3.6	110	40	9	< 2
2800	Naphthalene	91203	mg kg ⁻¹	M					

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LABORATORY TEST REPORT

Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

					210266					
					AH57670	AH57671	AH57673	AH57675	AH57677	AH57678
					BH5	BH5	BH6	BH6	BH7	BH7
					E2	E3	E1	E3	E1	E2
					Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
					0.50m	1.50m	0.10m	1.50m	0.10m	0.50m
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2670	TPH >C8-C10		mg kg ⁻¹	M	1.3 ^{1 3}	0.47 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}	< 0.1 ^{1 3}
	TPH >C10-C12		mg kg ⁻¹	M	1.3 ^{1 3}	0.56 ^{1 3}	0.75 ^{1 3}	0.65 ^{1 3}	0.72 ^{1 3}	0.58 ^{1 3}
	TPH >C12-C16		mg kg ⁻¹	M	2.9 ^{1 3}	2.2 ^{1 3}	2.9 ^{1 3}	5.8 ^{1 3}	2.3 ^{1 3}	2.4 ^{1 3}
	TPH >C16-C21		mg kg ⁻¹	M	19 ^{1 3}	5.0 ^{1 3}	11 ^{1 3}	28 ^{1 3}	9.5 ^{1 3}	9.4 ^{1 3}
	TPH >C21-C35		mg kg ⁻¹	M	250 ^{1 3}	110 ^{1 3}	28 ^{1 3}	34 ^{1 3}	17 ^{1 3}	24 ^{1 3}
	Total Petroleum Hydrocarbons		mg kg ⁻¹	U	270 ^{1 3}	120 ^{1 3}	42 ^{1 3}	69 ^{1 3}	30 ^{1 3}	36 ^{1 3}
2700	Naphthalene	91203	mg kg ⁻¹	M	< 0.1	< 0.1	13	3.4	0.84	4.2
	Acenaphthylene	208968	mg kg ⁻¹	M	< 0.1	< 0.1	2.3	1	1.1	1.1
	Acenaphthene	83329	mg kg ⁻¹	M	< 0.1	< 0.1	7.3	1.5	0.77	0.32
	Fluorene	86737	mg kg ⁻¹	M	< 0.1	< 0.1	6	1	0.5	0.4
	Phenanthrene	85018	mg kg ⁻¹	M	1.1	1.6	32	10	5.4	5.6
	Anthracene	120127	mg kg ⁻¹	M	0.46	0.62	7.7	2.6	2.2	2.2
	Fluoranthene	206440	mg kg ⁻¹	M	2.6	3.5	31	14	15	15
	Pyrene	129000	mg kg ⁻¹	M	2.2	3	24	11	12	12
	Benzo[a]anthracene	56553	mg kg ⁻¹	M	1.2	1.5	12	5.5	7.8	7.4
	Chrysene	218019	mg kg ⁻¹	M	1.6	1.9	15	6.4	9.3	9
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	M	2.1	1.9	11	4.6	7.7	7.8
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	M	0.64	1.3	9.3	3.4	3.8	4
	Benzo[a]pyrene	50328	mg kg ⁻¹	M	1.1	0.46	12	5.8	9.3	8.5
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	M	0.28	< 0.1	2.2	0.89	1.8	1.2
	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M	0.91	< 0.1	7.7	3.9	7	6
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M	1.4	< 0.1	7.1	4.1	7.6	6.2
Total (of 16) PAHs		mg kg ⁻¹	M	16	16	200	79	92	91	
2800	Naphthalene	91203	mg kg ⁻¹	M						

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LABORATORY TEST REPORT



Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

					210266					
					AH57651	AH57652	AH57653	AH57654	AH57655	AH57656
2800	Acenaphthylene	208968	mg kg ⁻¹	N	TP1	TP1	TP2	TP3	TP4	TP5
	Acenaphthene	83329	mg kg ⁻¹	M	D1	D2	D1	D1	D1	D1
	Fluorene	86737	mg kg ⁻¹	M	2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012
	Phenanthrene	85018	mg kg ⁻¹	M	0.50m	0.90m	0.40m	0.30m	0.40m	0.05m
	Anthracene	120127	mg kg ⁻¹	M	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Fluoranthene	206440	mg kg ⁻¹	M						
	Pyrene	129000	mg kg ⁻¹	M						
	Benzo[a]anthracene	56553	mg kg ⁻¹	M						
	Chrysene	218019	mg kg ⁻¹	M						
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	M						
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	N						
	Benzo[a]pyrene	50328	mg kg ⁻¹	M						
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	N						
	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M						
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M						
	Total (of 16) PAHs		mg kg ⁻¹	N						
2920	Phenols (total)		mg kg ⁻¹	N	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3

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All tests undertaken between 30/07/2012 and 07/08/2012

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page.

Column page 1

Report page 3 of 4

LIMS sample ID range AH57651 to AH57680

LABORATORY TEST REPORT

Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

					210266					
					AH57657	AH57658	AH57659	AH57660	AH57661	AH57662
					TP6	TP7	TP8	TP9	TP10	TP11
					D1	D1	D1	D1	D1	D1
					2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012	2/7/2012
					0.30m	0.30m	0.30m	0.20m	0.60m	0.40m
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2800	Acenaphthylene	208968	mg kg ⁻¹	N			0.6			
	Acenaphthene	83329	mg kg ⁻¹	M			1.4			
	Fluorene	86737	mg kg ⁻¹	M			1.3			
	Phenanthrene	85018	mg kg ⁻¹	M			10			
	Anthracene	120127	mg kg ⁻¹	M			3.2			
	Fluoranthene	206440	mg kg ⁻¹	M			14			
	Pyrene	129000	mg kg ⁻¹	M			13			
	Benzo[a]anthracene	56553	mg kg ⁻¹	M			6.9			
	Chrysene	218019	mg kg ⁻¹	M			5.9			
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	M			8.7			
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	N			4.1			
	Benzo[a]pyrene	50328	mg kg ⁻¹	M			7			
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	N			1.3			
	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M			5.2			
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M			5.8			
	Total (of 16) PAHs		mg kg ⁻¹	N			89			
2920	Phenols (total)		mg kg ⁻¹	N	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3

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LABORATORY TEST REPORT

Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

					210266					
					AH57663	AH57664	AH57665	AH57666	AH57667	AH57668
					TP12	BH1	BH2	BH3	BH3	BH4
					D1	D1	D1	D1	D2	D1
					2/7/2012	3/7/2012	3/7/2012	3/7/2012	3/7/2012	3/7/2012
					0.10m	0.20m	0.10m	0.50m	1.80m	0.20m
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2800	Acenaphthylene	208968	mg kg ⁻¹	N						
	Acenaphthene	83329	mg kg ⁻¹	M						
	Fluorene	86737	mg kg ⁻¹	M						
	Phenanthrene	85018	mg kg ⁻¹	M						
	Anthracene	120127	mg kg ⁻¹	M						
	Fluoranthene	206440	mg kg ⁻¹	M						
	Pyrene	129000	mg kg ⁻¹	M						
	Benzo[a]anthracene	56553	mg kg ⁻¹	M						
	Chrysene	218019	mg kg ⁻¹	M						
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	M						
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	N						
	Benzo[a]pyrene	50328	mg kg ⁻¹	M						
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	N						
	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M						
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M						
	Total (of 16) PAHs		mg kg ⁻¹	N						
2920	Phenols (total)		mg kg ⁻¹	N	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3

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LABORATORY TEST REPORT

Results of analysis of 24 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

					210266					
					AH57670	AH57671	AH57673	AH57675	AH57677	AH57678
					BH5	BH5	BH6	BH6	BH7	BH7
					E2	E3	E1	E3	E1	E2
					Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
					0.50m	1.50m	0.10m	1.50m	0.10m	0.50m
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
2800	Acenaphthylene	208968	mg kg ⁻¹	N						
	Acenaphthene	83329	mg kg ⁻¹	M						
	Fluorene	86737	mg kg ⁻¹	M						
	Phenanthrene	85018	mg kg ⁻¹	M						
	Anthracene	120127	mg kg ⁻¹	M						
	Fluoranthene	206440	mg kg ⁻¹	M						
	Pyrene	129000	mg kg ⁻¹	M						
	Benzo[a]anthracene	56553	mg kg ⁻¹	M						
	Chrysene	218019	mg kg ⁻¹	M						
	Benzo[b]fluoranthene	205992	mg kg ⁻¹	M						
	Benzo[k]fluoranthene	207089	mg kg ⁻¹	N						
	Benzo[a]pyrene	50328	mg kg ⁻¹	M						
	Dibenzo[a,h]anthracene	53703	mg kg ⁻¹	N						
	Indeno[1,2,3-cd]pyrene	193395	mg kg ⁻¹	M						
	Benzo[g,h,i]perylene	191242	mg kg ⁻¹	M						
	Total (of 16) PAHs		mg kg ⁻¹	N						
2920	Phenols (total)		mg kg ⁻¹	N	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3

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LABORATORY TEST REPORT



Results of analysis of 27 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

					210266		
					AH57672	AH57676	AH57680
					BH5	BH6	BH7
					W1	W1	W1
					13/7/2012	Not Provided	Not Provided
					1.50m	3.50m	2.30m
					WATER	WATER	WATER
SOP↓	Determinand↓	CAS No↓	Units↓	*			
1010	pH	PH		U	7.7	7.7	7.9
1020	Electrical Conductivity	EC	µS cm ⁻¹	U	360	370	350
1220	Chloride	16887006	mg l ⁻¹	U	17	17	16
	Ammonia (free)	7664417	mg l ⁻¹	U	< 0.01	< 0.01	< 0.01
	Nitrate	14797558	mg l ⁻¹	U	0.81	1.7	0.89
1325	Sulfide	18496258	mg l ⁻¹	U	<0.050	<0.050	<0.050
1610	Total Organic Carbon	TOC	mg l ⁻¹	N	3.2	3.3	2.9
1220	Sulfate	14808798	mg l ⁻¹	U	72	73	72
1450	Arsenic	7440382	µg l ⁻¹	U	4.2	4.1	3.0
	Cadmium	7440439	µg l ⁻¹	U	<0.08	<0.08	<0.08
	Chromium	7440473	µg l ⁻¹	U	7.8	6.2	5.2
	Mercury	7439976	µg l ⁻¹	U	<0.5	<0.5	<0.5
	Nickel	7440020	µg l ⁻¹	U	2.0	1.9	1.2
	Lead	7439921	µg l ⁻¹	U	1.1	1.4	<1.0
1670	TPH (Aqueous Phase)		µg l ⁻¹	U	<10 ²	39 ³	<10 ³
1920	Phenols (total)		mg l ⁻¹	N	< 0.03	< 0.03	< 0.03

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LABORATORY TEST REPORT

Results of analysis of 3 samples
received 30 July 2012

Report Date
07 August 2012

FAO M Cooper / M Plimmer

J11218A PO4 - Mearley Croft, Clitheroe

Login Batch No			210267		
Chemtest LIMS ID			AH57681	AH57682	AH57683
Sample ID					
Sample Description			ACM1	ACM2	ACM3
SOP↓	Determinand↓	CAS No↓			
2185	Actinolite		Not detected	Not detected	Not detected
	Amosite		Not detected	Not detected	Not detected
	Anthophyllite		Not detected	Not detected	Not detected
	Chrysotile		Not detected	Detected	Detected
	Crocidolite		Not detected	Not detected	Not detected
	Tremolite		Not detected	Not detected	Not detected
	Material		concrete	cement	cement

All tests undertaken between 02-Aug-2012 and 2-Aug-2012

Signed

Albert Vella
Senior Environmental Surveyor



2183

Notes to accompany report:

- The in-house procedure SOP 2185 is in accordance with the requirements of Appendix 2 of the Analyst Guide (HSG248)
- The results relate only to the items tested as supplied by the client
- Comments and interpretations are not UKAS accredited
- Amosite is alternatively termed 'brown asbestos'
- Chrysotile is alternatively termed 'white asbestos'
- Crocidolite is alternatively termed 'blue asbestos'
- Samples associated with asbestos in building surveys are retained for sixmonths (HSG 264 refers)
- Comments or interpretations are beyond the scope of UKAS accreditation

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LABORATORY TEST REPORT

Results of analysis of 5 samples
received 8 August 2012



Report Date
16 August 2012

FAO M Cooper / M Plimmer / B O'Gorman

J11218A PO4 - Mearley Croft, Clitheroe

Login Batch No

Chemtest LIMS ID

Sample ID

Sample No

Sampling Date

Depth

Matrix

SOP↓ Determinand↓

CAS No↓

Units↓

*

2120 Sulfate (2:1 water soluble) as SO4

14808798

g l⁻¹

M

210747

AH60655

AH60656

AH60657

AH60658

AH60659

TP5

TP6

TP7

TP9

TP12

D1

D1

D1

D1

D1

2/7/2012

2/7/2012

2/7/2012

2/7/2012

2/7/2012

0.05m

0.30m

0.30m

0.20m

0.10m

SOIL

SOIL

SOIL

SOIL

SOIL

0.03

<0.01

<0.01

0.07

0.03

Site Mearley Croft, Woone Lane, Clitheroe, Lancashire

Job Number
J11218A

Client Beck Developments Limited

Sheet
1

Engineer
Proposed End Use Residential with plant uptake

Soil pH 8

Soil Organic Matter content % 6.0

Contaminant	Screening Value mg/kg	Data Source
Metals		
Arsenic	37	C4SL
Cadmium	26	C4SL
Chromium (III)	3000	LQM/CIEH
Chromium (VI)	21	C4SL
Copper	2,330	LQM/CIEH
Lead	200	C4SL
Elemental Mercury	1	SGV
Inorganic Mercury	170	SGV
Nickel	97	LQM/CIEH
Selenium	350	SGV
Zinc	3,750	LQM/CIEH
Hydrocarbons		
Benzene	0.87	C4SL
Toluene	610	SGV
Ethyl Benzene	350	SGV
Xylene	230	SGV
Aliphatic C5-C6	110	LQM/CIEH
Aliphatic C6-C8	370	LQM/CIEH
Aliphatic C8-C10	110	LQM/CIEH
Aliphatic C10-C12	540	LQM/CIEH
Aliphatic C12-C16	3000	LQM/CIEH
Aliphatic C16-C35	76,000	LQM/CIEH
Aromatic C6-C7	See Benzene	LQM/CIEH
Aromatic C7-C8	See Toluene	LQM/CIEH
Aromatic C8-C10	151	LQM/CIEH
Aromatic C10-C12	346	LQM/CIEH
Aromatic C12-C16	593	LQM/CIEH
Aromatic C16-C21	770	LQM/CIEH
Aromatic C21-C35	1230	LQM/CIEH
PRO (C ₅ -C ₁₀)	1352	Calc
DRO (C ₁₂ -C ₂₈)	80,363	Calc
Lube Oil (C ₂₈ -C ₄₄)	77,230	Calc
TPH	1000	Trigger for speciated testing

Contaminant	Screening Value mg/kg	Data Source
Anions		
Soluble Sulphate	500 mg/l	Structures
Sulphide	50	Structures
Chloride	400	Structures
Others		
Organic Carbon (%)	6	Methanogenic potential
Total Cyanide	140	WRAS
Total Mono Phenols	420	SGV
PAH		
Naphthalene	12.40	C4SL exp & LQM/CIEH
Acenaphthylene	850	LQM/CIEH
Acenaphthene	1,000	LQM/CIEH
Fluorene	780	LQM/CIEH
Phenanthrene	380	LQM/CIEH
Anthracene	9,200	LQM/CIEH
Fluoranthene	670	LQM/CIEH
Pyrene	1,600	LQM/CIEH
Benzo(a) Anthracene	8.7	C4SL exp & LQM/CIEH
Chrysene	14	C4SL exp & LQM/CIEH
Benzo(b) Fluoranthene	10.5	C4SL exp & LQM/CIEH
Benzo(k) Fluoranthene	15.0	C4SL exp & LQM/CIEH
Benzo(a) pyrene	5.00	C4SL
Indeno(1 2 3 cd) Pyrene	6.2	C4SL exp & LQM/CIEH
Dibenzo(a h) Anthracene	1.35	C4SL exp & LQM/CIEH
Benzo (g h i) Perylene	71	C4SL exp & LQM/CIEH
Screening value for PAH	71.4	B(a)P / 0.15
Chlorinated Solvents		
1,1,1 trichloroethane (TCA)	53.1	LQM/CIEH
tetrachloroethane (PCA)	2.4	LQM/CIEH
tetrachloroethene (PCE)	4.5	LQM/CIEH
trichloroethene (TCE)	0.598	LQM/CIEH
1,2-dichloroethane (DCA)	0.014	LQM/CIEH
vinyl chloride (Chloroethene)	0.00329	LQM/CIEH
tetrachloromethane (Carbon tetra	0.089	LQM/CIEH
trichloromethane (Chloroform)	3.86	LQM/CIEH

Notes

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

SGV - Soil Guideline Value, derived from the CLEA model and published by Environment Agency 2009

LQM/CIEH - Generic Assessment Criteria for Human Health Risk Assessment 2nd edition (2009) derived using CLEA 1.04 model 2009

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

C4SL exp & LQM/CIEH calculated using C4SL revisions to exposure assessment but LQM/CIEH health criteria values

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

B(a)P / 0.15 - GEA experience indicates that Benzo(a) pyrene (one of the most common and most carcinogenic of the PAHs) rarely exceeds 15% of the total

PAH concentration, hence this Total PAH threshold is regarded as being conservative

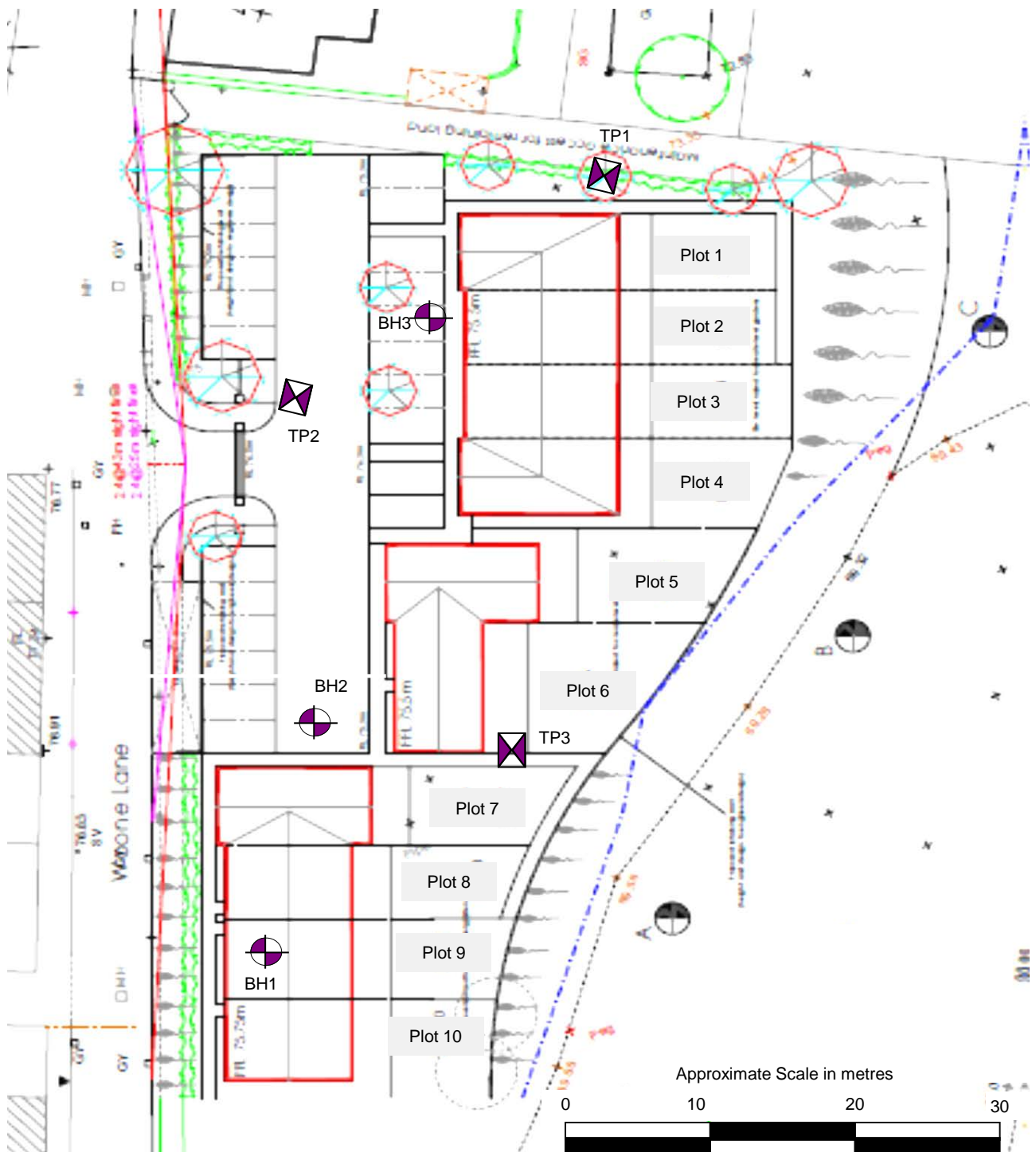
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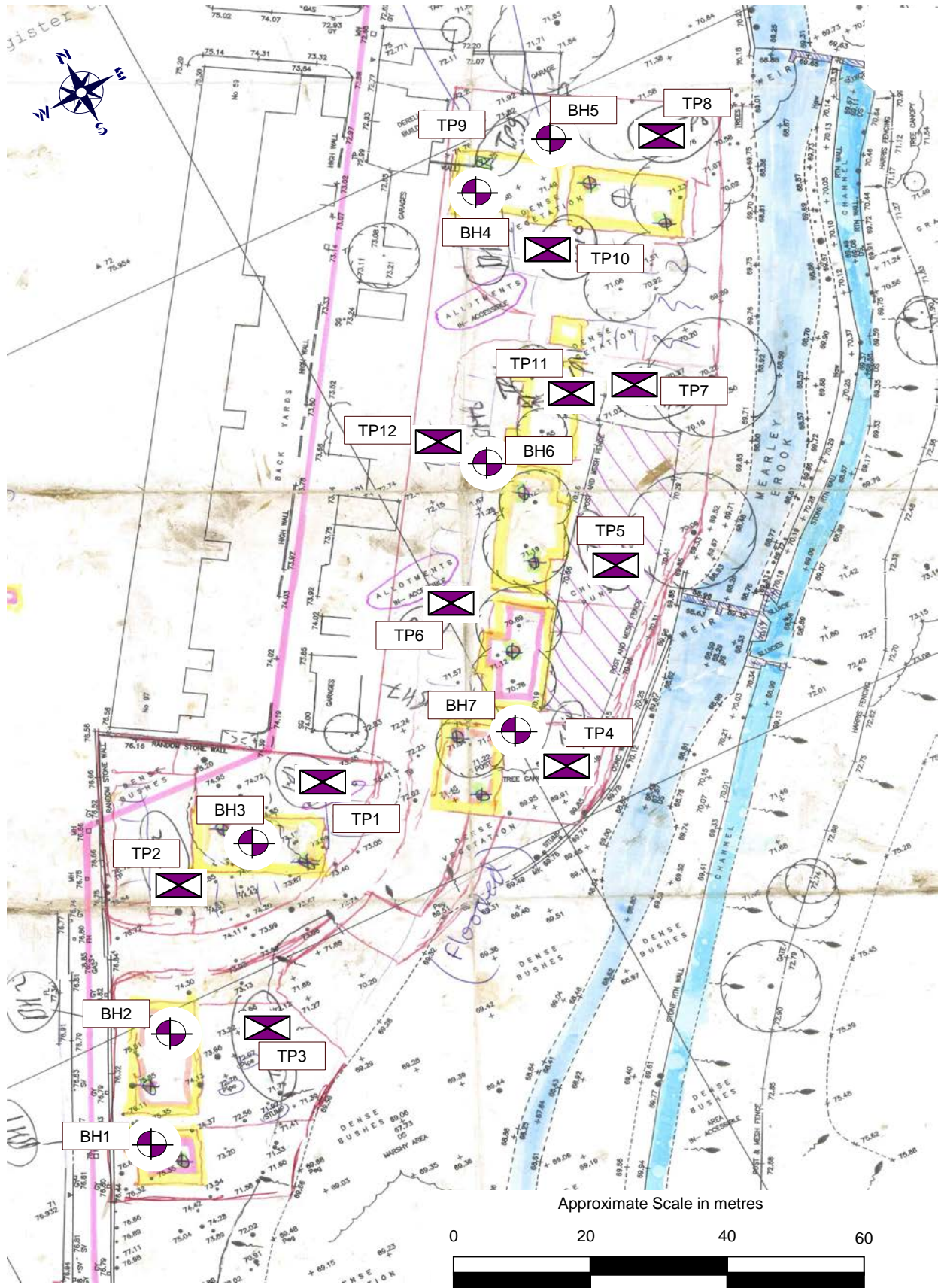
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