North London Anaerobic Digestion Facility

Site Environmental Permit: Attachment 5 - Site Condition Report

February 2016

1.0 SITE DETAILS	
Name of the Applicant	Agrivert Ltd.
Activity Address	North London AD Facility Coursers Farm Coursers Rd St Albans Hertfordshire AL4 0PG
National Grid Reference	National Grid Reference TL 204 048
Document Reference Dates for Site Condition Report at Permit Application and Surrender	**Attachment 5 - Site Condition** Report to support environmental permit application for North London AD – February 2016
Document References for Site Plans (including location and boundaries)	See **Attachment 4 – Site Plans** for Site Location and Site Layout plans
2.0 CONDITION OF THE LAND AT PERMIT ISSUE	
Environmental Setting	**Location and Current Land Use** The proposed Anaerobic Digestion (AD) plant is located on land used for the grazing of livestock and is part of an agricultural unit known as Coursers Farm, part of the Tyttenhanger Estate. Coursers Farm, part of Tyttenhanger Estate is located approximately 2km north of Junction 22 (London Colney) of the M25 motorway, 2km southwest of Hatfield and less than 1km southwest of the village of the Colney Heath at OS grid reference TL 204 048. It is located within the District of Hertsmere and the Parish of Ridge. The site, measuring approximately 5.2 hectares (ha), is bordered to the west by Tyttenhanger Quarry which is operated by Lafarge Aggregates. The site is bordered to the east by two large agricultural barns, fields and yards which form the Coursers Farm complex. A footpath runs through Coursers Farm, and approximately 100m from the southern boundary of the application site lies Tyttenhanger Stream. Coursers Road, forming the northern boundary of the application site, links Colney Heath with the Dell roundabout and the M25. In addition, an electricity substation is located

	adjacent to the northwest corner of the application site. **Surrounding Land Use** The site is bordered to the east by two large agricultural barns, fields and yards which form the Coursers Farm complex. A footpath runs through Coursers Farm, to the east of the site, and approximately 100m from the southern boundary of the application site lies Tyttenhanger Stream. Coursers Road, forming the northern boundary of the application site, links Colney Heath with the Bell roundabout and the M25. In addition, an electricity substation is located adjacent to the northwest corner of the application site. Planning permission for a new grain store at Coursers Farm was granted by Hertsmere Borough Council in April 2004 (planning permission reference TP/03/0870). As part of this planning permission screening bunds were constructed from imported inert material and topsoil stripped from the site. The site is also used for livestock grazing. Two ponds are present on the site **Geology** The geological setting of this area is shown in detail on plan titled: “Geology – Extract of British Geological Survey Sheet 239 Hertford”. The site is underlain by boulder clay which overlies more extensive deposits of sand and gravel as demonstrated by the presence of Tyttenhanger Quarry adjacent to the site. **Hydrogeology** The site is located within the catchment for the River Colne. The majority of the ponds in this area are underlain by boulder clay, reflecting the lower permeability of the subsurface strata. They are expected to be ephemeral features fed by rainfall runoff from adjacent land. **Hydrology** The site is located within the outer catchment for the defined Source Protection Zone (SPZ) for two abstractions for public water supply in the vicinity of Colney Heath (some 1.5km to the north-northwest and north-northeast of the site).Groundwater was not encountered within the excavations or probeholes. Examination of the EA’s database of Public Water Supply Abstraction indicates the site is not located within any defined groundwater Source Protection Zones (SPZ). **Ecology** The ecological desk study revealed that the site is not covered by any statutory nature conservation designations. There are no internationally designated sites present within 5km, however there are two statutorily

	designated sites within a 2km radius. These are; Redwell Wood Site of Special Scientific Interest (SSSI) is a broadleaved, mixed and yew woodland situated within 2km of the site; and Colney Heath Local Nature Reserve (LNR) contains a remnant of the heath vegetation community that used to be extensive in Hertfordshire, and is located within 0.5km of the site boundary. The desk study has identified 28 Local Wildlife Sites within a 2km radius of the site. These are; Smallford Pit, Knight's Wood, Tyttenhanger Gravel Pits, St. Mark's Churchyard and Graveyard, River Colne (SW of Colney Heath), St. Mark's Close (London), Colney Heath Common, Colney Heath Farm Meadows, Sleapshyde Gravel Pit, Bush Wood, Tollgate Wood, Frederick's Wood, Coppice Wood, The New Plantation, River Colne by Bowmansgreen Farm, Walsingham Wood, Cobs Ash, Cangsley Grove, Round Wood, Scrubby grassland by Frederick's Wood, Shenley Lodge Farm Wood, Potwells, North Mymms Park, North Mymms Churchyard, North Mymms Park Area, North Mymms Icehouse, Coursers Farm Area and Coursers Road Gravel Pit. The data search undertaken for the desk top study also revealed a number of species on record in the area. **Bats** A number of bat records were returned by HBRC as within 1km of the site. Species recorded include brown long-eared (Plecotus auritus), Natterer's (Myotis nattereri) and pipistrelle species (Pipistrellus sp.). Other Mammals There are records of badger (Meles meles) and water vole within 1km of the site. Dormice (Muscardinus avellanarius) have been recorded within 2km of the site. **Birds** There are several records of tree sparrow in the vicinity of Coursers Farm. This species has a Local Biodiversity Action Plan and in addition an important breeding area has been identified for tree sparrows located at Coursers Gravel Pit. The tree sparrow is listed as having the highest conservation concern, being categorised as a Red List Species within the UK. **Amphibians and Reptiles** There are records for common lizard (Lacerta vivipara) and grass snake (Natrix natrix) within 1km of the site, and whilst HBRC and the London, Essex and Hertfordshire Amphibian and Reptile Trust hold no records of great crested newts within 1km, several have been recorded within 5km of

	the proposed development. However, it is understood that this species has been recorded on the adjacent site managed by Lafarge Aggregates. A Field Survey was undertaken at the site in March 2011. The site comprises Amenity grassland, Hedgerow, Open Water (Ponds), Running Water (wet ditch), Scattered Scrub, Mature trees and Arable habitats. The survey found no notable habitats within the site. The presence of great crested newts has been confirmed in the two ponds within the site. The site has limited potential to support breeding birds within the scrub and hedgerow. No other protected or notable species are likely to be affected by the development proposals. Great Crested Newt Surveys were undertaken and a mitigation strategy agreed and implemented under a Licence granted by Natural England for the construction of the development. Information taken from Attachment 5 iii) – Coursers Farm Proposed Anaerobic Digestion Facility: Habitat Survey, October 2013.
Pollution History	There is no recorded pollution at the site of the proposed AD plant.
Evidence for Historic Contamination	The site is designated as Grade 2 agricultural land that is currently used for grazing livestock. Part of the site is used by the adjacent Coursers Farm Stables for exercising horses. Three large earth mounds / screening bunds with maximum heights 4 to 5 m above the original ground level were constructed to screen the barn development across the eastern half of the site. The bunds comprised of site won topsoil and subsoil and imported inert fill. The soil bunds were removed during the construction of the site. This site is not, therefore, deemed to be contaminated land. The only potential sources of contamination at this site, which are considered to be low risk, could include the use of agricultural machinery and fertilisers. However, as stated previously this site is used to graze cattle and for grazing and for exercising horses and as such the use of pesticides and artificial fertilisers has been at a very low level. Site contamination is not present as seen in Attachment 5 ii) ESG Ground Investigation Report No 22056/GI
Baseline Soil and Groundwater Reference Data	Attachment 5 ii) ESG Report No 22056/GI
Supporting Information	Attachment 5 ii) ESG Report No 22056/GI Attachment 5 iii) Coursers Farm Proposed Anaerobic Digestion Facility: Extended Phase 1 Habitat Survey by EDP, January 2012, submitted as part of the planning application.

3.0 PERMITTED ACTIVITIES	
Permitted Activities	See **Section 10** the permit application Supporting Statement
Non-permitted Activities	Agrivert is not proposing to undertake any non-permitted activities on the site other than those to be captured within the Environmental Permit.
Document References	Not applicable

During operational phase of the Permit, the following sections of the SCR template (EPR: H5) will be maintained for the whole site in order that Agrivert Ltd. can demonstrate that the land is in a 'satisfactory state' at time of Permit surrender.

4.0 Changes to the Activity	
Have there been any changes to the activity boundary?	
Have there been any changes to the permitted activities?	
Have any 'dangerous substances' not identified in the Application Site Condition Report been used or produced as a result of the permitted activities?	
Supporting Information	
5.0 Measures Taken to Protect Land	
Supporting Information	
6.0 Pollution Incidents that may have had an Impact on Land and their Remediation	
Supporting Information	
7.0 Soil Gas and Water Quality Monitoring (Where Undertaken)	
Supporting Information	

At Permit surrender, the following sections of the SCR template (EPR: H5) will be completed and submitted to the EA as part of the Permit Surrender Application. Information that has been gathered during the operational phase of the Permit following the 'lifetime approach' will be used to identify whether the land is in a satisfactory condition. Site surrender reference data will be collected if required.

8.0 Decommissioning and Removal of Pollution Risk	
Supporting Information	
9.0 Reference Data and Remediation (where relevant)	
Supporting Information	
10.0 Statement of Site Condition	

ESG
Environmental Scientifics Group

Coursers Farm, Colney Heath, Hertfordshire

Ground Investigation

Carried out for:
Agrivert Limited

March 2013 **Report No 22056/GI**

COURSERS FARM, COLNEY HEATH, HERTFORDSHIRE

GROUND INVESTIGATION

Carried out for : **Agrivert Limited**

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1 INTRODUCTION

1.1 Engagement of ESG

Environmental Scientifics Group (ESG) was instructed by Agrivert Limited (AL) to carry out a Ground Investigation for the site known as Coursers Farm, Colney Heath, Hertfordshire. The scope of work was presented in ESG Proposal reference QLO/22-E-0090/001/SM dated 31 October 2012. The Proposal was accepted by AL by means of an email dated 7 November 2012.

1.2 Proposed Development

The proposed development is understood to comprise an anaerobic digestion facility as outlined in Hertfordshire County Council's Planning Consent referenced 0/0262-12 (CM0937). The facility will include eight 28 m diameter digestion and storage tanks, a reception building, a site office, weighbridges, gas engines and ancillary equipment, internal roads, car parking, soft landscaping and an attenuation pond.

The proposed layout is shown on AL Drawing No COU001-P300 Rev 1 Site Plan and Indicative Landscaping (appended).

1.3 Preliminary Risk Assessment

A Land Contamination Preliminary Risk Assessment Report (AL Ref CL PRA Report, 2011) was prepared by AL and dated December 2011. The Preliminary Risk Assessment (PRA) is understood to have been reviewed and accepted by the Regulatory Authorities (Environment Agency, Hertfordshire County Council (HCC) and Hertsmere Borough Council).

The PRA report states that the site does not pose a significant contaminated land risk to future site users or controlled waters and that further site investigation or risk assessments are required to refine the conceptual site model. Therefore, with the exception of the investigation of the earth bunds, which includes a geoenvironmental element, the ground investigation has focused solely on geotechnical issues.

Planning Condition 9 requires the cross sections of proposed screening bunds be provided to HCC for prior approval. The existing three earth bunds were constructed on the site in 2005 to screen views to a recently constructed farm building and the core of the bunds is understood to consist of imported soils. As the material from within the existing bunds is proposed to be used to make the new screening bunds a site investigation within the bunds is required to identify the quality and volumes of material that make the existing bunds.

1.4 Scope of Work

The scope of work comprised the following:

- Intrusive investigation comprising boreholes sunk by cable percussive methods and machine dug trial pitting within the bunds.
- Factual record of the intrusive investigation, sampling, in-situ testing and laboratory testing.
- Laboratory analysis of soil samples collected from the bunds for a range of potential contaminants.
- Assessment of the geotechnical properties of the ground and the assessment of geotechnical parameters for use in design.
- Interpretative assessment of any contamination found within the material that makes up the bunds.

2 SITE DESCRIPTION AND HISTORY

2.1 Site Description

The site is situated to the south of Coursers Road, approximately 1 km south of Colney Heath and 3 km east of London Colney, Hertfordshire and is centred upon National Grid Reference TL 203 046 as shown on the Key Plan, Figure 1. The site, which measures approximately 5.2 ha in area, is currently open grassland used for livestock grazing.

The site is bound to the north by Coursers Road and arable farmland, to the east by the farm buildings of Coursers Farm and hard standing associated with a plant hire company, to the south by pasture and to the west by Tyttenhanger Quarry which is operated by Lafarge Aggregates. With the exception of the raised bunds, the site is relatively flat, with a slight fall in elevation from north to south, from approximately +76 to +75 m OD.

Three large earth mounds / screening bunds with maximum heights of 81.5 m OD (4 to 5 m above the original ground level) are present across the eastern half of the site. The bunds are understood to be comprised of site won topsoil and subsoil and imported inert fill.

High voltage overhead power lines run in an east to west direction across the northern end of the site parallel to Coursers Round. Two electrical pylons and one electrical substation are located just outside the north west of the site boundary.

3 PUBLISHED GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

According to the published British Geological Survey (BGS) plan for the area (Map Sheet 239, Hertford Drift Geology, 1:50,000 Scale, 1978), the underlying geology of the site is generally considered to comprise Glacial Clay over Upper Chalk. In addition Glacial Sand and Gravel is likely to be present above the Upper Chalk in places as it is identified to the west of the site and would be associated with Tyttenhanger Quarry.

The Environment Agency (EA) website indicates that the site lies on a Principal aquifer (Upper Chalk) and within a groundwater Source Protection Zone 3 (SPZ3). A SPZ3 is a source catchment protection zone and is defined as:

> *"the area around a source within which all groundwater recharge is presumed to be discharged at the source. In confined aquifers, the source catchment may be displaced some distance from the source. For heavily exploited aquifers, the final Source Catchment Protection Zone can be defined as the whole aquifer recharge area where the ratio of groundwater abstraction to aquifer recharge (average recharge multiplied by outcrop area) is >0.75".*

The nearest surface watercourse to the site is Tyttenhanger Stream which lies approximately 100 m to the south of the site boundary. A small pond is located in the north west of the site and several drainage ditches are located around the western and southern boundaries of the site. A larger pond is located approximately 100 m to the north east of the site boundary. Great Crested Newts were identified within the on site pond and larger pond to the north east of the site during an ecological survey of the site.

4 FIELDWORK

All site works were completed under the instruction and supervision of ESG in accordance with BS 5930+A2 (2010) Code of Practice for Site Investigations. The exploratory hole logs are based on BS 5930+A2 (2010) incorporating Amendment 2 and are therefore compliant with Eurocode 7.

Exploratory hole locations were marked out by ESG in advance of the fieldwork and the locations were cleared and positioned away from identified or suspected buried services. All locations were subject to a Cable Avoidance Tool (CAT) scan by ESG at each location prior to breaking ground. Hand dug inspection pits were undertaken at each cable percussive location to a depth of 1.2 m bgl. It should be noted that the locations of the exploratory holes could not be optimised for the current planned layout of the structures as the cable percussion rigs could not be operated on the areas of the existing bunds. The exploratory holes were therefore located at the nearest accessible locations.

The locations of the exploratory holes are shown on ESG Drawing No 22056/GI/001. The exploratory hole logs are presented in Appendix A. The details of the fieldwork undertaken are presented below.

4.1 Cable Percussion Boreholes

Seven cable percussive boreholes designated as BH1 to BH7 were sunk to depths of between 15.45 m and 24.45 m bgl using Dando 1000 and Dando 3000 cable percussive drilling rigs.

Standard Penetration Tests (SPTs), alternating with driven undisturbed (U100) sampling where appropriate in cohesive soils, were carried out. Bulk samples and disturbed samples were taken from each stratum encountered.

4.2 Trial Pits

Ten trial pits designated as TP1 to TP10 were excavated to a maximum depth of 3.6 m bgl using a 7 tonne tracked mini-digger within the three raised bunds.

The trial pitting methodology was agreed with an ecologist on site prior to the machine entering the site. The ecologist also supervised the removal of the turf layer at each of the trial pit locations to ensure the works would not impact the local population of Great Crested Newts.

Environmental soil samples were collected from the imported soils that made up the core of the bunds, together with any materials suspected of containing elevated concentrations of contaminants. Samples were also taken from the topsoil and subsoil placed as a capping layer above the imported material. Each soil sample comprised two 1 litre plastic tubs, a 125 ml amber glass jar and a 60 ml amber glass jar for volatile organic compounds (VOC) testing.

On completion the trial pits were backfilled with arisings. Photographs of the trial pits are included in the Plates (Appendix E).

4.3 Installations

On completion, three of the cable percussive boreholes were installed with 50 mm HDPE standpipes for the purpose of groundwater monitoring.

The depths of the response zones were specified by ESG and were positioned to enable groundwater monitoring and sampling where appropriate. Each response zone was formed using an inert gravel filter pack sealed above and below with bentonite and gas valves were placed at the top of each gas monitoring standpipe. Details of the installations are presented in Table 1 and on the relevant borehole records in Appendix A.

Table 1 Summary of Monitoring Installation Construction

Borehole	Standpipe Diameter (mm)	Response Zone (m bgl)	Stratum
BH1	50	1.7 – 6.1	Glacial Deposits
BH5	50	1.0 – 12.2	Glacial Deposits
BH6	50	1.0 – 11.4	Glacial Deposits

4.4 Groundwater Monitoring

Groundwater depth monitoring was carried out approximately four weeks after the completion of the fieldwork.

5 LABORATORY TESTING

5.1 Chemical Laboratory Testing

A programme of chemical laboratory testing was scheduled by ESG on selected soil samples obtained from within the bunds. Soil leachate tests were also carried out for a range of inorganic determinands.

The testing was undertaken at the Burton-on-Trent laboratories of ESG. The scheduled laboratory tests are detailed in Tables 2 and 3 and the results are presented in Appendix B.

Table 2 Summary of Soil Chemical Laboratory Testing

Determinand	No. of tests
Metals and semi-metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc)	10
Hexavalent chromium	7
Cyanide (total)	10
Phenols Index	10
pH	10
Asbestos (screening)	7
Asbestos (quantification)	1
PCBs (12 congeners)	3
Total Petroleum Hydrocarbon (TPH) by GCFID (C8 to C40) with aliphatic and aromatic class separation and carbon banding	10
Polycyclic aromatic hydrocarbons (PAH) (16 priority)	10
Gasoline Range Organics (GRO) and BTEX Compounds	7
SVOCs (Target list)	3
VOCs (Target list)	3
Total organic carbon	5

Table 3 Summary of Leachate Chemical Laboratory Testing

Determinand	No. of tests
Metals and semi-metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc)	5
Hexavalent chromium	5
Cyanide (free)	5
pH	5

5.2 Geotechnical Laboratory Testing

A programme of laboratory testing was scheduled by ESG to determine the geotechnical properties of selected soil samples obtained from the investigation (see Table 4). The laboratory testing was carried out in accordance with BS1377 (1990). The results of the laboratory geotechnical testing are presented in Appendix C.

Table 4 Summary of Geotechnical Laboratory Testing

Determinand	No. of tests
Atterberg Limits	26
Moisture Content	26
Particle Size Distribution	9
Undrained Unconsolidated Triaxial	11
CBR	7
One Dimensional Consolidation	5
BRE Special Digest 1 (SD1)	12

5.3 Horticultural Laboratory Testing

A programme of horticultural laboratory testing was scheduled by ESG on selected topsoil and subsoil samples obtained from within the bunds for a range of horticultural soil properties.

The testing was undertaken at the Bracknell laboratories of NRM. The scheduled laboratory tests are detailed in Table 5 and the results are presented in Appendix D.

Table 5 Summary of Soil Chemical Laboratory Testing

Determinand	No. of tests
Sand, silt and clay content	3
Stone content (2-10 mm, 10-50 mm and >50 mm)	3
pH value	3
Electrical conductivity	3

Determinand	No. of tests
Organic matter content	3
Nutrient content (total nitrogen, available phosphorus, available potassium and available magnesium	2

6 GROUND CONDITIONS

6.1 General Comments

The ground conditions encountered during the investigation are consistent with those shown on the published geological map. This comprises Topsoil and Subsoil overlying Glacial Deposits which in turn overlie Upper Chalk. In addition Made Ground was encountered below the Topsoil within the mounds.

For full details of the materials encountered, reference should be made to the exploratory hole records presented in Appendix A. Cross sections of the mounds are presented in Drawing 22056/GI/002.

6.2 Topsoil and Subsoil

Topsoil comprising sandy gravelly Clay was encountered to a maximum depth 0.6 m bgl at all exploratory locations. Subsoil comprising sandy gravelly Clay was encountered to a maximum depth of 1.7 m bgl at all exploratory hole locations, with the exceptions of some locations within the mounds where the Topsoil was directly underlain by Made Ground.

The pH value, sulphate content, CBR value, Atterberg limits and undrained shear strength were determined for selected samples of this material and the results are summarised in Table 6.

Table 6 Summary of Laboratory Test Results on Topsoil and Subsoil

Parameter	No of Tests	Range of Results
SD1 Sulphate (acid extract) (mg/kg) Sulphate (H_20 extract) (mg/l) Total sulphur (%) pH	4	 312 to 515 16 to 47 0.018 to 0.043 7.2 to 8.1
CBR CBR value (%) Bulk density (Mg/m^3) Dry density (Mg/m^3) Moisture content (%)	5	 Top: 0.11 to 2.2 : Base: 0.15 to 1.6 1.95 to 2.16 1.54 to 1.89 Top: 15 to 26 : Base: 14 to 26
Moisture content (%)	2	7.4 and 13
Liquid limit (%)	2	30 and 39
Plastic limit (%)	2	17
Plasticity index (%)	2	13 and 22
Unconsolidated Undrained Triaxial Compression Undrained shear strength (Cu) kPa Bulk density (Mg/m^3) Dry density (Mg/m^3) Moisture content (%)	1	 49 2.21 1.96 13

6.3 Made Ground

The core of the mounds and up to 1.5 m below the base of the mounds were found to comprise imported fill / Made Ground comprising sandy, gravelly, clay with pockets of firm clay was encountered in nine of the ten exploratory hole locations. The Made Ground contained frequent gravel and cobbles of concrete, brick, tarmacadam and occasional fragments of wood, plastic and metal.

Made Ground was not encountered in areas of the site away from the mounds.

6.4 Glacial Deposits

Glacial Deposits were encountered in all the exploratory borehole locations. The top of the stratum was encountered between 0.8 and 1.7 m bgl and the base between 19.2 and 21.3 m bgl (only encountered in two boreholes).

This stratum comprises both cohesive and granular materials. Shallower cohesive deposits were present in layers across the northern part of the site (BH1 to BH4) from below the subsoil to depths of up to 9.3 m bgl, with a maximum single stratum thickness was 3.2 m. This consists of greyish brown, yellowish brown and bluish grey slightly sandy slightly gravelly Clay. A deeper 2.5 to greater than 4 m thick deposit is found generally across the site at depths of between 13 and 17 m bgl. This is a bluish grey slightly sandy slightly gravelly Clay.

The predominant granular deposit is generally a yellowish brown, sandy Gravel to gravelly Sand with occasional clay lenses. Granular deposits were found between the cohesive layers where they are present in the north and below the subsoil in the south of the site. A granular deposit was also encountered across the site between the deeper cohesive glacial deposit and Upper Chalk.

A total of 61 SPTs were undertaken in the predominantly granular deposits yielding SPT N-values ranging from 3 to greater than 50 indicating they are very loose to very dense.

A total of 10 SPTs were undertaken in the predominantly cohesive deposits yielding SPT N-values ranging from 5 to 48.

The Particle Size Distribution, pH value, sulphate content, Atterberg limits, undrained shear strength and CBR values were determined for selected samples of this material. The results for the predominantly granular deposits are summarised in Table 7 and those for the predominantly cohesive deposits are summarised in Table 8.

Table 7 Summary of Laboratory Test Results on Predominantly Granular Glacial Deposits

Parameter	No of Tests	Range of Results
Particle Size Distribution (%) Cobbles/boulders Gravel Sand Silt/Clay	7	 0 15 to 83 16 to 79 0 to 16
SD1 Sulphate (acid extract) (mg/kg) Sulphate (H_20 extract) (mg/l) Total sulphur (%) pH	3	 55 to 102 15 to 26 0.008 to 0.024 8.1 to 8.5
CBR CBR value (%) Bulk density (Mg/m^3) Dry density (Mg/m^3) Moisture content (%)	2	 Top: 27 and 45 : Base: 11 and 31 2.08 and 2.23 1.97 and 2.09 Top: 5.2 and 6.3 : Base: 5.4 and 6.5
Moisture content (%)	1	8
Liquid limit (%)	1	24
Plastic limit (%)	1	Non Plastic
Plasticity index (%)	1	Non Plastic

Table 8 Summary of Laboratory Test Results on Predominantly Cohesive Glacial Deposits

Parameter	No of Tests	Range of Results
Particle Size Distribution (%) Cobbles/boulders Gravel Sand Silt Clay	2	 0 2 and 8 17 and 18 24 and 36 45 and 50
SD1 Sulphate (acid extract) (mg/kg) Sulphate (H_20 extract) (mg/l) Total sulphur (%) pH	5	 169 to 1430 <10 to 376 0.015 to 0.658 7.7 to 9.0
Moisture content (%)	23	12 to 32
Liquid limit (%)	23	31 to 81
Plastic limit (%)	23	14 to 29
Plasticity index (%)	23	15 to 52
Unconsolidated Undrained Triaxial Compression Undrained shear strength (Cu) kPa Bulk density (Mg/m^3) Dry density (Mg/m^3) Moisture content (%)	10	 31 to 286 1.94 to 2.19 1.49 to 1.91 12 to 30

Five oedometer consolidation tests were also carried out on samples from this stratum. The results of these tests are discussed in Section 7.2.

6.5 Upper Chalk

The top of the Upper Chalk was penetrated in two of the boreholes at depths of 19.2 and 21.3 m bgl, with a maximum penetration of 3.15 m. The Chalk was described as very weak yellowish white fine grained Chalk with occasional gravel of fine to coarse, subrounded flint.

A total of 2 SPTs were undertaken in the Upper Chalk yielding SPT N-values of 15 and 22.

6.6 Groundwater

During the cable percussive boring, groundwater was first struck at depths from 1.2 to 2.6 m bgl. Groundwater was not encountered within the bunds during the trial pitting.

During the monitoring visit on 27 February 2013, groundwater levels were recorded in the standpipes with response zones in the Glacial Deposits at depths of 2.9 m bgl in BH1, 9 m bgl in BH5 and 8.5 m bgl in BH6 indicating that there may be perched water within the upper granular Glacial Deposits and groundwater within the deeper granular Glacial Deposits.

6.7 Observed Contamination

No notable contamination was observed during the site works by either visual or olfactory means other than general inclusions of builders waste including brick, concrete, metal and tarmacadam in the Made Ground.

7 GEOTECHNICAL ENGINEERING ASSESSMENT

7.1 Proposed Development

The proposed development is understood to comprise an anaerobic digestion facility. This will include 8 No 28 m diameter digester and storage tanks, a reception building, a site office, weighbridges, gas engines and ancillary equipment, internal roads, car parking, soft landscaping and an attenuation pond. The proposed layout is shown on AL Drawing No TRU001 COU001-P300 Rev 1 (appended).

Details of loadings on the ground from the proposed development have not been provided. However, from previous, similar developments it is understood that loads up to 50 kPa could be applied to the ground under the ancillary buildings. Under the Reception Building, storage tanks and digesters, this increases to around 135 kPa.

7.2 Foundations

The investigation has identified a layer of Topsoil and Subsoil up to 1.7 m thick overlying the Glacial clays, sands and gravels. Upper Chalk is present at depths of around 20 m below current ground level. Groundwater is likely to be encountered around 3 m below current ground level, although this may only be a local perched level. It has been assumed that the topsoil will be removed prior to development. The subsoil is not dissimilar to the underlying cohesive Glacial Deposits, where present at shallow depth, albeit generally softer. It is recommended that the tanks and buildings are founded in the underlying Glacial Deposits. However, it may be possible to found the lighter items of plant within this subsoil, subject to the excavation of unsuitable materials and compaction of the ground below the plant.

The Glacial Deposits are variably clay, sand and gravel, with near surface deposits being clay over gravel towards the north of the site and gravel only towards the south of the site. In addition a second layer of clay, between 6 and 9 m below ground level at its thickest, occurs on the northern part of the site. This is not present on the southern part. A lower clay layer, typically 3 to 4 m thick with its upper surface between 12 to 15 m below ground level, is present across the whole of the site.

The results of the Standard Penetration Tests (SPT) are shown on Figure 2. These are divided into those which were carried out in the clay strata, those which were carried out in the granular (sand and gravel) strata and those which were carried out in the Chalk. However, the variability in predominant soil type means that some of these may have been carried out in a mixture of sand and clay. The results of laboratory undrained strength tests on predominantly clay samples are shown on Figure 3, along with estimates of strength from the SPT N-Values taken in the predominantly clay strata using a factor of 4.5. The classification tests indicate the clay to be of low to intermediate plasticity, although there are three results, all from clays at depths between 6.0 and 7.5 m, with high to very high plasticity.

The results of the in situ testing indicate that the granular strata are generally medium dense to dense, occasionally very dense, within approximately the top 6 m below ground level with a characteristic SPT N-Value of around 30 (equivalent to an angle of internal friction of 36°). However below 6 m the relative density decreases such that between 10 and 15 m depth, the granular deposit is loose with a SPT N-Value ranging from 3 to 45, an average value of 15 and a suggested characteristic value of around 10 (equivalent to an angle of internal friction of 30°). Below 15 m the relative density increase again, with a characteristic SPT N-Value of around 30 again at the top of the Chalk around 20 m depth.

The results of the laboratory and in situ testing indicate that the clay strata have an undrained shear strength of around 25 kPa at 2 m depth increasing with depth to around 150 kPa at a depth of 15 m. A reasonable correlation in strengths between the measured laboratory values and the estimates from the SPT N-Values can be seen on Figure 3. However, it is noted that there is one particularly low SPT result in the clay in BH2 at 15.3 m depth which equates to a strength of around 40 kPa. This is lower than would be expected when compared with the remainder of the data. The reason for this is not clear but the result has been considered as anomalous in the overall assessment of the ground conditions.

It is recommended that foundation design for the main structures be based on an undrained strength of 25 kPa (where clay is present) or an angle of friction of 36° (where granular deposits are present) at a depth of 2.0 m in the Glacial Deposits. It is also recommended that in all locations the foundations penetrate at least 2 m below ground level or at least 0.3 m into the Glacial Deposits, whichever is the greater. This should ensure that the foundations are still above the current groundwater level. It is only in the northern part of the site (BH2, BH3 and BH4) where the weaker clay is at this foundation depth of 2 m. Extending the foundation depth to 3.5 m in these areas will place the foundation on the stronger granular deposits. However, this will place the foundation below the highest groundwater table and

although this may only be perched water, the quantities of water which could enter any excavation could still be large. Any groundwater or surface water ingress to the excavations will need to be controlled in order that softening of the clays or loosening of the granular deposits does not occur. Where the base of the excavation is in granular deposits, this may require the groundwater flow cutting off by the use of dewatering, sheet piling or similar. All excavations should have a blinding layer of concrete applied to the final formation as soon as possible after exposure to reduce any softening due to ingress of surface or groundwater. No formation surface should be left open overnight. Any loose or soft zones revealed in the formation should be excavated and replaced with placed and compacted granular fill.

It should be noted that the preceding recommendations are for the design of the safe bearing pressures for the foundations. Settlements under these loads may be larger than is normally the case, especially for the larger structures, as a result of the loose granular deposits below a depth of 10 m. This is discussed further in the following paragraphs.

The smaller ancillary buildings with a maximum loading of 50 kPa should be founded below the topsoil and subsoil. At a depth of 2 m, the allowable bearing pressure is around 60 kPa where the foundation is on the upper softer clays and somewhat greater where the foundation is on the granular Glacial Deposits. This should provide a suitable foundation and should result in settlements not exceeding approximately 25 mm.

It is recommended that the more highly stressed foundations for the Reception Building and tanks be founded below the near surface clays (ie 3.5 m below current ground level on the northern part of the site, 2 m elsewhere). In the case of the northern part of the site, this could be below the groundwater table which was at 2.9 m in BH1. This should provide an allowable bearing pressure in excess of 135 kPa. However, the width of these structures means that the zone of ground stressed by the load will include the looser granular materials between approximately 10 and 15 m depth, the lower clay layer and, in the case of the northern part of the site, the clay layer at variably 6 to 9 m below ground level. Allowing for a 2 m embedment on the southern part of the site (ie Reception Building and four southern tanks), settlements should not exceed around 80 mm. Allowing for a deeper 3.5 m embedment on the northern part of the site (ie four northern tanks), where there is an additional layer of clay, settlements should not exceed around 100 mm.

It is recommended that the formation for all foundations should be inspected and any areas of soft clay or loose granular material removed and backfilled with compacted granular fill. The formation should also be proof rolled with a heavy roller.

An alternative to the above shallow foundations, would be to adopt deep foundations (eg piles) for these tanks. The use of piles would limit settlements further, typically to less than 25 mm. The total load on each tank at 135 kPa is approximately 83,000 kN. Assuming a pile spacing of around 2 m, this indicates approximately 150 piles per tank, giving a working load of 550 kN per pile. Typically, 450 mm diameter piles to around 18 m depth would be required to support this load. This is only provided as an indicative pile design and the advise of a specialist contractor should be sought as to the suitability and capacities of their techniques in these ground conditions. Stone columns or other forms of ground reinforcement (eg grouted columns) may offer an alternative to the use of piles. However, the strength of the ground and the magnitude of the loading may preclude the use of such methods. The advise of a specialist contractor should be sought as to the suitability and capacities of their techniques in these ground conditions.

The Glacial Deposit clays generally have a low to medium volume change potential. At present there are no trees on the site. However, any planned planting of trees will need to make allowance for the potential volume change of any clays below the building foundations (NHBC, 2011).

7.3 Chalk – Mining and Dissolution

The site is underlain by the Upper Chalk at depths of around 20 m below current ground levels. The general area of Hertfordshire in which the site is located has had a past record of mining and dissolution features.

Mining typically takes the form of Deneholes and Chalkwells, which both involve sinking a vertical shaft through the overlying deposits. These shafts and the mined zone of Chalk are often badly backfilled and subsidence ensues. Whilst the 20 m of cover here has probably mitigated against surface mining on this site, shafts in excess of this depth have been recorded in the past. No obvious signs of subsidence have been noted on the site, but it is possible that the ponds noted in the locality could mark areas of old subsidence.

Dissolution features are similar but natural occurring phenomena. In this case water flow has dissolved a vertical pipe into the top of the Chalk which then fills with loose deposits. These loose zones can then migrate to the surface, typically causing subsidence but in extreme cases creating a significant crater at the ground surface.

Whilst the risk to the facility from either of these features is considered to be low, it cannot be totally ruled out and the effects of subsidence can be significant. Normally a desk study carried out prior to the investigation would have highlighted and potentially investigated the possibility of such features with a search of local records. However, this may do no more than indicate the possibility of their presence on site. A full investigation of the Chalk surface over the whole site with a suitable density of exploratory holes or probes can be a lengthy and expensive exercise.

At this stage it is recommended that further enquiries be made with the Local Authority, library, archives etc to see if any records exist of features on or near to the site. The design of the structures may need to allow for the possibility of local subsidence over part of a tank or structure. A frequent trigger for subsidence from these features is a burst or leaking pipe. Therefore particular attention should be taken with the design and installation of water bearing pipes on the site to ensure their integrity for the lifetime of the facility.

7.4 Ground Floor Slabs

Lightly loaded floor slabs may be designed to be ground bearing only if there is a fairly uniform sub-grade of low compressibility material and no cohesive material with a potential for heave are present. Suspended floor slabs should be used in the areas of Topsoil and Subsoil to eliminate the risk of differential settlements. Alternatively, the Topsoil, subsoil and any underlying clay could be removed to a depth of at least 500 mm in the areas. It should be replaced with an appropriate engineered and compacted granular fill. Prior to placing the fill the exposed formation should be inspected and any clay or areas of loose granular material removed and backfilled with compacted granular fill. The formation should also be proof rolled with a heavy roller.

7.5 Pavements

Pavements, hardstanding and car parking areas are expected to be founded on the Topsoil or, more likely, the Subsoil or near surface sands and clays. The results of laboratory testing indicate CBR values in the range 0.11 to 2.2%. It is recommended that pavements are designed using a CBR value of 0.1%, which may prove impractical. Removal of the softer materials and replacement with a compacted granular fill, separated from the underlying soil by a geotextile layer, may therefore be necessary. Wherever an in situ formation is exposed it should be proof rolled with a heavy roller prior to the placing of the fill or capping and any soft spots or cohesive materials removed and backfilled with compacted granular fill. Further in situ CBR testing in specific areas designated for pavements may result in higher values at the proposed formation level.

7.6 Buried Concrete

The results of the chemical analyses on samples taken from the Made Ground and underlying materials indicate pH values in the range 7.2 to 9.0. The results of water soluble sulphate (SO_4) determinations fall within the range of 10 to 376 mg/l and total sulphur in the range 0.01 to 0.66%. Using the guidelines from BRE (2005), it can be assessed that pyrite is probably not present on this site at shallow depths.

For shallow concrete foundations, assuming a Brownfield location and mobile groundwater, concrete in contact with the ground should be designed to Design Sulphate Class DS-1 and Aggressive Chemical Environment for Concrete classification AC-1, as defined by BRE (2005).

One of the two results of the chemical analyses from around 16 m depth in BH3 implies that pyrite may be present in the deeper soils. At such depths, this should not be a problem as there is little potential for oxidisation. A Design Sulphate Class based on Total Potential Sulphate is not therefore considered to be warranted for any deeper piled foundations

8 UK CONTAMINATED LAND LEGISLATIVE FRAMEWORK

8.1 Legislation on Contaminated Land

Part IIA of the Environmental Protection Act, 1990, which was enacted by Section 57 of the Environment Act 1995 and the associated Contaminated Land (England) Regulations 2000 (SI 2000/227), was brought into full effect on 1 April 2000. This legislation created a statutory regime for the identification and remediation of potentially contaminated land. The principal feature of this legislation is that the hazards associated with contaminated land should be evaluated in the context of a site-specific risk-based framework.

Part IIA of the EPA 1990 defines contaminated land as:

> "*any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is a significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused*".

Controlled waters are considered to be all groundwaters, inland surface waters and estuarine and coastal waters.

To determine whether land falls under the Part IIA definition of contaminated land, it is necessary to establish whether a pollutant linkage is present, the degree of harm resulting from the linkage, and the significance of such harm to the receptor. A pollutant linkage comprises:

- Source - a contaminant at a concentration capable of causing adverse health or environmental effects.
- Pathway - there must be an exposure pathway through which the receptor comes into contact with the contamination source.
- Receptor - there must be a human or environmental receptor present, which may be at risk of harm or impact from the source.

The responsible authority then needs to consider whether the identified pollution linkage:

- is resulting in significant harm being caused to the receptor in the pollutant linkage;
- presents a significant possibility of significant harm being caused to that receptor;
- is resulting in the significant pollution of controlled waters, which constitute the receptor; or is likely to result in such pollution.

If a pollutant linkage is demonstrated, then the Part IIA legislation provides powers for remedial action to be enforced by the Local Authority in whose area the contaminated land is situated.

The planning process for developing land affected by contamination, as outlined in the National Planning Policy Framework (March 2012), is intended to ensure that unacceptable risk is removed and that the site is suitable for its new use. Furthermore, the National Planning Policy Framework states that, as a minimum "after remediation under Planning, the land should not be capable of being determined as contaminated land under Part IIA".

Although Part IIA is not being enforced in respect of this site and in fact the site is very unlikely to come under the definition, the above regime nevertheless provides an appropriate framework for the assessment of contaminated land or potentially contaminated land.

8.2 Risk Assessment

The assessment of contaminated land is typically a two-phase process, which is initially based on a qualitative assessment of the likelihood of pollution linkages being present, followed if necessary by a quantitative assessment, which seeks to determine the degree and the significance of the pollution. The process of assessing risks from contaminated land is outlined in “Guidelines for Environmental Risk Assessment and Management” (Department for the Environment, Transport and the Regions (DETR), 2000) and "Model Procedures for the Management of Land Contamination" (CLR11; EA 2004).

9 SUMMARY OF CONCEPTUAL SITE MODEL

9.1 Potential Sources

Information gathered during the site research has been used to identify the likely contaminants, their sources and their spatial distribution.

The PRA Report (AL Ref CL PRA Report, 2011) identified the following primary sources of contamination:

- Fill materials within the core of the three bunds – believed to be inert but possibility of some contaminants being present.

9.2 Potential Pathways

To develop further an understanding of the potential risks posed by the contaminants to human receptors, the pathways through which contaminants may impact sensitive receptors need to be identified. The Contaminated Land Exposure Assessment (CLEA) model (DEFRA & EA 2009) indicates potential exposure routes for assessing risks to human health as follows:

- Direct soil and dust ingestion;
- Dermal contact with soil and dust; and
- Inhalation of particulates and vapours;

It is considered that the potential pathways with respect to controlled waters will include:

- Downward migration through Made Ground to groundwater;
- Lateral migration through groundwater to surface water; and
- Lateral migration by means of man-made pathways (i.e. services) and surface water run-off to surface water.

9.3 Potential Receptors

A proposed end-use as an anaerobic digestion facility and known neighbouring land uses have been used to develop an understanding of the likely sensitive human receptors. It is envisaged that the potential receptors of contamination (if present on site) are:

- Construction workers - critical receptor female adult;
- Future site users - critical receptor female adult; and
- Neighbouring properties – plant hire site and farmland – critical receptor female adult.

Information gathered during the site research has been used to develop an understanding of the likely sensitive controlled waters receptors. The potential controlled waters receptors of contamination (if present on site) are considered to be:

- Surface water (Tyttenhanger Stream);
- Groundwater (Principal Aquifer).

9.4 Potential Significant Pollutant Linkages Considered

The potential sources, pathways and receptors, as detailed above, have been assessed in respect of whether they constitute potentially significant pollutant linkages. This has been updated from the PRA Report (AL Ref CL PRA Report, 2011) and incorporates the findings of the fieldwork carried out.

SOURCE		PATHWAY		ON-SITE RECEPTOR	OFF-SITE RECEPTOR	SIGNIFICANCE
Contaminated soils / Groundwater	→	Outdoor inhalation	→	Female Adult	Female Adult	Low to Moderate
Contaminated soils	→	Dermal exposure	→	Female Adult	n/a	Low
Contaminated soils	→	Ingestion	→	Female Adult	n/a	Low
Contaminated soils	→	Inhalation of particulates	→	Female Adult	Female Adult	Moderate
Leachate from Contaminated soils	→	Downward migration through Made Ground	→	Groundwater (Principal) Aquifer)	Surface water (Tyttenhanger Stream)	Low to Moderate
Asbestos contaminated soils	→	Dust inhalation and deposition	→	Female Adult	Female Adult Farmland	Low to Moderate

10 HUMAN HEALTH RISK ASSESSMENT SCREENING

10.1 Technical Approach

Human health risk assessment for long term exposure has been undertaken initially by comparing the maximum measured soil concentrations with Soil Guideline Values (SGVs) published by the EA. A review of the published SGVs was carried out in December 2006 by the EA which resulted in the SGVs being withdrawn from use. In 2009, the EA published a series of documents which updated the technical basis of the CLEA model and reconsidered the rationale for the generic land use scenarios used to derive SGVs; revised SGVs for a number of determinands were also published at this time (EA, 2009d-n).

As revised SGVs are only available for a certain number of contaminants, generic assessment criteria (GAC) have been derived by ESG in line with the CLEA guidance for substances without SGVs. The GAC have been derived using the CLEA 1.06 software with default generic receptors, exposure parameters and soil types appropriate for the site usage. Chemical data have been input into the model from peer reviewed sources, and EA data have been used where available. The GAC have been adjusted for soil organic matter (SOM) where appropriate in order to render them suitably conservative; the default SOM of 6% used in the derivation of SGVs is not considered to be sufficiently conservative for GACs for all sites. The CLEA model used for this risk assessment can be provided to regulators on request.

The exposure pathways considered in the model are dependent on the land use scenario; in the case of the proposed commercial end use of the site, the relevant pathways include direct soil and dust ingestion, dermal contact with soil and inhalation of dust and vapours indoors and outdoors.

10.2 Human Health Risk Assessment Screening

The recorded concentrations of contaminants in soils are compared with commercial / industrial GAC (adjusted for 1.0% SOM), in Table 9. The ICRCL Guidance Note 64/85 Action Level has been used as a screening value to assess the risks from asbestos.

Table 9 Comparison of Soil Analytical Results with Commercial / Industrial GAC

Determinand	Maximum Measured Concentration (mg/kg)	Generic Assessment Criterion (GAC) (mg/kg)	No. of results exceeding GAC (no. of tests in brackets)
Metals & semi- metals			
Arsenic	31.6	640	0 (10)
Cadmium	0.44	230	0 (10)
Chromium (total)	43.4	8400	0 (10)
Chromium VI	<0.1	35	0 (10)
Copper	34.7	72000	0 (10)
Lead	243.5	750	0 (10)
Mercury	<0.6	3600	0 (10)
Nickel	32.1	1800	0 (10)
Selenium	0.7	13000	0 (10)
Zinc	153.1	660000	0 (10)
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	0.28	85000	0 (10)
Acenaphthylene	<0.11	84000	0 (10)
Anthracene	0.34	520000	0 (10)
Benzo(a)anthracene	2.4	130	0 (10)
Benzo(a)pyrene	3.29	14	0 (10)

Determinand	Maximum Measured Concentration (mg/kg)	Generic Assessment Criterion (GAC) (mg/kg)	No. of results exceeding GAC (no. of tests in brackets)
Benzo(b)fluoranthene	4.2	140	0 (10)
Benzo(g,h,i)perylene	2.19	1400	0 (10)
Benzo(k)fluoranthene	2.1	140	0 (10)
Chrysene	2.87	1400	0 (10)
Dibenzo(a,h)anthracene	0.5	14	0 (10)
Fluoranthene	2.94	23000	0 (10)
Fluorene	0.21	64000	0 (10)
Indeno(1,2,3,c,d)pyrene	2.14	140	0 (10)
Naphthalene	0.3	980	0 (10)
Phenanthrene	1.46	22000	0 (10)
Pyrene	3.63	54000	0 (10)
Total Petroleum Hydrocarbons			
TPH – >C5-C8	0.67	3600[1]	0 (7)
TPH – >C8-C10	<3	2100[1]	0 (10)
TPH – >C10-C12	4	5100[1]	0 (10)
TPH – >C12-C16	24.8	34000[1]	0 (10)
TPH – >C16-C21	55.1	27000[1]	0 (10)
TPH – >C21-C35	185	28000[1]	0 (10)
Other compounds (including SVOCs and VOCs greater than LOD)			
PCBs	<0.063	9.0	0 (3)
Benzene	<0.013	28	0 (7)
Asbestos	<0.001%	0.001%[3]	0 (7)
Phenol index	<0.7	32000	0 (10)
Cyanide (total)	<0.7	1200[2]	0 (10)

GACs assume that no free phase is present.
[1] Using most applicable and conservative TPH fraction GAC.
[2] GAC based on calculated minimum concentration of CN to produce enough toxic gas to classify as hazardous by H12.
[3] ICRCL Guidance Note 64/85 Action Level

As shown in Table 9, none of the contaminants of concern exceed the relevant GAC, indicating that there is no significant risk to future site users from these substances in soil.

Asbestos was detected by the laboratory within one of the Made Ground samples (Trial Pit TP10 at a depth of 0.7 m bgl) within the bunds; the lab described the material as free fibres of chrysotile and amosite. Subsequent quantification of asbestos content of the sample found the concentration of asbestos to be less than the ICRCL Guidance Note 64/85 Action Level of 0.001 percent by weight, indicating that there is a low chance of asbestos fibres being released into the atmosphere where they can cause a hazard to construction works or future site users if inhaled.

However, should any visual evidence of potential asbestos-containing materials be identified during work on site, ESG should be contacted for advice on the way to proceed.

In order to protect construction workers against exposure to contamination, contact with the Made Ground should be avoided and standard site hygiene procedures should be implemented, such as wearing gloves and overalls and providing adequate washing facilities. Eating, drinking and smoking should be banned in the working areas to prevent inadvertent ingestion of the soil. Dust suppression measures should be implemented as and when necessary and P3 dusk masks should be worn by construction workers during dusty conditions.

11 CONTROLLED WATERS RISK ASSESSMENT SCREENING

11.1 Technical Approach

The assessment of risks to controlled waters follows guidance provided by the EA and DEFRA in the Contaminated Land (England) Regulations 2000 (SI 2000/227).

Due to the site's setting, the Principal Aquifer below the Glacial Deposits and Tyttenhanger Stream are considered to be the most sensitive controlled waters receptors in the vicinity of the site.

The target concentrations (Ct) have been based on the environmental quality standards (EQS; freshwater) or the UK Drinking Water Standards whichever is lower. Where appropriate, EQS values have been adjusted to account for water hardness. The Drinking Water Inspectorate water hardness map of England and Wales, indicates that the site falls within an area of very hard water (>300 mg/l $CaCO_3$) supply. Therefore, the EQS corresponding to the water hardness band (>250 mg/l CaCO3) has been used.

11.2 Controlled Waters Risk Assessment Screening

To determine whether there is a source of contamination at a concentration posing a risk to the quality of controlled waters, leachate concentrations are compared to their respective target concentrations (Ct) in Table 10.

Table 10 Comparison of Maximum Leachate Concentrations with Target Concentrations (Ct)

Contaminants of Concern	Maximum Leachate Concentration (mg/l)	Ct[1] (mg/l)	Results greater than Ct?	No. of Results Exceeding Ct (No. of tests in brackets)
Arsenic	0.008	0.01[1]	NO	0 (5)
Cadmium	0.0006	0.00025[2]	YES	**1 (5)**
Chromium	0.002	0.0047[2]	NO	0 (5)
Copper	0.021	0.028[2]	NO	0 (5)
Lead	0.009	0.0072[2]	YES	**1 (5)**

Contaminants of Concern	Maximum Leachate Concentration (mg/l)	Ct[1] (mg/l)	Results greater than Ct?	No. of Results Exceeding Ct (No. of tests in brackets)
Mercury	<0.0001	0.00005[2]	NO	0 (5)
Nickel	0.005	0.02[1 and 2]	NO	0 (5)
Selenium	0.002	0.01[1]	NO	0 (5)
Zinc	0.123	0.125[2]	NO	0 (5)
Cyanide (free)	<0.02	0.001[2]	YES	**5 (5)**

[1] UKDWS Ct value
[2] EQS Ct value

From Table 10, it can be seen that the concentrations of inorganic determinands in leachates were generally less than their respective Ct in the five samples of Made Ground scheduled for testing. However, elevated concentrations of cadmium and lead were encountered in the sample recovered from TP5 at 1.0 m and cyanide (free) was identified as potentially being present at concentrations greater than the Ct in all five samples.

However, the laboratory limit of detection (LOD) for cyanide (free) was greater than the Ct and free cyanide was not recorded in any of the five leachate samples. In addition total cyanide was not detected within any of the 10 soil samples obtained from the Made Ground.

The concentrations of cadmium and lead were elevated above the Ct in one of the five samples. The remaining four leachate samples did not detect concentrations of cadmium above the laboratory limit of detection, while the recorded concentrations of lead were well below the Ct. No significantly elevated concentrations of cadmium or lead were recorded in the soil samples.

Therefore, based on the analytical results it is unlikely that the site soils pose a significant risk to controlled waters.

CONCLUSIONS AND RECOMMENDATIONS

11.3 Ground and Groundwater Conditions

Topsoil was encountered across the majority of the site to a maximum depth of 0.6 m bgl. The Topsoil was underlain by Made Ground within the bunds and outside the bunds sequentially by subsoil, Glacial Deposits and Upper Chalk.

Made Ground was encountered within the bunds to a maximum depth of 1.5 m below the surrounding ground level. The minimum depth to the top of the Glacial Deposits was 1.7 m bgl and the Upper Chalk was encountered at 19.2 and 21.3 m bgl.

During the subsequent monitoring visit groundwater levels in the Glacial Deposits ranged between 2.9 and 9.0 m bgl.

11.4 Geotechnical Engineering Assessment

It is likely that shallow foundations will be suitable for the proposed structures. For the smaller structures, an allowable bearing pressure of 60 kPa is suggested for foundations at least 2 m below the current ground level. For the Reception Building and tanks, it is recommended that the foundation levels should be below the near surface clays, ie 2 to 3.5 m below current ground level. This should provide an allowable bearing pressure in excess of 135 kPa. Any water ingress to the foundation excavations will need to be controlled. Groundwater levels could be above the proposed foundation levels on the northern part of the site.

Settlements of the Reception Building and tanks should not exceed 100 mm.

The possibility of mining and dissolution features in the Chalk causing subsidence on the site cannot be ruled out, although the risk is considered to be low. Further enquiries are recommended along with attention to the design and installation of water bearing pipes.

Road pavement design should be based on a CBR value of 0.1%, but further in situ testing is recommended to identify areas with possibly higher CBR values at formation level.

Below ground concrete should be designed for Design Sulphate Class DS-1 and Aggressive Chemical Environment AC-1.

11.5 Risk Assessment Screening

A human health risk assessment screening has been undertaken on the Made Ground within the bunds in line with the latest guidance and CLEA methodology. Generic assessment criteria (GAC) have been derived by ESG in line with the current CLEA guidance. The GACs used relate to a commercial / industrial end use.

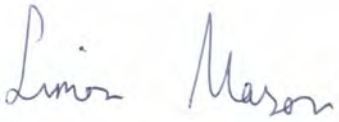
None of the contaminants of concern exceed the relevant GAC, indicating that there is no significant risk to future site users from these substances in soil.

In order to protect construction workers against exposure to contamination, contact with soil should be avoided and standard site hygiene procedures should be implemented, such as wearing gloves and overalls and providing adequate washing facilities. Eating, drinking and smoking should be banned in the working areas to prevent inadvertent ingestion of the soil. Construction workers should be alert to the possible presence of asbestos when excavating within Made Ground, dust suppression measures should be put in place as necessary and P3 asbestos dust masks worn by construction workers during dusty conditions.

A controlled waters risk assessment screening has been carried out in line with guidance provided by the EA and DEFRA. No contaminants were identified within the site soils that could be considered to pose a significant risk to controlled waters.

For **Environmental Scientifics Group**

Simon Mason



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EA : 2009m : Science Report SC050021. Soil Guideline Values for phenol in soil. Environment Agency, Bristol.

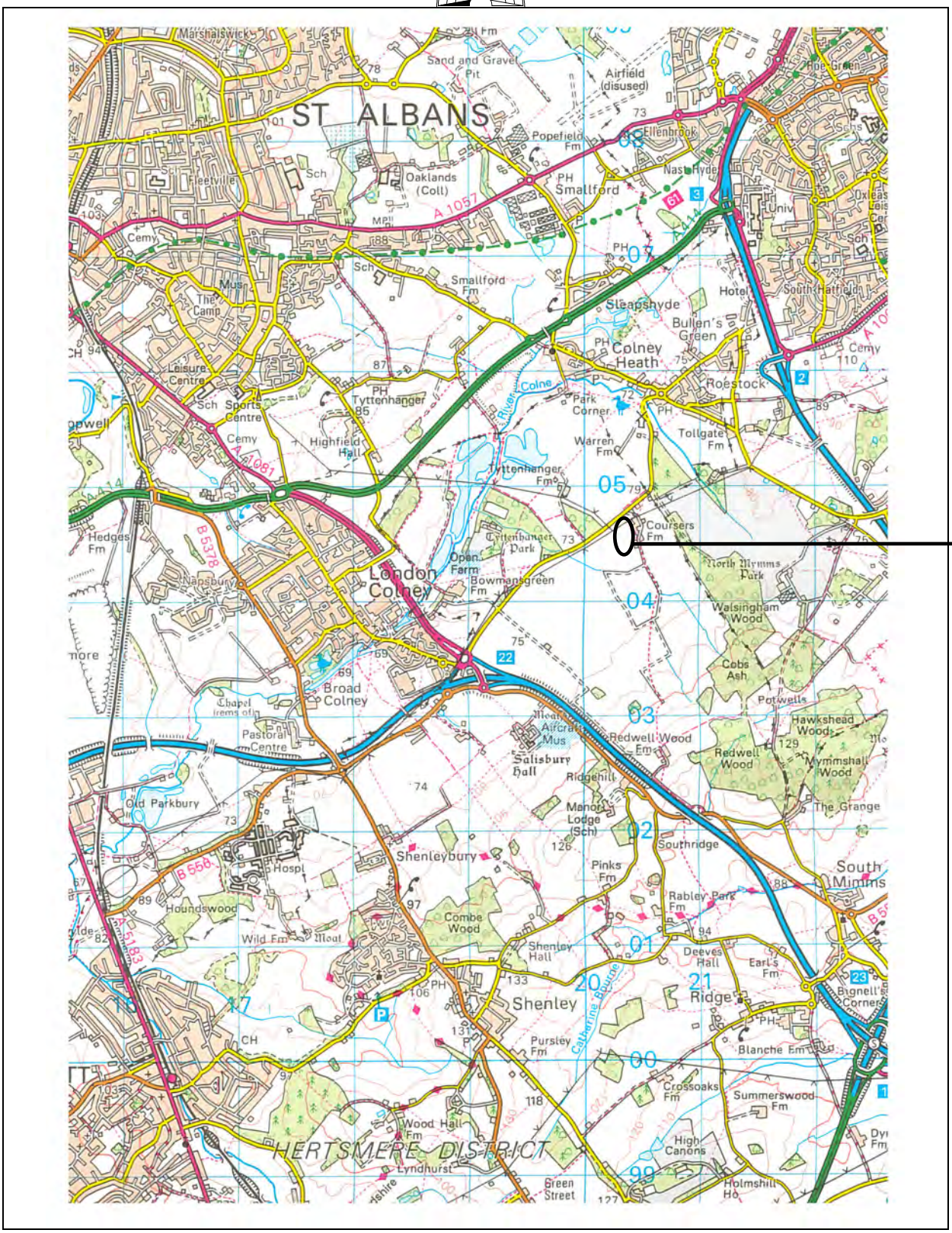
EA : 2009n : Science Report SC050021. Soil Guideline Values for dioxins, furans and dioxin-like PCBs in soil. Environment Agency, Bristol.

Environment Agency website : www.environment-agency.gov.uk.

HSE : 2005 : EH40 / 2005 Workplace Exposure Limits. Health and Safety Executive. Norwich.

ICRCL : 1990 : Asbestos on contaminated sites. Guidance Note 64/85 Second Edition. Interdepartmental Committee on the Redevelopment of Contaminated Land.

FIGURES



Reproduced from the 1998 Ordnance Survey 1:50,000 scale Landranger map, sheet no. 176 with the permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office, © Crown Copyright, Environmental Sciences Group Limited, Licence No. AL 100006060.

Figure 1
Coursers Farm,
Colney Heath, Hertfordshire
Report No 22056/GI

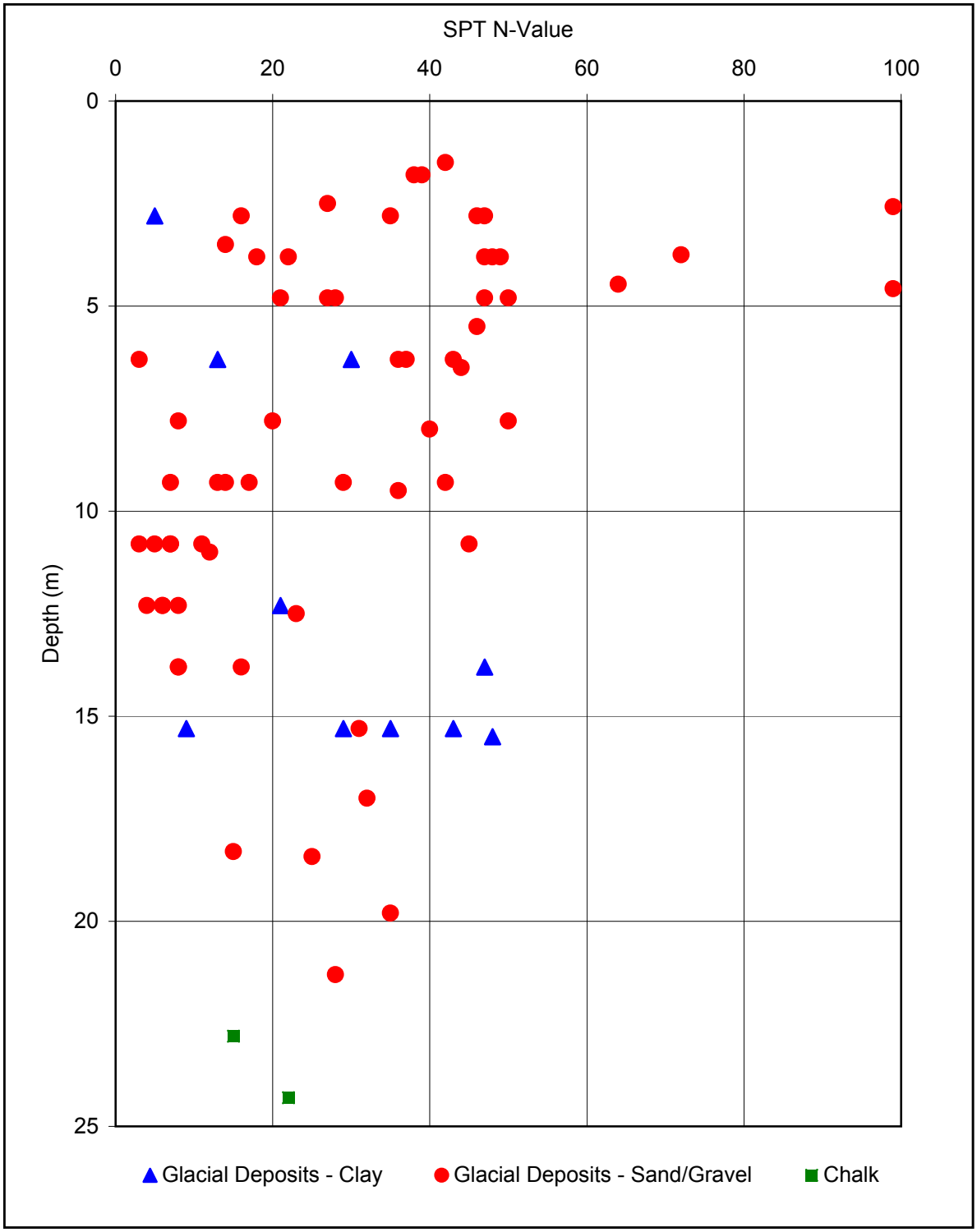


Figure 2
All SPT N-Values against Depth
Coursers Farm, Colney Heath
Report No 22056/GI

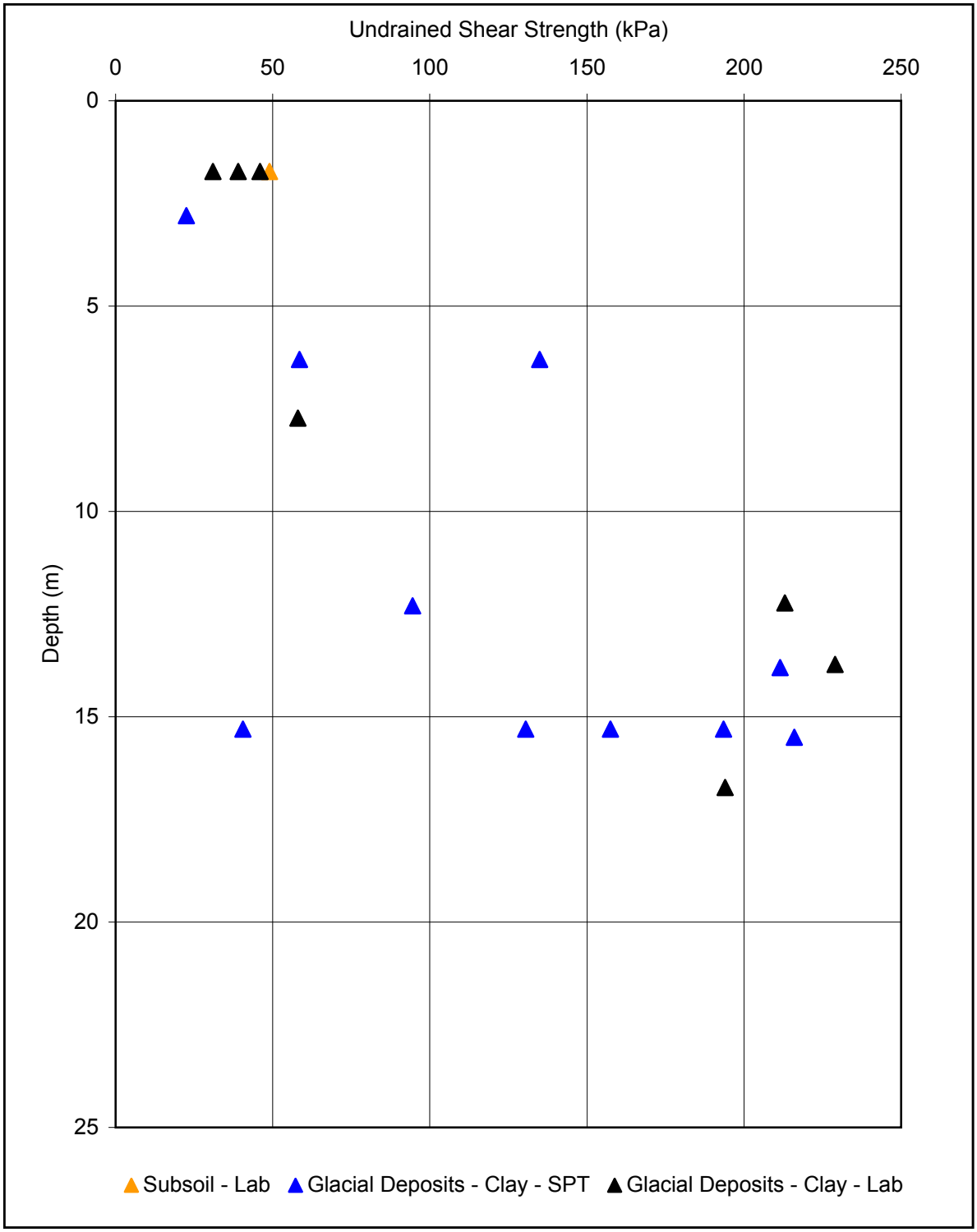
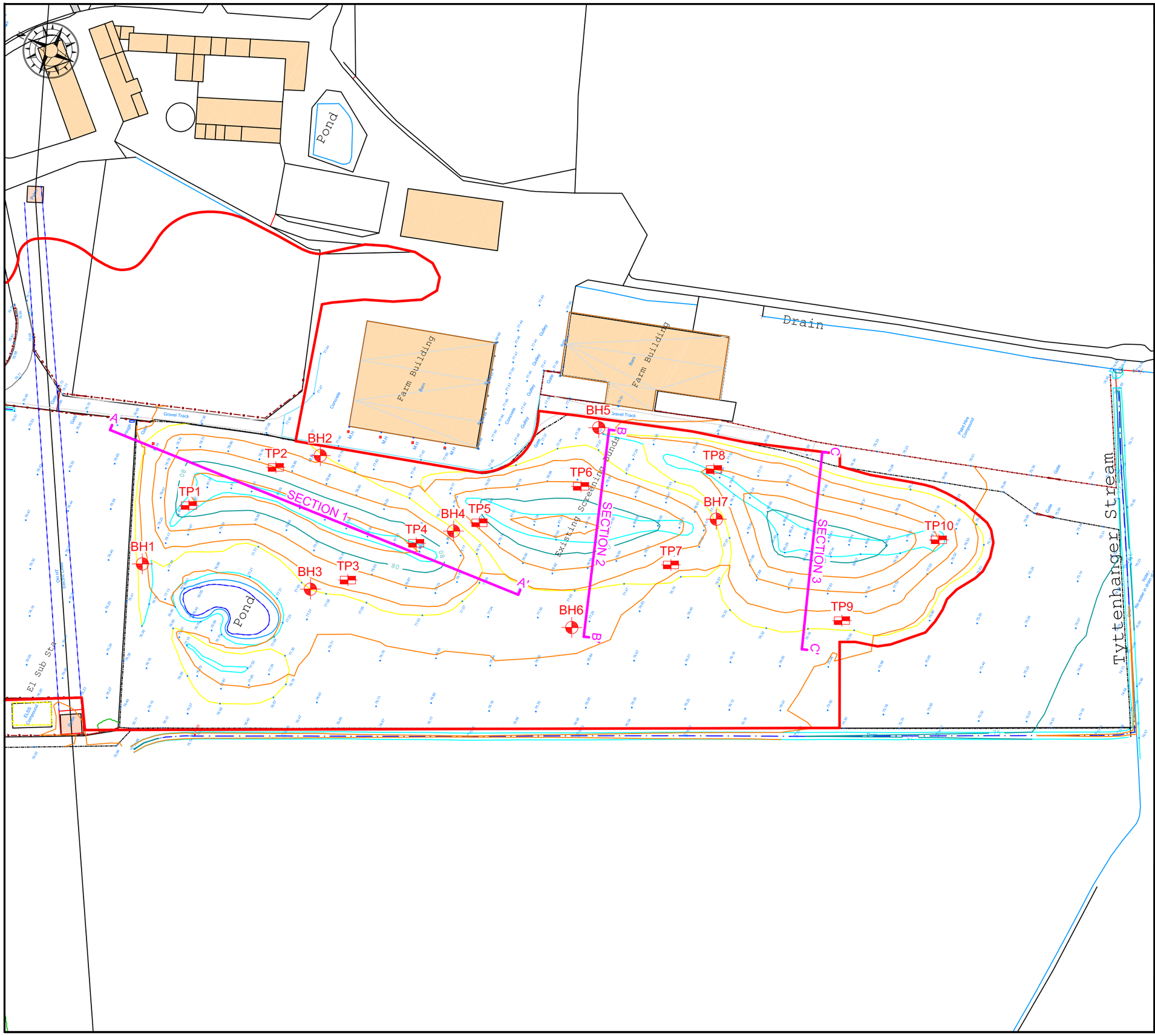


Figure 3
Undrained Shear Strength against Depth
Coursers Farm, Colney Heath
Report No 22056/GI

DRAWINGS

22056/GI/001	Site Plan
22056/GI/001	Bund Cross Sections
COU001-P300 rev 1	Site Plan and Indicative Landscaping



GENERAL NOTES

1.Reproduced from Agrivert Ltd's Drawing No. P200.

LEGEND TO SYMBOLS

Borehole Location

Trial Pit Location

Rev	Drawn	Date	Approv.	Date	Modification Details
1	BS	14/03/2013	SM	14/03/2013	Added BH Locations

AMENDMENTS

Title

SITE PLAN

Project

COURSERS FARM,
COURSERS ROAD,
COLNEY HEATH

Client

AGRIVERT LTD

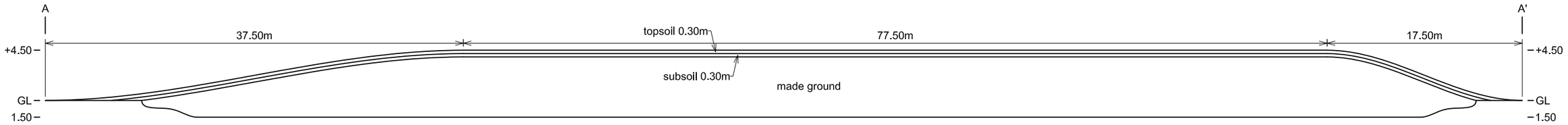
ESG Environmental Scientifics Group

Date	Drawn By	Approv. By
11/12/2012	BS	SM

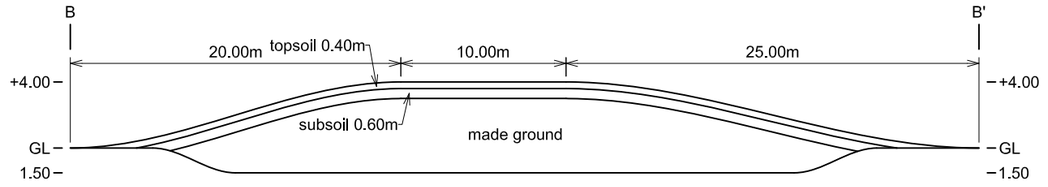
Sheet Size	Scale	Project No
A3	NTS	22056

Drawing No	Rev
22056/001	1

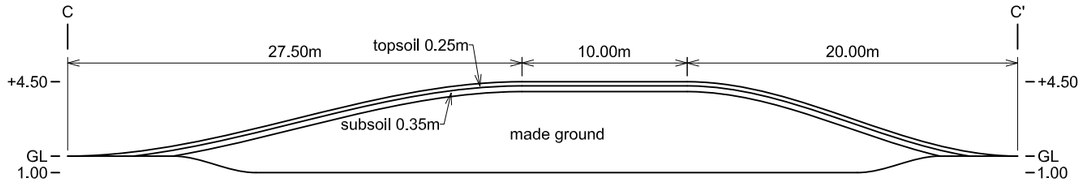
Section Drawing



SECTION 1



SECTION 2



SECTION 3

All dimensions in metres. Scale: 1:375 approx	Project Project no. Client	Coursers Farm, Coursers Road, Colney Heath 22056 Agrivert Ltd	Cross Sections 1-3

Notes.

1. Reproduced from the Ordnance Survey Map with the permission of the Controller of Her Majesty's Stationary Office, Crown Copyright, Licence Number 100020449.
2. All bunds shown on this plan are for indicative purposes only.
3. Material finishes are indicative only.

Legend

- Planning Boundary
- Ownership Boundary
- Indicative Grass Planting
- Indicative Shrub Planting
- Indicative Bund Contours
- Indicative Tree Planting
- Existing Trees
- Proposed Hardstanding
- Proposed Hedgerow

Rev	Description	Date	By

AGRIVERT
Agrivert Limited
The Stables,
Radford,
Chipping Norton,
OX7 4EB
Tel 01608 677 700,
Fax 01608 677 711,
email mail@agrivert.co.uk

Project
Anaerobic Digestion Facility
Coursers Farm
Colney Heath

Title
Site Plan & Indicative Landscaping

Scale @ A3	Drawn by/Checked by	Date
1:1250	JM/JI	16.12.11

Job no.	Dwg No.	Revision
COU001	P300	1

APPENDIX A
EXPLORATORY HOLE LOGS

Key to Exploratory Hole Records

Borehole Records

Trial Pit Records

Key to Exploratory Hole Records

SAMPLES

Undisturbed

U	Driven tube sample	nominally 100 mm diameter and full recovery unless otherwise stated
UT	Driven thin wall tube sample	
TW	Pushed thin wall tube sample	
P	Pushed piston sample	
L	Liner sample (from Windowless or similar sampler), full recovery unless otherwise stated	
CBR	CBR mould sample	
BLK	Block sample	
CS	Core sample (from rotary core) taken for laboratory testing	
AMAL	Amalgamated sample	

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample
	Environmental chemistry samples (in more than one container where appropriate)
ES	Soil sample
EW	Water sample

Comments Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that attempt was made to take a tube sample, however, there was no recovery.

Monitoring samples taken after completion of hole construction are not shown on the exploratory hole logs.

TESTS

SPT S or SPT C Standard Penetration Test, open shoe (S) or solid cone (C)

The Standard Penetration Test is defined in BS EN ISO 22476-3 (2005). The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 the total blow count beyond the seating drive is given (without the N = prefix).

IV	*in situ* Vane shear strength, peak (p) and remoulded (r)
HV	Hand vane shear strength, peak (p) and remoulded (r)
PP	Pocket penetrometer test, converted to shear strength
KFH, KRH, KPI	Permeability tests (KFH = falling head, KRH = rising head; KPI = packer inflow); results provided in Field Records column (one value per stage for packer tests)

DRILLING RECORDS

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930+A2 (2010)

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacings are presented. The term non-intact (NI) is used where the core is fragmented.

Flush returns, estimated percentage with colour where relevant, are given in the Records column

CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss
NR	Not recovered

GROUNDWATER

▼	Groundwater strike
▽	Groundwater level after standing period

Notes:
See report text for full references of standards

Project Coursers Farm, Colney Heath, Hertfordshire
Project No. 22056/GI
Carried out for Agrivert Limited

Key

Key to Exploratory Hole Records

INSTALLATION

Standpipe/ piezometer

Details of standpipe/piezometer installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

The type of instrument installed is indicated by a code in the Legend column at the depth of the response zone:

SP Standpipe
SPIE Standpipe piezometer
PPIE Pneumatic piezometer
EPIE Electronic piezometer

Inclinometer or Slip Indicator

The installation of vertical profiling instruments is indicated on the Record. The base of tubing is shown in the Legend column.

The type of instrument installed is indicated by a code in the Legend column at the base of the tubing:

ICE Biaxial inclinometer
ICM Inclinometer tubing for use with probe
SLIP Slip indicator

Settlement Points or Pressure Cells

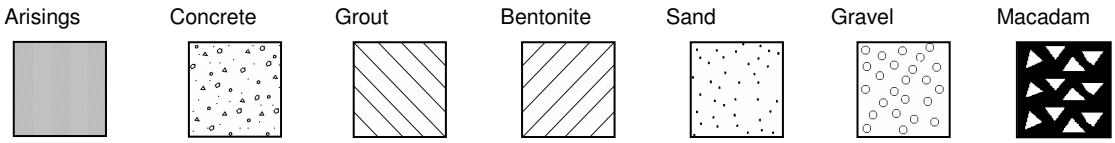
The installation of single point instruments is indicated on the Record. The location of the measuring device is shown in the Legend column.

The type of instrument installed is indicated by a code in the Legend column:

ESET Electronic settlement cell/gauge
ETM Magnetic extensometer settlement point
EPCE Electronic embedment pressure cell
PPCE Electronic push in pressure cell

INSTALLATION LEGENDS

A legend describing the installation is shown in the rightmost column. Legends additional to BS5930 are used to describe the backfill materials as indicated below.



NOTES

1 Soils and rocks are described in accordance with BS EN ISO 14688-1 (2002) and 14689-1 (2003) respectively as amplified by BS 5930+A2 (2010).

2 For fine soils, consistency determined during description is reported for those strata where undisturbed samples are available. Where the logger considers that the sample may not be representative of the condition in situ, for whatever reason, the reported consistency is given in brackets. The reliability of the sample is indicated by Probably or Possibly as appropriate. Hence (Probably firm) indicates the logger is reasonably confident of the assessment, but (Possibly firm) means less certainty. Where the samples available are too disturbed to allow a reasonable assessment of the in situ condition, no consistency is given.

3 Evidence of the occurrence of very coarse particles (cobbles and boulders) is presented on the logs, however, because of their size in relation to the exploratory hole these records may not be fully representative of their size and frequency in the ground mass.

4 The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.

5 The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures

6 Strata legends are in accordance with BS 5930+A2 (2010).

7 Water level observations of discernible entries during the advancing of the exploratory hole are given at the foot of the log and in the Legend column. The term "none observed" is used where no discrete entries are identified although this does not necessarily indicate that the hole has not been advanced below groundwater level. Under certain conditions groundwater cannot be observed, for instance, drilling with water flush or overwater, or boring at a rate much faster than water can make its way into the borehole (ref BS5930+A2:2010, Clause 47.2.7). In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.

8 The borehole logs present the results of Standard Penetration Tests recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.

Updated March 2012

Notes:
See report text for full references of standards

Project	**Coursers Farm, Colney Heath, Hertfordshire**
Project No.	**22056/GI**
Carried out for	**Agrivert Limited**

Key

Borehole Log

ESG Environmental Scientifics Group

Drilled JW **Logged** KS **Checked** SM	**Start** 17/01/2013 **End** 24/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 9.50m / 200mm / 9.50m 9.50m / 15.00m / 150mm / 15.00m	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**			

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.05	D 1			
0.50-1.00	B 2			
1.50-1.95	U 3	25 blows	1.50	
2.50-2.95	SPT C	N=16 (4,5/4,4,4,4)	2.50	1.50
2.50-2.95	D 4			
3.50-3.95	SPT C	N=22 (3,5/6,5,5,6)	3.30	3.00
3.50-3.95	D 5			
4.50-4.95	SPT C	N=28 (3,5/6,7,7,8)	4.50	3.40
4.50-4.95	D 6			
6.00-6.45	SPT C	N=13 (5,2/3,3,3,4)	6.00	5.20
6.00-6.45	D 7			
6.10	D 8			
6.40	D 9			
6.80	D 10			
7.20	D 11			
7.40	D 12			
7.50-7.95	U 13	7 blows		
7.95-8.00	D 14			
8.40	D 15			
8.71	D 16			
9.00-9.45	SPT S	N=29 (2,2/3,10,9,7)	9.00	8.20
9.00-9.45	D 17			
9.50-10.00	B 18			

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over soft dark brown slightly gravelly, slightly sandy CLAY. Sand is fine to medium. Gravel is fine subrounded to subangular of flint.	0.10		
(SUBSOIL) Firm yellowish brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is fine, subrounded of flint.	(1.60)		
Medium dense yellowish brown slightly sandy GRAVEL. Gravel is fine to medium, rounded to subrounded of flint. (GLACIAL DEPOSITS)	1.70		
5.20 m Clay lens	(4.40)		
Very soft to stiff yellowish brown to bluish grey slightly gravelly sandy CLAY. Sand is fine to medium. Gravel is fine to medium, rounded to subrounded of flint and chalk. (GLACIAL DEPOSITS) 6.80-7.40 m Becoming stiff 7.40-7.60 m Becoming soft 7.60-8.40 m Becoming very soft 8.40-9.30 m Becoming firm	6.10		SP
Dense brownish grey slightly sandy GRAVEL. Gravel is fine to coarse, subangular to rounded of flint and	(3.20) 9.30		
Stratum continues to 12.20 m			

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
	1.20	Water seepage observed	-

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire
Project No. 22056
Carried out for Agrivert Limited

Borehole
BH1
Sheet 1 of 2

Borehole Log

Drilled JW **Logged** KS **Checked** SM	**Start** 17/01/2013 **End** 24/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	**Depth from**	**to**	**Diameter**	**Casing Depth**	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**		
			0.00m	9.50m	200mm	9.50m			
			9.50m	15.00m	150mm	15.00m			

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
10.50-10.95 10.50-10.95	SPT C D 19	N=45 (6,7/10,11,12,12)	10.50	9.50
11.00-11.50	B 20			
12.00-12.45 12.00-12.45	SPT C D 21	N=6 (5,6/2,1,2,1)	12.00	10.30
13.50-13.95 13.50-13.95	SPT C D 22	N=16 (1,2/3,3,4,6)	13.50	12.00
15.00-15.45 15.00-15.45	SPT S D 23	N=29 (5,6/6,7,8,8)	15.00	14.30

Strata

Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
chalk. (GLACIAL DEPOSITS)	(2.90)		
11.00-12.20 m Becoming very sandy			
Loose to medium dense yellowish brown slightly gravelly SAND. Gravel is fine to medium, subrounded to rounded of flint. (GLACIAL DEPOSITS)	12.20 (2.60)		
Stiff bluish grey slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is fine, subrounded to rounded of chalk. (GLACIAL DEPOSITS)	14.80 (0.65)		
EXPLORATORY HOLE ENDS AT 15.45 m	15.45		

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Borehole

BH1

Borehole Log

ESG Environmental Scientifics Group

Drilled JW **Logged** KS **Checked** SM	**Start** 25/01/2013 **End** 26/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 8.50m / 200mm / 8.50m 8.50m / 15.00m / 150mm / 15.00m	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.05	D 1			
0.50-1.00	B 2			
1.30	D 3			
1.50-1.95	U 4	7 blows		
1.95-2.00	D 5			
2.25	D 6			
2.50-2.95	SPT S	N=5 (1,2/1,1,1,2)	2.50	0.00
2.50-2.95	D 7			
3.50-3.95	SPT C	N=47 (9,12/12,11,12,12)	3.30	2.90
3.50-3.95	B 8			
4.50-4.95	SPT C	N=47 (7,10/11,11,12,13)	4.50	4.00
4.50-4.95	B 9			
6.00-6.45	SPT C	N=36 (7,7/8,9,9,10)	6.00	4.50
6.00-6.45	B 10			
7.20	D 11			
7.50-7.95	U 12	18 blows		
7.95-8.00	D 13			
8.20	D 14			
9.00-9.45	SPT C	N=13 (4,3/4,3,3,3)	9.00	8.60
9.00-9.45	B 15			

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over soft dark brown slightly sandy CLAY. Sand is fine to medium.	0.10		
(SUBSOIL) Soft brown slightly gravelly, sandy CLAY. Sand is fine to medium. Gravel is fine to coarse, subrounded to rounded of flint.	(1.20)		
Firm brown slightly sandy CLAY. Sand is fine. (GLACIAL DEPOSITS)	1.30		
	(2.00)		
Dense yellowish brown slightly sandy GRAVEL. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS)	3.30		
4.95-7.20 m Becoming sandy	(3.90)		
Stiff greyish brown mottled yellowish brown slightly sandy CLAY with occasional fine subangular to subrounded gravel of flint. Sand is fine to medium. (GLACIAL DEPOSITS)	7.20		
8.00-8.40 m Becoming soft and gravelly	(1.20)		
Loose to medium dense yellowish brown sandy GRAVEL. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS)	8.40		
9.45-11.90 m Becoming sandy			
Stratum continues to 11.90 m			

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire
Project No. 22056
Carried out for Agrivert Limited

Borehole
BH2
Sheet 1 of 2

Borehole Log

Drilled JW **Logged** KS **Checked** SM	**Start** 25/01/2013 **End** 26/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 8.50m / 200mm / 8.50m 8.50m / 15.00m / 150mm / 15.00m			**Ground Level** - **Coordinates** - **National Grid** - **Chainage**	

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
10.50-10.95 10.50-10.95	SPT C B 16	N=7 (3,3/2,1,2,2)	10.50	9.00
12.00-12.45 12.00-12.45	SPT C B 17	N=6 (1,2/1,1,2,2)	12.00	10.80
13.50-13.95 13.50-13.95	SPT C B 18	N=8 (1,2/3,2,2,1)	13.50	12.00
14.50	D 19			
15.00-15.45 15.00-15.45	SPT S D 20	N=9 (3,3/2,2,2,3)	15.00	14.50

Strata

Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Loose to medium dense yellowish brown sandy GRAVEL. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS)	(3.50)		
Loose yellowish brown slightly gravelly SAND. Gravel is fine, subangluar to subrounded of flint. (GLACIAL DEPOSITS)	11.90 (2.50)		
Stiff bluish grey slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is fine, subangular to subrounded of chalk. (GLACIAL DEPOSITS)	14.40 (1.05)		
EXPLORATORY HOLE ENDS AT 15.45 m	15.45		

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Borehole

BH2

Borehole Log

ESG Environmental Scientifics Group

Drilled JW **Logged** KS **Checked** SM	**Start** 08/01/2013 **End** 11/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	**Depth from** to 0.00m 15.00m 15.00m 24.00m	**Diameter** 200mm 150mm	**Casing Depth** 15.00m 24.00m	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**		

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.05	D 1			
0.50-1.00	B 2			
1.25	D 3			
1.50-1.95	U 4	8 blows		
1.95-2.00	D 5			
2.25	D 6			
2.50-2.95	SPT S	N=47 (2,3/5,9,15,18)	2.50	dry
2.50-2.95	D 7			
3.50-3.95	SPT C	N=48 (5,7/10,12,12,14)	3.30	2.00
3.50-3.95	B 8			
4.50-4.90	SPT C	50 (10,12/14,15,16,5 for 22mm)	4.50	2.20
4.50-4.95	B 9			
6.00-6.45	SPT C	N=37 (7,9/9,9,9,10)	6.00	3.30
6.00-6.45	B 10			
7.00-7.50	B 11			
7.50-7.95	U 12	16 blows		
7.95-8.00	D 13			
9.00-9.45	SPT S	N=14 (3,4/4,4,3,3)	9.00	dry
9.00-9.45	D 14			
9.50-10.00	B 15			

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over soft dark brown sandy CLAY. Sand is fine to medium.	0.10		
(SUBSOIL) Firm brown sandy slightly gravelly CLAY. Gravel is fine to coarse, subangular to subrounded of flint.	(0.90) 1.00		
Soft greyish brown very sandy CLAY with occasional rounded to subrounded gravel of flint. (GLACIAL DEPOSITS) 1.40-2.80 m Becoming firm	(1.80) 2.80		
Dense yellowish brown slightly sandy GRAVEL. Gravel is fine to coarse, rounded to subrounded of flint. (GLACIAL DEPOSITS) 4.00 m Clay lens	(2.30) 5.10		
Dense yellowish brown very gravelly SAND. Gravel is rounded to subrounded, fine to medium of flint. (GLACIAL DEPOSITS) 5.30 m Clay lens	(1.50) 6.60		
Stiff grey mottled brown slightly gravelly, very sandy CLAY. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS)	(1.00) 7.60		
Yellowish brown gravelly SAND. Gravel is fine to medium, rounded to subrounded of flint. (GLACIAL DEPOSITS)	(1.50) 9.10		
Medium dense yellowish brown sandy GRAVEL. Gravel is fine to coarse, rounded to subrounded of flint. (GLACIAL DEPOSITS) 9.60 m Occasional cobbles of flint			
Stratum continues to 11.20 m			

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
	2.80	Rose to 2.60 m after 20 minutes. Medium	-

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire
Project No. 22056
Carried out for Agrivert Limited

Borehole
BH3
Sheet 1 of 3

Borehole Log

ESG Environmental Scientifics Group

Drilled JW **Logged** KS **Checked** SM	**Start** 08/01/2013 **End** 11/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	**Depth from**	**to**	**Diameter**	**Casing Depth**	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**	
			0.00m	15.00m	200mm	15.00m		
			15.00m	24.00m	150mm	24.00m		

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
10.50-10.95 10.50-10.95	SPT C B 16	N=5 (1,2/1,1,1,2)	10.50	dry
11.50-12.00	B 17			
12.00-12.45 12.00-12.45	SPT C B 18	N=4 (1,1/1,1,1,1)	12.00	10.00
13.50-13.95 13.50-13.95	SPT C B 19	N=8 (1,2/2,3,1,2)	13.50	10.40
15.00-15.45 15.00-15.45	SPT C B 20	N=31 (5,5/5,6,8,12)	15.00	11.00
16.00	D 21			
16.50-16.95	U 22	60 blows		
16.95-17.00	D 23			
18.00-18.45 18.00-18.45	SPT C B 24	N=15 (3,2/3,4,4,4)	18.00	17.00
18.70	D 25			
19.50-19.95 19.50-19.95	SPT S D 26	N=35 (1,4/6,9,8,12)	19.50	17.00

Strata

Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Medium dense yellowish brown sandy GRAVEL. Gravel is fine to coarse, rounded to subrounded of flint. (GLACIAL DEPOSITS)	(2.10)		
10.50-11.20 m Becoming very sandy			
Loose yellowish brown slightly gravelly SAND. Gravel is fine to medium, rounded to subrounded of flint. (GLACIAL DEPOSITS)	11.20		
	(4.00)		
Stiff bluish grey slightly sandy, slightly gravelly CLAY. Gravel is fine to medium, subangular to subrounded of chalk and flint. Sand is fine to medium. (GLACIAL DEPOSITS)	15.20		
	(2.10)		
16.90-17.30 m Becoming brown			
Medium dense greyish brown sandy GRAVEL with numerous cobbles of flint. Gravel is fine to coarse, rounded to subrounded of flint. (GLACIAL DEPOSITS)	17.30		
18.70-18.90 m Band of flint			
19.30-20.30 m Dense	(4.00)		
Stratum continues to 21.30 m			

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Borehole

BH3

Borehole Log

ESG Environmental Scientifics Group

Drilled JW **Logged** KS **Checked** SM	**Start** 08/01/2013 **End** 11/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	**Depth from** to 0.00m 15.00m 15.00m 24.00m	**Diameter** 200mm 150mm	**Casing Depth** 15.00m 24.00m	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**	

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
21.00-21.45 21.00-21.45	SPT C B 27	N=28 (1,3/5,5,8,10)	21.00	17.00
21.50	D 28			
22.50-22.95 22.50-22.95	SPT S D 29	N=15 (1,1/2,2,3,8)	22.50	17.00
23.00-23.50	B 30			
24.00-24.45 24.00-24.45	SPT S D 31	N=22 (2,4/5,6,6,5)	24.00	18.20

Strata

Description (Continued from Sheet 2)

Medium dense greyish brown sandy GRAVEL with numerous cobbles of flint. Gravel is fine to coarse, rounded to subrounded of flint.
(GLACIAL DEPOSITS)

Very weak yellowish white fine grained CHALK with occasional gravel. Gravel is fine to coarse, subrounded of flint.
(UPPER CHALK)

EXPLORATORY HOLE ENDS AT 24.45 m

Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
21.30		
(3.15)		
24.45		

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire
Project No. 22056
Carried out for Agrivert Limited

Borehole
BH3
Sheet 3 of 3

Borehole Log

Drilled JW **Logged** KS **Checked** SM	**Start** 25/01/2013 **End** 28/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	**Depth from** / **to** / **Diameter** / **Casing Depth** 0.00m / 9.00m / 200mm / 9.00m 9.00m / 15.00m / 150mm / 15.00m			**Ground Level** - **Coordinates** - **National Grid** - **Chainage**	

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.05	D 1			
0.50-1.00	B 2			
1.25	D 3			
1.50-1.95	U 4			
2.50-2.95 2.50-2.95	SPT C B 5	N=46 (4,8/9,11,13,13)	2.50	2.00
3.50-3.95 3.50-3.95	SPT C B 6	N=49 (7,9/10,13,12,14)	3.30	2.70
4.50-4.95 4.50-4.95	SPT C B 7	N=27 (5,7/3,3,9,12)	4.50	4.00
6.00-6.45 6.00-6.45	SPT C B 8	N=30 (1,2/4,8,8,10)	6.00	5.20
7.50-7.95 7.50-7.95	SPT C B 9	N=20 (12,10/6,3,5,6)	7.50	6.00
9.00-9.45 9.00-9.45	SPT C B 10	N=42 (7,9/10,10,12,10)	9.00	8.50

Strata

Description	Depth, *Level* (Thickness)
(TOPSOIL) Grass over soft dark brown slightly sandy CLAY. Sand is fine to medium.	0.10
(SUBSOIL) Firm brown slightly sandy, slightly gravelly CLAY. Sand id fine to medium. Gravel is fine to medium, rounded to subrounded of flint.	(0.90) 1.00
Firm brown slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium, rounded to subrounded of flint. (GLACIAL DEPOSITS)	(1.30) 2.30
Medium dense to dense yellowish brown slightly sandy GRAVEL. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS)	
3.30 m Clay lens	
	(3.80)
	6.10
Stiff grey slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is fine, rounded to subrounded of flint. (GLACIAL DEPOSITS)	(0.30) 6.40
Medium dense to dense yellowish brown slightly sandy GRAVEL. Gravel fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS)	
7.70 m Clay lens	
	(3.30)
	9.70
Stratum continues to 13.30 m	

Legend

Backfill/ Instruments

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

None observed (see Key Sheet)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Borehole

BH4

Sheet 1 of 2

Borehole Log

Drilled JW **Logged** KS **Checked** SM	**Start** 25/01/2013 **End** 28/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	**Depth from** 0.00m 9.00m	**to** 9.00m 15.00m	**Diameter** 200mm 150mm	**Casing Depth** 9.00m 15.00m	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
10.50-10.95 10.50-10.95	SPT C B 11	N=3 (1,-/1,-,1,1)	10.50	9.70
12.00-12.45 12.00-12.45	SPT C B 12	N=8 (1,1/1,2,2,3)	12.00	10.60
13.50-13.95	U 13	43 blows		
13.95-14.00	D 14			
15.00-15.45 15.00-15.45	SPT S D 15	N=35 (3,6/7,8,9,11)	13.50	dry

Strata

Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Very loose to loose yellowish brown slightly gravelly SAND. Gravel is fine to medium, rounded to subrounded of flint. (GLACIAL DEPOSITS)	(3.60)		
Stiff bluish grey slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium, subangular to rounded of flint and chalk. (GLACIAL DEPOSITS)	13.30 (2.15)		
EXPLORATORY HOLE ENDS AT 15.45 m	15.45		

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

None observed (see Key Sheet)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Borehole

BH4

Borehole Log

ESG Environmental Scientifics Group

Drilled	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	-
Logged KS	16/01/2013	Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	0.00m	8.00m	200mm	8.00m	Coordinates	-
Checked SM	End 16/01/2013		8.00m	15.00m	150mm	15.00m	National Grid	-
							Chainage	

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.05	D 1			
0.50-1.00	B 2			
1.50-1.95	SPT C	N=39 (5,5/5,11,11,12)	1.50	1.00
1.50-1.95	B 3			
2.50-2.58	SPT C	(6)	2.50	1.80
2.50-2.95	D 4	10/bouncing for seating and main drive		
3.50-3.86	SPT C	50 (10,11/11,21,18 for 58mm)	3.30	2.90
3.50-3.95	B 5			
4.50-4.58	SPT C	(15)	4.50	4.00
4.50-4.95	B 6	10/bouncing for seating and main drive		
6.00-6.45	SPT C	N=3 (1,-/1,-,1,1)	6.00	5.20
6.00-6.45	B 7			
7.50-7.95	SPT C	N=8 (1,1/2,1,2,3)	7.50	6.80
7.50-7.95	B 8			
9.00-9.45	SPT C	N=17 (1,1/2,4,5,6)	9.00	7.80
9.00-9.45	B 9			

Strata

Description	Depth, *Level* (Thickness)
(TOPSOIL) Grass over soft dark brown slightly sandy CLAY. Sand is fine to medium.	0.10
(SUBSOIL) Firm brown slightly sandy, gravelly CLAY. Gravel is fine to medium, rounded to subrounded of flint. Sand is fine to medium.	(0.90) 1.00
Dense to very dense yellowish brown sandy GRAVEL. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS).	(4.90)
1.60 m Clay lens	
3.70 m Clay lens	
Very loose to loose yellowish brown slightly gravelly SAND. Gravel is fine to medium, subrounded to rounded of flint. (GLACIAL DEPOSITS)	5.90
7.95-10.50 m Becoming medium dense	(6.30)
Stratum continues to 12.20 m	

Legend

Backfill/ Instruments

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From to (m)

Chiselling

Depths (m) Time Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

AGS

Project: Coursers Farm, Colney Heath, Hertfordshire

Project No.: 22056

Carried out for: Agrivert Limited

Borehole

BH5

Borehole Log

ESG Environmental Scientifics Group

Drilled	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	-
Logged KS	16/01/2013	Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	0.00m	8.00m	200mm	8.00m	Coordinates	-
Checked SM	End 16/01/2013		8.00m	15.00m	150mm	15.00m	National Grid	-
							Chainage	

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
10.50-10.95 10.50-10.95	SPT C B 10	N=7 (1,-/1,1,2,3)	10.50	10.00
12.00-12.45 12.00-12.45	SPT C B 11	N=21 (2,2/3,4,7,7)	12.00	11.20
13.00	D 12			
13.50-13.95	U 13	31 blows		
13.95-14.00	D 14			
14.50	D 15			
15.00-15.45 15.00-15.45	SPT S D 16	N=43 (5,6/8,11,12,12)	13.00	dry

Strata

Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Very loose to loose yellowish brown slightly gravelly SAND. Gravel is fine to medium, subrounded to rounded of flint. (GLACIAL DEPOSITS) 10.50-12.20 m Loose			
Stiff bluish grey slightly sandy, slightly gravelly CLAY. Gravel is fine, rounded to subrounded of flint and chalk. (GLACIAL DEPOSITS)	12.20 (3.25)		SP
EXPLORATORY HOLE ENDS AT 15.45 m	15.45		

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

None observed (see Key Sheet)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

AGS

Project	Coursers Farm, Colney Heath, Hertfordshire
Project No.	22056
Carried out for	Agrivert Limited

Borehole

BH5

Borehole Log

Drilled JW **Logged** KS **Checked** SM	**Start** 14/01/2013 **End** 15/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	**Depth from** 0.00m **to** 15.00m	**Diameter** 200mm	**Casing Depth** 15.00m

Ground Level -
Coordinates -
National Grid -
Chainage

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.05	D 1			
0.50-0.80	B 2			
1.50-1.95 1.50-1.95	SPT C B 3	N=38 (7,9/9,9,10,10)	1.50	1.00
2.50-2.95 2.50-2.95	SPT C B 4	N=35 (6,7/9,8,9,9)	2.50	2.00
3.50-3.95 3.50-3.95	SPT C B 5	N=18 (6,7/7,4,4,3)	3.30	2.00
4.50-4.95 4.50-4.95	SPT C B 6	N=21 (4,4/6,7,5,3)	4.50	4.20
6.00-6.45 6.00-6.45	SPT C B 7	N=43 (6,6/9,11,11,12)	6.00	5.50
7.50-7.95 7.50-7.95	SPT C B 8	N=50 (4,6/10,13,13,14)	7.50	6.30
9.00-9.45 9.00-9.45	SPT S B 9	N=7 (1,-/1,2,2,2)	9.00	8.50

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over soft brown slightly sandy CLAY. Sand is fine to medium. 0.20-0.80 m Becoming gravelly and sandy	0.10		
(SUBSOIL) Soft brown slightly sandy, slightly gravelly CLAY. Gravel is fine to coarse, subrounded to rounded of flint.	(0.70) 0.80		
Medium dense to dense yellowish brown sandy GRAVEL. Gravel is fine to coarse, rounded to subrounded of flint. (GLACIAL DEPOSITS) 2.00 m Clay lens	(4.20)		
3.70 m Clay lens			
Dense yellowish brown very gravelly SAND. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS) 6.80-8.50 m Becoming very dense	5.00		
8.50-11.40 m Becoming loose	(6.40)		
Stratum continues to 11.40 m			

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)
None observed (see Key Sheet)			

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire
Project No. 22056
Carried out for Agrivert Limited

Borehole
BH6
Sheet 1 of 2

Borehole Log

Drilled JW **Logged** KS **Checked** SM	**Start** 14/01/2013 **End** 15/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 1000.	**Depth from** 0.00m	**to** 15.00m	**Diameter** 200mm	**Casing Depth** 15.00m	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
10.50-10.95 10.50-10.95	SPT S B 10	N=11 (1,2/1,3,3,4)	10.50	9.70
11.50-12.00	B 11			
12.00-12.45	U 12	22 blows		
12.45-12.50	D 13			
13.00	D 14			
13.50-13.95 13.50-13.95	SPT S D 15	N=47 (4,6/8,11,13,15)	12.00	dry
14.50	D 16			
15.00-15.45	U 17	40 blows		

Strata

Description (Continued from Sheet 1)	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
Dense yellowish brown very gravelly SAND. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS)	11.40		
Stiff bluish grey slightly sandy, slightly gravelly CLAY. Gravel is fine, subangular to subrounded, of chalk. (GLACIAL DEPOSITS)	(4.05)		SP
EXPLORATORY HOLE ENDS AT 15.45 m	15.45		

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

None observed (see Key Sheet)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Borehole BH6

Borehole Log

Drilled PW **Logged** KS **Checked** SM	**Start** 22/01/2013 **End** 24/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 3000.	**Depth from** **to** **Diameter** **Casing Depth**	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**	

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
0.00-0.30	B 2			
0.05	D 1			
0.50	D 3			
0.50-0.80	B 4			
1.20-1.65	SPT C	N=42 (3,4/5,7,12,18)	1.20	dry
1.20	D 5			
1.20-1.65	B 6			
1.70	D 7			
2.20-2.65	SPT C	N=27 (3,4/5,6,8,8)	2.20	0.00
2.20	D 8			
2.20-2.65	B 9			
3.20-3.65	SPT C	N=14 (4,5/4,3,4,3)	3.20	0.00
3.20	D 10			
3.20-3.65	B 12			
3.50	D 13			
4.20-4.65	SPT C	N=50 (6,7/9,15,22,4) Pen 8	4.20	0.00
4.20	D 14			
4.20-4.65	B 15			
5.20-5.65	SPT C	N=46 (4,6/9,11,12,14)	5.20	0.00
5.20	D 16			
5.20-5.65	B 17			
6.20-6.65	SPT C	N=44 (4,7/9,11,11,13)	6.20	0.00
6.20	D 18			
6.20-6.65	B 19			
7.70-8.15	SPT C	N=40 (3,5/7,9,11,13)	7.70	0.00
7.70	D 20			
7.70-8.15	B 21			
9.20-9.65	SPT C	N=36 (4,6/8,8,9,11)	9.20	0.00
9.20	D 22			
9.20-9.65	B 23			

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over soft dark brown slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to medium, subangular of flint.	(0.50) 0.50		
(SUBSOIL) Soft brown sandy, very gravelly CLAY. Gravel is fine to coarse, subrounded to rounded of flint.	(0.70) 1.20		
Dense yellowish brown gravelly, very clayey SAND. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS)	(0.50) 1.70		
Medium dense yellowish brown slightly sandy GRAVEL. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS)			
3.50 m Clay lens 3.50-10.50 m Becoming medium dense to very dense			
	(8.80)		
Stratum continues to 10.50 m			

Depth	Type & No	Records	Date Casing	Time Water

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

None observed (see Key Sheet)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Borehole

BH7

Borehole Log

Drilled PW **Logged** KS **Checked** SM	**Start** 22/01/2013 **End** 24/01/2013	**Equipment, Methods and Remarks** Hand excavated inspection pit from GL to 1.2m depth. Cable percussive boring from 1.2 m with Dando 3000.	**Depth from** **to** **Diameter** **Casing Depth**	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**	

Samples and Tests

Depth	Type & No	Records	Date Casing	Time Water
10.70-11.15	SPT C	N=12 (1,2/3,3,3,3)	10.70	7.50
10.70	D 24			
10.70-11.15	B 25			
12.20-12.65	SPT C	N=23 (1,5/7,6,5,5)	12.20	9.00
12.20	D 26			
12.20-12.65	B 27			
12.80	D 28			
12.80-13.00	B 29			
13.70-14.15	U 30	52 blows		
14.15-14.20	D 31			
15.20-15.65	SPT S	N=48 (4,6/8,10,14,16)	13.00	damp
15.20-15.65	D 32			
15.50	D 33			
15.50-15.80	B 34			
15.80	D 35			
15.80-16.00	B 36			
16.70-17.15	SPT S	N=32 (2,4/5,8,9,10)	16.70	15.00
16.70-17.15	B 37			
17.80	D 38			
18.20-18.65	SPT C	N=25 (1,2/4,6,7,8)	18.20	16.50
18.20	D 39			
18.20-18.65	B 40			
19.20	D 41			
19.20-19.50	B 42			

Strata

Description (Continued from Sheet 1)

Medium dense yellowish brown slightly sandy GRAVEL. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS)

10.50

Medium dense yellowish brown very gravelly SAND. Gravel is fine to medium, subangular to rounded of flint. (GLACIAL DEPOSITS)

10.70-12.80 m Becoming slightly gravelly

(2.30)

12.80

Stiff bluish grey slightly sandy, slightly gravelly CLAY. Sand is fine to medium. Gravel is fine to coarse, subangular to subrounded of flint and chalk. (GLACIAL DEPOSITS)

15.50-15.80 m Becoming brown

(3.00)

15.80

Dense yellowish brown slightly gravelly SAND. Sand is fine to medium. Gravel is fine, rounded to subrounded of flint. (GLACIAL DEPOSITS)

(2.00)

17.80

Medium dense yellowish brown slightly sandy GRAVEL. Gravel is fine to coarse, subangular to rounded of flint. (GLACIAL DEPOSITS)

(1.40)

19.20

Very weak yellowish white fine grained CHALK. (UPPER CHALK)

(0.80)

EXPLORATORY HOLE ENDS AT 20.00 m

Depth, *Level* (Thickness)	Legend	Backfill/ Instruments

Groundwater Entries

No.	Struck (m)	Post strike behaviour	Depth sealed (m)

None observed (see Key Sheet)

Depth Related Remarks *

From	to (m)

Chiselling

Depths (m)	Time	Tools used

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:50

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Borehole

BH7

Sheet 2 of 2

Trial Pit Log

Logged SM **Checked** PE	**Start** 14/11/2012 **End** 14/11/2012	**Equipment, Methods and Remarks** 7 Tonne Mini-Digger Machine dug	**Dimensions and Orientation** Width 0.60 m Length 2.00 m A D B C 135 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
0.05	ES 1	
2.70	ES 2	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over dark brown, sandy, gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	0.20		
(MADE GROUND) Soft to firm brown, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	(0.60)		
(MADE GROUND) Soft to stiff greyish brown, sandy, gravelly cobbley CLAY with pockets (up to 0.5 m diameter) of firm brown clay. Angular to rounded, fine to coarse gravel and cobbles of concrete, brick, wood, tarmacadam, plastic and metal.	0.80 (2.10)		
EXPLORATORY HOLE ENDS AT 2.90 m	2.90		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Trial Pit

TP1

Sheet 1 of 1

Trial Pit Log

Logged SM **Checked** PE	**Start** 14/11/2012 **End** 14/11/2012	**Equipment, Methods and Remarks** 7 Tonne Mini-Digger Machine dug	**Dimensions and Orientation** Width 0.60 m Length 2.00 m A D B C 100 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
1.30	ES 1	
3.10	ES 2	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over dark brown, slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to medium of flint.	(0.40)		
	0.40		
(MADE GROUND) Orangish brown, sandy, clayey GRAVEL. Gravel is angular to rounded, fine to coarse of flint.	(0.30)		
	0.70		
(MADE GROUND) Soft to stiff greyish brown, sandy, gravelly cobbley CLAY with pockets (up to 0.5 m diameter) of firm brown clay. Angular to rounded, fine to coarse gravel and cobbles of concrete, brick, wood, tarmacadam, plastic and metal.	(2.70)		
EXPLORATORY HOLE ENDS AT 3.40 m	3.40		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Trial Pit

TP2

Sheet 1 of 1

Trial Pit Log

Logged SM **Checked** PE	**Start** 14/11/2012 **End** 14/11/2012	**Equipment, Methods and Remarks** 7 Tonne Mini-Digger Machine dug	**Dimensions and Orientation** Width 0.60 m Length 2.00 m A B C D 100 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
0.10	ES 1	
3.20	ES 2	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over dark brown, sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	(0.50)		
(MADE GROUND) Firm to stiff, light brown, slightly sandy, slightly gravelly CLAY. Gravel is subangular to rounded, fine to medium of flint.	0.50 (0.60)		
(MADE GROUND) Soft to stiff greyish brown, sandy, gravelly cobbley CLAY with pockets (up to 0.5 m diameter) of firm brown clay. Angular to rounded, fine to coarse gravel and cobbles of concrete, brick, wood, tarmacadam, plastic and metal.	1.10 (2.20)		
Firm light brown slightly sandy CLAY. (Possibly GLACIAL DEPOSITS)	3.30 3.40		
EXPLORATORY HOLE ENDS AT 3.40 m			

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Trial Pit

TP3

Sheet 1 of 1

Trial Pit Log

Logged	SM	Start	14/11/2012	Equipment, Methods and Remarks	Dimensions and Orientation	Ground Level	-
Checked	PE	End	14/11/2012	7 Tonne Mini-Digger Machine dug	Width 0.60 m Length 2.00 m A / D / B / C 020 (Deg)	Coordinates National Grid Chainage	- -

Samples and Tests

Depth	Type & No.	Date Records
1.10	ES 1	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over dark brown sandy, gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	(0.40)		
	0.40		
(MADE GROUND) Soft to firm, brown, sandy, gravelly cobbley CLAY with pockets (up to 0.5 m diameter) of firm brown clay. Angular to rounded, fine to coarse gravel and cobbles of concrete, brick and tarmacadam.	(1.40)		
	1.80		
EXPLORATORY HOLE ENDS AT 1.80 m			

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Trial Pit

TP4

Sheet 1 of 1

Trial Pit Log

Logged SM **Checked** PE	**Start** 13/11/2012 **End** 13/11/2012	**Equipment, Methods and Remarks** 7 Tonne Mini-Digger Machine dug	**Dimensions and Orientation** Width 0.60 m Length 2.00 m A D B C 135 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
1.00	ES 1	
2.50	ES 2	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over dark brown, sandy, gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	(0.60)		
(MADE GROUND) Orangish brown, sandy, clayey GRAVEL. Gravel is angular to rounded, fine to coarse of flint.	0.60 (0.30)		
(MADE GROUND) Soft to stiff greyish brown, sandy, gravelly cobbley CLAY with pockets (up to 0.5 m diameter) of firm brown clay. Angular to rounded, fine to coarse gravel and cobbles of concrete, brick, wood, tarmacadam, plastic and metal.	0.90 (1.90)		
Orangish brown, slightly clayey, sandy GRAVEL. Gravel is angular to rounded, fine to coarse of flint. (Possibly GLACIAL DEPOSITS)	2.80 (0.30)		
EXPLORATORY HOLE ENDS AT 3.10 m	3.10		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Trial Pit

TP5

Sheet 1 of 1

Trial Pit Log

Logged SM **Checked** PE	**Start** 13/11/2012 **End** 13/11/2012	**Equipment, Methods and Remarks** 7 Tonne Mini-Digger Machine dug	**Dimensions and Orientation** Width 0.60 m Length 2.00 m A D B C 100 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
0.30	ES 1	
2.60	ES 2	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over dark brown, sandy, gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	(0.40)		
(MADE GROUND) Orangish brown, sandy GRAVEL. Gravel is angular to rounded, fine to coarse of flint.	0.40 (0.40)		
(MADE GROUND) Soft to stiff greyish brown, sandy, gravelly cobbley CLAY with pockets (up to 0.5 m diameter) of firm brown clay. Angular to rounded, fine to coarse gravel and cobbles of concrete, brick, wood, tarmacadam, plastic and metal.	0.80 (2.50)		
EXPLORATORY HOLE ENDS AT 3.30 m	3.30		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour

None observed (see Key Sheet)

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Trial Pit

TP6

Sheet 1 of 1

Trial Pit Log

Logged SM **Checked** PE	**Start** 13/11/2012 **End** 13/11/2012	**Equipment, Methods and Remarks** 7 Tonne Mini-Digger Machine dug	**Dimensions and Orientation** Width 0.60 m Length 2.00 m A / D / B / C 100 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
1.10	ES 1	
3.20	ES 2	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over dark brown, sandy, gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	(0.50)		
(MADE GROUND) Orangish brown, sandy GRAVEL. Gravel is angular to rounded, fine to coarse of flint.	0.50 (0.50)		
(MADE GROUND) Soft to stiff greyish brown, sandy, gravelly cobbley CLAY with pockets (up to 0.5 m diameter) of firm brown clay. Angular to rounded, fine to coarse gravel and cobbles of concrete, brick, wood, tarmacadam, plastic and metal.	1.00 (2.50)		
EXPLORATORY HOLE ENDS AT 3.50 m	3.50		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Trial Pit

TP7

Sheet 1 of 1

Trial Pit Log

Logged SM **Checked** PE	**Start** 13/11/2012 **End** 13/11/2012	**Equipment, Methods and Remarks** 7 Tonne Mini-Digger Machine dug	**Dimensions and Orientation** Width 0.60 m Length 2.00 m A / D / B / C 020 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
0.40	ES 1	
2.40	ES 2	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over dark brown, sandy, gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	0.20		
(MADE GROUND) Firm orangish brown, sandy, gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	(0.40)		
	0.60		
(MADE GROUND) Soft to stiff brown, sandy, gravelly cobbley CLAY with pockets (up to 0.5 m diameter) of firm brown clay. Angular to rounded, fine to coarse gravel and cobbles of concrete, brick and tarmacadam.	(2.20)		
	2.80		
EXPLORATORY HOLE ENDS AT 2.80 m			

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Trial Pit

TP8

Sheet 1 of 1

Trial Pit Log

Logged SM **Checked** PE	**Start** 13/11/2012 **End** 13/11/2012	**Equipment, Methods and Remarks** 7 Tonne Mini-Digger Machine dug	**Dimensions and Orientation** Width 0.60 m Length 2.00 m A / D / B / C 080 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
0.10	ES 1	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over dark brown, sandy, very gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	0.20		
(MADE GROUND) Soft to firm brown, sandy, very gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	(0.70)		
Orangish brown, sandy GRAVEL. Gravel is angular to rounded, fine to coarse of flint. (Possibly GLACIAL DEPOSITS)	0.90 (0.70)		
EXPLORATORY HOLE ENDS AT 1.60 m	1.60		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Trial Pit

TP9

Sheet 1 of 1

Trial Pit Log

Logged SM **Checked** PE	**Start** 13/11/2012 **End** 13/11/2012	**Equipment, Methods and Remarks** 7 Tonne Mini-Digger Machine dug	**Dimensions and Orientation** Width 0.60 m Length 2.00 m A / D / B / C 165 (Deg)	**Ground Level** - **Coordinates** - **National Grid** - **Chainage**

Samples and Tests

Depth	Type & No.	Date Records
0.10	ES 1	
0.70	ES 2	
3.00	ES 3	

Strata

Description	Depth, *Level* (Thickness)	Legend	Backfill/ Instruments
(TOPSOIL) Grass over dark brown, sandy, gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	0.25		
(MADE GROUND) Soft to firm brown, sandy, gravelly CLAY. Gravel is subangular to rounded, fine to coarse of flint.	(0.35) 0.60		
(MADE GROUND) Soft to stiff greyish brown, sandy, gravelly cobbley CLAY with pockets (up to 0.5 m diameter) of firm brown clay. Angular to rounded, fine to coarse gravel and cobbles of concrete, brick, wood, tarmacadam, plastic, glass and metal.	(3.00)		
EXPLORATORY HOLE ENDS AT 3.60 m	3.60		

Depth	Type & No.	Records Date

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
None observed (see Key Sheet)		

Depth Related Remarks *

From to (m)

Stability Stable

Shoring None

Weather

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Scale 1:25

Project Coursers Farm, Colney Heath, Hertfordshire

Project No. 22056

Carried out for Agrivert Limited

Trial Pit

TP10

Sheet 1 of 1

APPENDIX B
CHEMICAL LABORATORY TESTING RESULTS

APPENDIX B1
SOIL CHEMICAL TESTING RESULTS

Our Ref: EFS/128590M (Ver. 2)
Your Ref: 22056

December 20, 2012

Environmental Chemistry
ESG
Bretby Business Park
Ashby Road
Burton-on-Trent
Staffordshire
DE15 0YZ

Telephone: 01283 554400
Facsimile: 01283 554422

Mr S Mason
ESG Geoenvironmental Consulting
Glossop House
Hogwood Lane
Wokingham
Berkshire
RG40 4QW

For the attention of Mr S Mason

Dear Mr Mason

Soil Sample Analysis - Coursers Farm, Colney Heath

Samples from the above site have been analysed in accordance with the schedule supplied.
The sample details and the results of analyses for these samples are given in the appended report.

An invoice for this work will follow under a separate cover.

Where appropriate the samples will be kept until 28/12/12 when they will be discarded. Please call 01283 554500 for an extension of this date.
Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with Environmental Scientifics Group Ltd (Laboratory and Analytical) Standard Terms and Conditions of Contract.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

for ESG

J Elstub
Project Co-ordinator
01283 554500

Environmental Chemistry, ESG, P.O. Box 100, Burton-upon-trent, DE15 0XD Tel: 01283 554400 Fax: 01283 554422
Environmental Scientifics Group Limited.
Registered No: 2880501

TEST REPORT
SOIL SAMPLE ANALYSIS

1252

Report No. EFS/128590M (Ver. 2)

ESG Geoenvironmental Consulting
Glossop House
Hogwood Lane
Wokingham
Berkshire
RG40 4QW

Site: Coursers Farm, Colney Heath

The 17 samples described in this report were registered for analysis by ESG on 16-Nov-2012. This report supersedes any versions previously issued by the laboratory.
The analysis was completed by: 20-Dec-2012

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS or MCERTS accredited
Any opinions or interpretations expressed herein are outside the scope of any UKAS accreditation held by ESG.

The following tables are contained in this report:

On behalf of ESG :
Declan Burns — Operations Director, Laboratory and Analytical Business

Date of Issue: 20-Dec-2012

Accreditation Codes: **N** (Not Accredited), **U** (UKAS), **UM** (UKAS & MCERTS)
Tests marked '^' have been subcontracted to another laboratory.
(NVM) - denotes the sample matrix is dissimilar to matrices upon which the MCERTS validation was based, and is therefore not accredited for MCERTS.
All results are reported on a dry weight basis at 105^{o}C unless otherwise stated. (except QC samples)
ESG accepts no responsibility for any sampling not carried out by our personnel.

Units :			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	pH Units	mg/kg	mg/kg	%		%
Method Codes :			GROHSA	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	ICPMSS	PHSOIL	SFAPI	SFAPI	Sub002	Sub002a	TMSS
Method Reporting Limits :			0.2	0.3	0.2	1.2	1.6	0.7	0.5	2	0.5	16		0.5	0.5	0.001		0.2
Accreditation Code:			UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	UM	U	U	U	U
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**GRO**	**Arsenic (MS)**	**Cadmium (MS)**	**Chromium (MS)**	**Copper (MS)**	**Lead (MS)**	**Mercury (MS)**	**Nickel (MS)**	**Selenium (MS)**	**Zinc (MS)**	**pH units (AR)**	**Cyanide(Total) (AR)**	**Phenol Index.(AR)**	**^Asbestos ID and Quant (1 to 3)**	**^Asbestos Screen**	**Tot.Moisture @ 105C**
1282429	TP1 ES 1 0.5	14-Nov-12		11.0	0.44	29.3	15.2	19.3	<0.6	24.4	<0.6	51	7.7		<0.7			24.7
1282430	TP1 ES 2 2.7	14-Nov-12												<0.6	<0.6		NAIIS	19.6
1282445	TP10 ES 2 0.3	13-Nov-12	<0.2	31.6	0.40	23.8	34.7	77.5	<0.52	32.1	<0.5	140.1	7.9	<0.6	<0.6			19.8
1282444	TP10 ES 1 0.7	13-Nov-12												<0.6		<0.001	CH AM	20.4
1282431	TP2 ES 1 1.3	14-Nov-12	0.67											<0.6	<0.6			19.8
1282432	TP2 ES 2 3.1	14-Nov-12		11.6	0.32	34.3	20.9	52.0	<0.52	24.6	0.7	75.2	8.5					23.9
1282433	TP3 ES 1 0.1	14-Nov-12	0.32															19.0
1282434	TP3 ES 2 3.2	14-Nov-12		11	0.39	20.5	33.1	161	<0.51	17.7	<0.5	135.4	8.2	<0.6	<0.6		NAIIS	15.0
1282435	TP4 ES 1 1.1	14-Nov-12		10.9	0.25	38.9	23.4	47	<0.5	24.8	0.5	81.8	9.7	<0.7	<0.7		NAIIS	25.9
1282436	TP5 ES 1 1.0	13-Nov-12	<0.3	13.1	0.27	36.2	18.7	36.1	<0.51	25	<0.5	78.0	8.3		<0.6			21.8
1282437	TP5 ES 2 2.5	13-Nov-12												<0.6			NAIIS	22.4
1282438	TP6 ES 2 2.6	13-Nov-12		12.2	0.3	43.4	21.7	87.0	<0.50	31.7	0.6	79.9	8.4	<0.6	<0.6			22.3
1282439	TP7 ES 1 1.1	13-Nov-12	<0.3											<0.7				23.7
1282440	TP7 ES 2 3.2	13-Nov-12		11.0	0.25	30.1	19	41.9	<0.5	23.2	<0.5	73.3	8.8		<0.7		NAIIS	23.2
1282441	TP8 ES 1 0.4	13-Nov-12	<0.2															14.3
1282442	TP8 ES 2 2.4	13-Nov-12	<0.3	14.2	0.32	29.0	33.9	243.5	<0.55	22.6	<0.6	153.1	9.0	<0.6	<0.6		NAIIS	22.7
1282443	TP9 ES 1 0.1	13-Nov-12		9.3	0.2	16.9	14.4	42.8	<0.5	11	0.5	53.7	7.7					14.1

ESG Environmental Scientifics Group
Bretby Business Park, Ashby Road
Burton-on-Trent, Staffordshire, DE15 0YZ
Tel +44 (0) 1283 554400
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Client Name ESG Geoenvironmental Consulting

Contact Mr S Mason

Coursers Farm, Colney Heath

Soil Sample Analysis

Date Printed	**20-Dec-2012**
Report Number	**EFS/128590M**
Table Number	**1**

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

		Units :	mg/kg	mg/kg	µg/kg	mg/kg	mg/kg	mg/kg	% M/M	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	mg/kg		
		Method Codes :	TPHFIDUS	TPHFIDUS	VOCHSAS	KONECR	PCBUSECDAR	SVOCMSUS	WSLM59	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	BTEXHSA	PAHMSUS		
		Method Reporting Limits :	10	10		0.1			0.02	10	10	10	20	10	10			
		Accreditation Code:	UM			N			N	UM	UM	UM	UM	UM	UM			
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**TPH by GCFID (AR)**	**TPH Carbon Banding.**	**VOC HSA-GCMS**	**Chromium vi:**	**PCB-12 Congeners Analysis**	**SVOC by GCMS (AR)**	**Total Organic Carbon**	**Benzene**	**Toluene**	**Ethyl Benzene**	**Xylenes**	**m/p Xylenes**	**o Xylene**	**PAH (16) by GCMS**		
1282429	TP1 ES 1 0.5	14-Nov-12				<0.1										Req		
1282430	TP1 ES 2 2.7	14-Nov-12	165	Req				Req	1.08									
1282445	TP10 ES 2 0.3	13-Nov-12	298	Req		<0.1			1.85	<12	<12	<12	<25	<12	<12	Req		
1282444	TP10 ES 1 0.7	13-Nov-12	85	Req			Req	Req										
1282431	TP2 ES 1 1.3	14-Nov-12	37	Req						<12	<12	<12	<25	<12	<12			
1282432	TP2 ES 2 3.1	14-Nov-12			Req	<0.1	Req									Req		
1282433	TP3 ES 1 0.1	14-Nov-12	37	Req						<12	<12	<12	<25	<12	<12			
1282434	TP3 ES 2 3.2	14-Nov-12				<0.1												
1282435	TP4 ES 1 1.1	14-Nov-12																
1282436	TP5 ES 1 1.0	13-Nov-12	207	Req					1.33	<13	<13	<13	<26	<13	<13	Req		
1282437	TP5 ES 2 2.5	13-Nov-12			Req			Req										
1282438	TP6 ES 2 2.6	13-Nov-12	272	Req		<0.1	Req		0.93									
1282439	TP7 ES 1 1.1	13-Nov-12	229	Req					1.98	<13	<13	<13	<26	<13	<13	Req		
1282440	TP7 ES 2 3.2	13-Nov-12			Req	<0.1												
1282441	TP8 ES 1 0.4	13-Nov-12	46	Req						<12	<12	<12	<23	<12	<12			
1282442	TP8 ES 2 2.4	13-Nov-12	282	Req		<0.1				<13	<13	<13	<26	<13	<13	Req		
1282443	TP9 ES 1 0.1	13-Nov-12														Req		

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Client Name ESG Geoenvironmental Consulting

Contact Mr S Mason

Coursers Farm, Colney Heath

Soil Sample Analysis

Date Printed	**20-Dec-2012**
Report Number	**EFS/128590M**
Table Number	**1**

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath		
Sample Details:	TP1 ES 1 0.5	**Job Number:**	S12_8590M
LIMS ID Number:	CL1282429	**Date Booked in:**	16-Nov-12
QC Batch Number:	121033	**Date Extracted:**	20-Nov-12
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Nov-12
Directory:	12_PAH.MS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.11	-	**UM**
Acenaphthylene	208-96-8	-	< 0.11	-	U
Acenaphthene	83-32-9	-	< 0.11	-	UM
Fluorene	86-73-7	-	< 0.11	-	UM
Phenanthrene	85-01-8	-	< 0.11	-	UM
Anthracene	120-12-7	-	< 0.11	-	U
Fluoranthene	206-44-0	-	< 0.11	-	UM
Pyrene	129-00-0	-	< 0.11	-	UM
Benzo[a]anthracene	56-55-3	-	< 0.11	-	UM
Chrysene	218-01-9	-	< 0.11	-	UM
Benzo[b]fluoranthene	205-99-2	-	< 0.11	-	UM
Benzo[k]fluoranthene	207-08-9	-	< 0.11	-	UM
Benzo[a]pyrene	50-32-8	-	< 0.11	-	UM
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.11	-	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.11	-	UM
Benzo[g,h,i]perylene	191-24-2	-	< 0.11	-	UM
Total (USEPA16) PAHs	-	-	< 1.70	-	N

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	83
Acenaphthene-d10	78
Phenanthrene-d10	78
Chrysene-d12	69
Perylene-d12	66

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	102
Terphenyl-d14	101

Concentrations are reported on a dry weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath		
Sample Details:	TP2 ES 2 3.1	**Job Number:**	S12_8590M
LIMS ID Number:	CL1282432	**Date Booked in:**	16-Nov-12
QC Batch Number:	121033	**Date Extracted:**	20-Nov-12
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Nov-12
Directory:	12_PAH.MS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.11	-	**UM**
Acenaphthylene	208-96-8	-	< 0.11	-	U
Acenaphthene	83-32-9	4.55	0.28	95	UM
Fluorene	86-73-7	4.94	0.21	94	UM
Phenanthrene	85-01-8	5.80	1.46	98	UM
Anthracene	120-12-7	5.85	0.34	98	U
Fluoranthene	206-44-0	7.15	0.96	95	UM
Pyrene	129-00-0	7.44	0.83	92	UM
Benzo[a]anthracene	56-55-3	9.12	0.34	96	UM
Chrysene	218-01-9	9.17	0.41	96	UM
Benzo[b]fluoranthene	205-99-2	10.65	0.32	96	UM
Benzo[k]fluoranthene	207-08-9	10.67	0.24	93	UM
Benzo[a]pyrene	50-32-8	11.08	0.28	96	UM
Indeno[1,2,3-cd]pyrene	193-39-5	12.45	0.16	81	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.11	-	UM
Benzo[g,h,i]perylene	191-24-2	12.75	0.17	76	UM
Total (USEPA16) PAHs	-	-	< 6.29	-	N

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	84
Acenaphthene-d10	77
Phenanthrene-d10	75
Chrysene-d12	76
Perylene-d12	78

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	99
Terphenyl-d14	102

Concentrations are reported on a dry weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath		
Sample Details:	TP5 ES 1 1.0	**Job Number:**	S12_8590M
LIMS ID Number:	CL1282436	**Date Booked in:**	16-Nov-12
QC Batch Number:	121033	**Date Extracted:**	20-Nov-12
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Nov-12
Directory:	12_PAH.MS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	3.38	0.10	95	**UM**
Acenaphthylene	208-96-8	-	< 0.10	-	U
Acenaphthene	83-32-9	-	< 0.10	-	UM
Fluorene	86-73-7	-	< 0.10	-	UM
Phenanthrene	85-01-8	5.80	0.52	97	UM
Anthracene	120-12-7	5.85	0.20	99	U
Fluoranthene	206-44-0	7.15	0.92	80	UM
Pyrene	129-00-0	7.44	0.90	90	UM
Benzo[a]anthracene	56-55-3	9.12	0.43	95	UM
Chrysene	218-01-9	9.17	0.55	96	UM
Benzo[b]fluoranthene	205-99-2	10.65	0.59	77	UM
Benzo[k]fluoranthene	207-08-9	10.68	0.33	93	UM
Benzo[a]pyrene	50-32-8	11.08	0.47	96	UM
Indeno[1,2,3-cd]pyrene	193-39-5	12.45	0.31	99	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.10	-	UM
Benzo[g,h,i]perylene	191-24-2	12.75	0.36	99	UM
Total (USEPA16) PAHs	-	-	< 6.10	-	N

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	83
Acenaphthene-d10	78
Phenanthrene-d10	75
Chrysene-d12	74
Perylene-d12	75

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	100
Terphenyl-d14	103

Concentrations are reported on a dry weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath		
Sample Details:	TP7 ES 1 1.1	**Job Number:**	S12_8590M
LIMS ID Number:	CL1282439	**Date Booked in:**	16-Nov-12
QC Batch Number:	121033	**Date Extracted:**	20-Nov-12
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Nov-12
Directory:	12_PAH.MS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.10	-	**UM**
Acenaphthylene	208-96-8	-	< 0.10	-	U
Acenaphthene	83-32-9	-	< 0.10	-	UM
Fluorene	86-73-7	-	< 0.10	-	UM
Phenanthrene	85-01-8	5.80	0.46	98	UM
Anthracene	120-12-7	5.85	0.31	90	U
Fluoranthene	206-44-0	7.15	2.94	97	UM
Pyrene	129-00-0	7.44	3.63	91	UM
Benzo[a]anthracene	56-55-3	9.12	2.40	97	UM
Chrysene	218-01-9	9.17	2.87	96	UM
Benzo[b]fluoranthene	205-99-2	10.65	4.20	99	UM
Benzo[k]fluoranthene	207-08-9	10.68	2.10	94	UM
Benzo[a]pyrene	50-32-8	11.07	3.29	98	UM
Indeno[1,2,3-cd]pyrene	193-39-5	12.45	2.14	93	UM
Dibenzo[a,h]anthracene	53-70-3	12.47	0.50	77	UM
Benzo[g,h,i]perylene	191-24-2	12.75	2.19	98	UM
Total (USEPA16) PAHs	-	-	< 27.42	-	N

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	80
Acenaphthene-d10	75
Phenanthrene-d10	71
Chrysene-d12	71
Perylene-d12	75

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	99
Terphenyl-d14	102

Concentrations are reported on a dry weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath		
Sample Details:	TP8 ES 2 2.4	**Job Number:**	S12_8590M
LIMS ID Number:	CL1282442	**Date Booked in:**	16-Nov-12
QC Batch Number:	121033	**Date Extracted:**	20-Nov-12
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Nov-12
Directory:	12_PAH.MS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	3.38	0.10	92	**UM**
Acenaphthylene	208-96-8	-	< 0.10	-	U
Acenaphthene	83-32-9	4.55	0.14	92	UM
Fluorene	86-73-7	4.94	0.10	96	UM
Phenanthrene	85-01-8	5.80	0.88	99	UM
Anthracene	120-12-7	5.85	0.30	97	U
Fluoranthene	206-44-0	7.15	1.32	97	UM
Pyrene	129-00-0	7.44	1.25	91	UM
Benzo[a]anthracene	56-55-3	9.12	0.60	94	UM
Chrysene	218-01-9	9.17	0.80	97	UM
Benzo[b]fluoranthene	205-99-2	10.65	0.88	82	UM
Benzo[k]fluoranthene	207-08-9	10.68	0.45	86	UM
Benzo[a]pyrene	50-32-8	11.08	0.66	93	UM
Indeno[1,2,3-cd]pyrene	193-39-5	12.45	0.45	93	UM
Dibenzo[a,h]anthracene	53-70-3	12.47	0.12	57	UM
Benzo[g,h,i]perylene	191-24-2	12.75	0.50	100	UM
Total (USEPA16) PAHs	-	-	< 8.78	-	N

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	82
Acenaphthene-d10	77
Phenanthrene-d10	75
Chrysene-d12	69
Perylene-d12	70

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	100
Terphenyl-d14	105

Concentrations are reported on a dry weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath		
Sample Details:	TP9 ES 1 0.1	**Job Number:**	S12_8590M
LIMS ID Number:	CL1282443	**Date Booked in:**	16-Nov-12
QC Batch Number:	121033	**Date Extracted:**	20-Nov-12
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Nov-12
Directory:	12_PAH.MS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	-	< 0.09	-	**UM**
Acenaphthylene	208-96-8	-	< 0.09	-	U
Acenaphthene	83-32-9	-	< 0.09	-	UM
Fluorene	86-73-7	-	< 0.09	-	UM
Phenanthrene	85-01-8	-	< 0.09	-	UM
Anthracene	120-12-7	-	< 0.09	-	U
Fluoranthene	206-44-0	7.15	0.10	66	UM
Pyrene	129-00-0	7.44	0.10	M	UM
Benzo[a]anthracene	56-55-3	-	< 0.09	-	UM
Chrysene	218-01-9	-	< 0.09	-	UM
Benzo[b]fluoranthene	205-99-2	-	< 0.09	-	UM
Benzo[k]fluoranthene	207-08-9	-	< 0.09	-	UM
Benzo[a]pyrene	50-32-8	-	< 0.09	-	UM
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.09	-	UM
Dibenzo[a,h]anthracene	53-70-3	-	< 0.09	-	UM
Benzo[g,h,i]perylene	191-24-2	-	< 0.09	-	UM
Total (USEPA16) PAHs	-	-	< 1.53	-	N

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	82
Acenaphthene-d10	77
Phenanthrene-d10	77
Chrysene-d12	66
Perylene-d12	64

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	99
Terphenyl-d14	97

Concentrations are reported on a dry weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

Polycyclic Aromatic Hydrocarbons
GC/MS (SIM)

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath		
Sample Details:	TP10 ES 2 0.3	**Job Number:**	S12_8590M
LIMS ID Number:	CL1282445	**Date Booked in:**	16-Nov-12
QC Batch Number:	121033	**Date Extracted:**	20-Nov-12
Quantitation File:	Initial Calibration	**Date Analysed:**	21-Nov-12
Directory:	12_PAH.MS14\	**Matrix:**	Soil
Dilution:	1.0	**Ext Method:**	Ultrasonic

Accredited?: Yes

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Naphthalene	91-20-3	3.38	0.30	98	**UM**
Acenaphthylene	208-96-8	-	< 0.10	-	U
Acenaphthene	83-32-9	4.55	0.24	94	UM
Fluorene	86-73-7	4.94	0.14	93	UM
Phenanthrene	85-01-8	5.80	1.01	99	UM
Anthracene	120-12-7	5.85	0.30	96	U
Fluoranthene	206-44-0	7.15	1.70	97	UM
Pyrene	129-00-0	7.44	1.70	92	UM
Benzo[a]anthracene	56-55-3	9.12	0.90	94	UM
Chrysene	218-01-9	9.17	1.05	100	UM
Benzo[b]fluoranthene	205-99-2	10.65	1.26	95	UM
Benzo[k]fluoranthene	207-08-9	10.68	0.50	92	UM
Benzo[a]pyrene	50-32-8	11.08	0.92	96	UM
Indeno[1,2,3-cd]pyrene	193-39-5	12.45	0.67	100	UM
Dibenzo[a,h]anthracene	53-70-3	12.47	0.15	57	UM
Benzo[g,h,i]perylene	191-24-2	12.75	0.77	99	UM
Total (USEPA16) PAHs	-	-	< 11.80	-	N

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	NA
Naphthalene-d8	80
Acenaphthene-d10	76
Phenanthrene-d10	78
Chrysene-d12	75
Perylene-d12	77

Surrogates	% Rec
Nitrobenzene-d5	NA
2-Fluorobiphenyl	99
Terphenyl-d14	99

Concentrations are reported on a dry weight basis.

The Total PAH result is the sum of non-rounded individual PAH results and therefore may differ to the sum of the rounded individual PAH results printed above. By convention, where any one or more result is a "less than", the total is expressed as a "less than" and includes the "less than" concentration within the total.

Polychlorinated Biphenyls (congeners)

Customer and Site Details: ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath
Job Number: S12_8590M
QC Batch Number: 120306
Directory: 1127PCB.GC8
Method: Ultrasonic
Accreditation code: N

Matrix: Soil Soil
Date Booked in: 16-Nov-12
Date Extracted: 27-Nov-12
Date Analysed: 28-Nov-12

			Concentration, (µg/kg)										
Sample ID	**Customer ID**	**PCB 81**	**PCB 77**	**PCB 123**	**PCB 118**	**PCB 114**	**PCB 105**	**PCB 126**	**PCB 167**	**PCB 156**	**PCB 157**	**PCB 169**	**PCB 189**
* CL1282432	TP2 ES 2 3.1	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2	<5.2
CL1282438	TP6 ES 2 2.6	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
CL1282444	TP10 ES 1 0.7	<6.3	<6.3	<6.3	<6.3	<6.3	<6.3	<6.3	<6.3	<6.3	<6.3	<6.3	<6.3

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Semi-Volatile Organic Compounds

Accredited?: No

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath			**Matrix:**	Soil	**QC Batch Number:**	208
Sample Details:	TP1 ES 2 2.7	**Date Booked in:**	16-Nov-12	**Ext Method:**	Ultrasonic	**Multiplier:**	0.2
LIMS ID Number:	CL1282430	**Date Extracted:**	22-Nov-12	**Operator:**	AB	**Dilution Factor:**	1
Job Number:	S12_8590M	**Date Analysed:**	23-Nov-12	**Directory/Quant File:**	22SVOC.MS20\ 1122_CCC2.D	**GPC (Y/N)**	N

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Phenol	108-95-2	-	< 2.0	-	N
bis(2-Chloroethyl)ether	111-44-4	-	< 0.6	-	N
2-Chlorophenol	95-57-8	-	< 2.0	-	N
1,3-Dichlorobenzene	541-73-1	-	< 0.6	-	N
1,4-Dichlorobenzene	106-46-7	-	< 0.6	-	N
Benzyl alcohol	100-51-6	-	< 0.6	-	N
1,2-Dichlorobenzene	95-50-1	-	< 0.6	-	N
2-Methylphenol	95-48-7	-	< 0.6	-	N
bis(2-Chloroisopropyl)ether	108-60-1	-	< 0.6	-	N
Hexachloroethane	67-72-1	-	< 0.6	-	N
N-Nitroso-di-n-propylamine	621-64-7	-	< 0.6	-	N
3- & 4-Methylphenol	108-39-4/106-44-5	-	< 2.0	-	N
Nitrobenzene	98-95-3	-	< 0.6	-	N
Isophorone	78-59-1	-	< 0.6	-	N
2-Nitrophenol	88-75-5	-	< 2.0	-	N
2,4-Dimethylphenol	105-67-9	-	< 2.0	-	N
Benzoic Acid	65-85-0	-	< 12.0	-	N
bis(2-Chloroethoxy)methane	111-91-1	-	< 0.6	-	N
2,4-Dichlorophenol	120-83-2	-	< 2.0	-	N
1,2,4-Trichlorobenzene	120-82-1	-	< 0.6	-	N
Naphthalene	91-20-3	-	< 0.2	-	N
4-Chlorophenol	106-48-9	-	< 2.0	-	N
4-Chloroaniline	106-47-8	-	< 0.6	-	N
Hexachlorobutadiene	87-68-3	-	< 0.6	-	N
4-Chloro-3-methylphenol	59-50-7	-	< 0.6	-	N
2-Methylnaphthalene	91-57-6	-	< 0.2	-	N
1-Methylnaphthalene	90-12-0	-	< 0.2	-	N
Hexachlorocyclopentadiene	77-47-4	-	< 0.6	-	N
2,4,6-Trichlorophenol	88-06-2	-	< 2.0	-	N
2,4,5-Trichlorophenol	95-95-4	-	< 2.0	-	N
2-Chloronaphthalene	91-58-7	-	< 0.2	-	N
Biphenyl	92-52-4	-	< 0.2	-	N
Diphenyl ether	101-84-8	-	< 0.2	-	N
2-Nitroaniline	88-74-4	-	< 0.6	-	N
Acenaphthylene	208-96-8	-	< 0.2	-	N
Dimethylphthalate	131-11-3	-	< 0.6	-	N
2,6-Dinitrotoluene	606-20-2	-	< 0.6	-	N
Acenaphthene	83-32-9	-	< 0.2	-	N
3-Nitroaniline	99-09-2	-	< 0.6	-	N

Target Compounds	CAS #	R.T.	Concentration mg/kg	% Fit	Accr. code
2,4-Dinitrophenol	51-28-5	-	< 1.0	-	N
Dibenzofuran	132-64-9	-	< 0.6	-	N
4-Nitrophenol	100-02-7	-	< 6.0	-	N
2,4-Dinitrotoluene	121-14-2	-	< 0.6	-	N
Fluorene	86-73-7	-	< 0.2	-	N
Diethylphthalate	84-66-2	-	< 0.6	-	N
4-Chlorophenyl-phenylether	7005-72-3	-	< 0.6	-	N
4,6-Dinitro-2-methylphenol	534-52-1	-	< 6.0	-	N
4-Nitroaniline	100-01-6	-	< 0.6	-	N
N-Nitrosodiphenylamine	86-30-6	-	< 0.6	-	N
4-Bromophenyl-phenylether	101-55-3	-	< 0.6	-	N
Hexachlorobenzene	118-74-1	-	< 0.6	-	N
Pentachlorophenol	87-86-5	-	< 6.0	-	N
Phenanthrene	85-01-8	10.88	0.2	99	N
Anthracene	120-12-7	-	< 0.2	-	N
Di-n-butylphthalate	84-74-2	-	< 0.6	-	N
Fluoranthene	206-44-0	12.71	0.5	100	N
Pyrene	129-00-0	13.05	0.5	81	N
Butylbenzylphthalate	85-68-7	-	< 0.6	-	N
Benzo[a]anthracene	56-55-3	-	< 0.2	-	N
Chrysene	218-01-9	15.02	0.2	100	N
3,3'-Dichlorobenzidine	91-94-1	-	< 2.0	-	N
bis(2-Ethylhexyl)phthalate	117-81-7	-	< 0.6	-	N
Di-n-octylphthalate	117-84-0	-	< 0.2	-	N
Benzo[b]fluoranthene	205-99-2	16.59	0.4	100	N
Benzo[k]fluoranthene	207-08-9	-	< 0.2	-	N
Benzo[a]pyrene	50-32-8	17.03	0.2	100	N
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.2	-	N
Dibenzo[a,h]anthracene	53-70-3	-	< 0.2	-	N
Benzo[g,h,i]perylene	191-24-2	-	< 0.2	-	N

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	95
Naphthalene-d8	88
Acenaphthene-d10	84
Phenanthrene-d10	81
Chrysene-d12	77
Perylene-d12	81

Surrogates	% Rec
2-Fluorophenol	70
Phenol-d5	65
Nitrobenzene-d5	66
2-Fluorobiphenyl	64
2,4,6-Tribromophenol	60
Terphenyl-d14	71

This analysis was conducted on an 'As Recieved' basis.

Concentrations are reported on a dry weight basis.

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appropriate, in accordance with the MCERTS standard.

Semi-Volatile Organic Compounds

Accredited?: No

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath			**Matrix:**	Soil	**QC Batch Number:**	208
Sample Details:	TP5 ES 2 2.5	**Date Booked in:**	16-Nov-12	**Ext Method:**	Ultrasonic	**Multiplier:**	0.2
LIMS ID Number:	CL1282437	**Date Extracted:**	22-Nov-12	**Operator:**	AB	**Dilution Factor:**	1
Job Number:	S12_8590M	**Date Analysed:**	23-Nov-12	**Directory/Quant File:**	22SVOC.MS20\ 1122_CCC2.D	**GPC (Y/N)**	N

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Phenol	108-95-2	-	< 3.0	-	N
bis(2-Chloroethyl)ether	111-44-4	-	< 0.6	-	N
2-Chlorophenol	95-57-8	-	< 3.0	-	N
1,3-Dichlorobenzene	541-73-1	-	< 0.6	-	N
1,4-Dichlorobenzene	106-46-7	-	< 0.6	-	N
Benzyl alcohol	100-51-6	-	< 0.6	-	N
1,2-Dichlorobenzene	95-50-1	-	< 0.6	-	N
2-Methylphenol	95-48-7	-	< 0.6	-	N
bis(2-Chloroisopropyl)ether	108-60-1	-	< 0.6	-	N
Hexachloroethane	67-72-1	-	< 0.6	-	N
N-Nitroso-di-n-propylamine	621-64-7	-	< 0.6	-	N
3- & 4-Methylphenol	108-39-4/106-44-5	-	< 3.0	-	N
Nitrobenzene	98-95-3	-	< 0.6	-	N
Isophorone	78-59-1	-	< 0.6	-	N
2-Nitrophenol	88-75-5	-	< 3.0	-	N
2,4-Dimethylphenol	105-67-9	-	< 3.0	-	N
Benzoic Acid	65-85-0	-	< 13.0	-	N
bis(2-Chloroethoxy)methane	111-91-1	-	< 0.6	-	N
2,4-Dichlorophenol	120-83-2	-	< 3.0	-	N
1,2,4-Trichlorobenzene	120-82-1	-	< 0.6	-	N
Naphthalene	91-20-3	-	< 0.3	-	N
4-Chlorophenol	106-48-9	-	< 3.0	-	N
4-Chloroaniline	106-47-8	-	< 0.6	-	N
Hexachlorobutadiene	87-68-3	-	< 0.6	-	N
4-Chloro-3-methylphenol	59-50-7	-	< 0.6	-	N
2-Methylnaphthalene	91-57-6	-	< 0.3	-	N
1-Methylnaphthalene	90-12-0	-	< 0.3	-	N
Hexachlorocyclopentadiene	77-47-4	-	< 0.6	-	N
2,4,6-Trichlorophenol	88-06-2	-	< 3.0	-	N
2,4,5-Trichlorophenol	95-95-4	-	< 3.0	-	N
2-Chloronaphthalene	91-58-7	-	< 0.3	-	N
Biphenyl	92-52-4	-	< 0.3	-	N
Diphenyl ether	101-84-8	-	< 0.3	-	N
2-Nitroaniline	88-74-4	-	< 0.6	-	N
Acenaphthylene	208-96-8	-	< 0.3	-	N
Dimethylphthalate	131-11-3	-	< 0.6	-	N
2,6-Dinitrotoluene	606-20-2	-	< 0.6	-	N
Acenaphthene	83-32-9	-	< 0.3	-	N
3-Nitroaniline	99-09-2	-	< 0.6	-	N

Target Compounds	CAS #	R.T.	Concentration mg/kg	% Fit	Accr. code
2,4-Dinitrophenol	51-28-5	-	< 1.0	-	N
Dibenzofuran	132-64-9	-	< 0.6	-	N
4-Nitrophenol	100-02-7	-	< 6.0	-	N
2,4-Dinitrotoluene	121-14-2	-	< 0.6	-	N
Fluorene	86-73-7	-	< 0.3	-	N
Diethylphthalate	84-66-2	-	< 0.6	-	N
4-Chlorophenyl-phenylether	7005-72-3	-	< 0.6	-	N
4,6-Dinitro-2-methylphenol	534-52-1	-	< 6.0	-	N
4-Nitroaniline	100-01-6	-	< 0.6	-	N
N-Nitrosodiphenylamine	86-30-6	-	< 0.6	-	N
4-Bromophenyl-phenylether	101-55-3	-	< 0.6	-	N
Hexachlorobenzene	118-74-1	-	< 0.6	-	N
Pentachlorophenol	87-86-5	-	< 6.0	-	N
Phenanthrene	85-01-8	-	< 0.3	-	N
Anthracene	120-12-7	-	< 0.3	-	N
Di-n-butylphthalate	84-74-2	-	< 0.6	-	N
Fluoranthene	206-44-0	-	< 0.3	-	N
Pyrene	129-00-0	-	< 0.3	-	N
Butylbenzylphthalate	85-68-7	-	< 0.6	-	N
Benzo[a]anthracene	56-55-3	-	< 0.3	-	N
Chrysene	218-01-9	-	< 0.3	-	N
3,3'-Dichlorobenzidine	91-94-1	-	< 3.0	-	N
bis(2-Ethylhexyl)phthalate	117-81-7	-	< 0.6	-	N
Di-n-octylphthalate	117-84-0	-	< 0.3	-	N
Benzo[b]fluoranthene	205-99-2	-	< 0.3	-	N
Benzo[k]fluoranthene	207-08-9	-	< 0.3	-	N
Benzo[a]pyrene	50-32-8	-	< 0.3	-	N
Indeno[1,2,3-cd]pyrene	193-39-5	-	< 0.3	-	N
Dibenzo[a,h]anthracene	53-70-3	-	< 0.3	-	N
Benzo[g,h,i]perylene	191-24-2	-	< 0.3	-	N

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	94
Naphthalene-d8	88
Acenaphthene-d10	92
Phenanthrene-d10	99
Chrysene-d12	94
Perylene-d12	105

Surrogates	% Rec
2-Fluorophenol	75
Phenol-d5	68
Nitrobenzene-d5	69
2-Fluorobiphenyl	68
2,4,6-Tribromophenol	62
Terphenyl-d14	71

This analysis was conducted on an 'As Recieved' basis.

Concentrations are reported on a dry weight basis.

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appropriate, in accordance with the MCERTS standard.

Semi-Volatile Organic Compounds

Accredited?: No

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath			**Matrix:**	Soil	**QC Batch Number:**	208
Sample Details:	TP10 ES 1 0.7	**Date Booked in:**	16-Nov-12	**Ext Method:**	Ultrasonic	**Multiplier:**	0.2
LIMS ID Number:	CL1282444	**Date Extracted:**	22-Nov-12	**Operator:**	AB	**Dilution Factor:**	1
Job Number:	S12_8590M	**Date Analysed:**	23-Nov-12	**Directory/Quant File:**	22SVOC.MS20\ 1122_CCC2.D	**GPC (Y/N)**	N

Target Compounds	CAS #	R.T. (min)	Concentration mg/kg	% Fit	Accr. code
Phenol	108-95-2	-	< 3.0	-	N
bis(2-Chloroethyl)ether	111-44-4	-	< 0.6	-	N
2-Chlorophenol	95-57-8	-	< 3.0	-	N
1,3-Dichlorobenzene	541-73-1	-	< 0.6	-	N
1,4-Dichlorobenzene	106-46-7	-	< 0.6	-	N
Benzyl alcohol	100-51-6	-	< 0.6	-	N
1,2-Dichlorobenzene	95-50-1	-	< 0.6	-	N
2-Methylphenol	95-48-7	-	< 0.6	-	N
bis(2-Chloroisopropyl)ether	108-60-1	-	< 0.6	-	N
Hexachloroethane	67-72-1	-	< 0.6	-	N
N-Nitroso-di-n-propylamine	621-64-7	-	< 0.6	-	N
3- & 4-Methylphenol	108-39-4/106-44-5	-	< 3.0	-	N
Nitrobenzene	98-95-3	-	< 0.6	-	N
Isophorone	78-59-1	-	< 0.6	-	N
2-Nitrophenol	88-75-5	-	< 3.0	-	N
2,4-Dimethylphenol	105-67-9	-	< 3.0	-	N
Benzoic Acid	65-85-0	-	< 13.0	-	N
bis(2-Chloroethoxy)methane	111-91-1	-	< 0.6	-	N
2,4-Dichlorophenol	120-83-2	-	< 3.0	-	N
1,2,4-Trichlorobenzene	120-82-1	-	< 0.6	-	N
Naphthalene	91-20-3	6.84	0.6	99	N
4-Chlorophenol	106-48-9	-	< 3.0	-	N
4-Chloroaniline	106-47-8	-	< 0.6	-	N
Hexachlorobutadiene	87-68-3	-	< 0.6	-	N
4-Chloro-3-methylphenol	59-50-7	-	< 0.6	-	N
2-Methylnaphthalene	91-57-6	7.57	0.5	92	N
1-Methylnaphthalene	90-12-0	7.67	0.4	96	N
Hexachlorocyclopentadiene	77-47-4	-	< 0.6	-	N
2,4,6-Trichlorophenol	88-06-2	-	< 3.0	-	N
2,4,5-Trichlorophenol	95-95-4	-	< 3.0	-	N
2-Chloronaphthalene	91-58-7	-	< 0.3	-	N
Biphenyl	92-52-4	-	< 0.3	-	N
Diphenyl ether	101-84-8	-	< 0.3	-	N
2-Nitroaniline	88-74-4	-	< 0.6	-	N
Acenaphthylene	208-96-8	-	< 0.3	-	N
Dimethylphthalate	131-11-3	-	< 0.6	-	N
2,6-Dinitrotoluene	606-20-2	-	< 0.6	-	N
Acenaphthene	83-32-9	8.82	0.8	97	N
3-Nitroaniline	99-09-2	-	< 0.6	-	N

Target Compounds	CAS #	R.T.	Concentration mg/kg	% Fit	Accr. code
2,4-Dinitrophenol	51-28-5	-	< 1.0	-	N
Dibenzofuran	132-64-9	-	< 0.6	-	N
4-Nitrophenol	100-02-7	-	< 6.0	-	N
2,4-Dinitrotoluene	121-14-2	-	< 0.6	-	N
Fluorene	86-73-7	9.51	0.8	98	N
Diethylphthalate	84-66-2	-	< 0.6	-	N
4-Chlorophenyl-phenylether	7005-72-3	-	< 0.6	-	N
4,6-Dinitro-2-methylphenol	534-52-1	-	< 6.0	-	N
4-Nitroaniline	100-01-6	-	< 0.6	-	N
N-Nitrosodiphenylamine	86-30-6	-	< 0.6	-	N
4-Bromophenyl-phenylether	101-55-3	-	< 0.6	-	N
Hexachlorobenzene	118-74-1	-	< 0.6	-	N
Pentachlorophenol	87-86-5	-	< 6.0	-	N
Phenanthrene	85-01-8	10.88	2.9	100	N
Anthracene	120-12-7	10.96	0.9	95	N
Di-n-butylphthalate	84-74-2	-	< 0.6	-	N
Fluoranthene	206-44-0	12.71	4.0	100	N
Pyrene	129-00-0	13.05	3.1	82	N
Butylbenzylphthalate	85-68-7	-	< 0.6	-	N
Benzo[a]anthracene	56-55-3	14.97	1.9	100	N
Chrysene	218-01-9	15.02	1.5	100	N
3,3'-Dichlorobenzidine	91-94-1	-	< 3.0	-	N
bis(2-Ethylhexyl)phthalate	117-81-7	-	< 0.6	-	N
Di-n-octylphthalate	117-84-0	-	< 0.3	-	N
Benzo[b]fluoranthene	205-99-2	16.59	2.0	100	N
Benzo[k]fluoranthene	207-08-9	16.62	0.8	100	N
Benzo[a]pyrene	50-32-8	17.03	1.6	100	N
Indeno[1,2,3-cd]pyrene	193-39-5	18.45	1.0	100	N
Dibenzo[a,h]anthracene	53-70-3	18.47	0.3	100	N
Benzo[g,h,i]perylene	191-24-2	18.78	1.0	97	N

"M" denotes that % fit has been manually interpreted

Internal Standards	% Area
1,4-Dichlorobenzene-d4	97
Naphthalene-d8	92
Acenaphthene-d10	97
Phenanthrene-d10	99
Chrysene-d12	100
Perylene-d12	111

Surrogates	% Rec
2-Fluorophenol	69
Phenol-d5	71
Nitrobenzene-d5	73
2-Fluorobiphenyl	73
2,4,6-Tribromophenol	64
Terphenyl-d14	76

This analysis was conducted on an 'As Recieved' basis.

Concentrations are reported on a dry weight basis.

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appropriate, in accordance with the MCERTS standard.

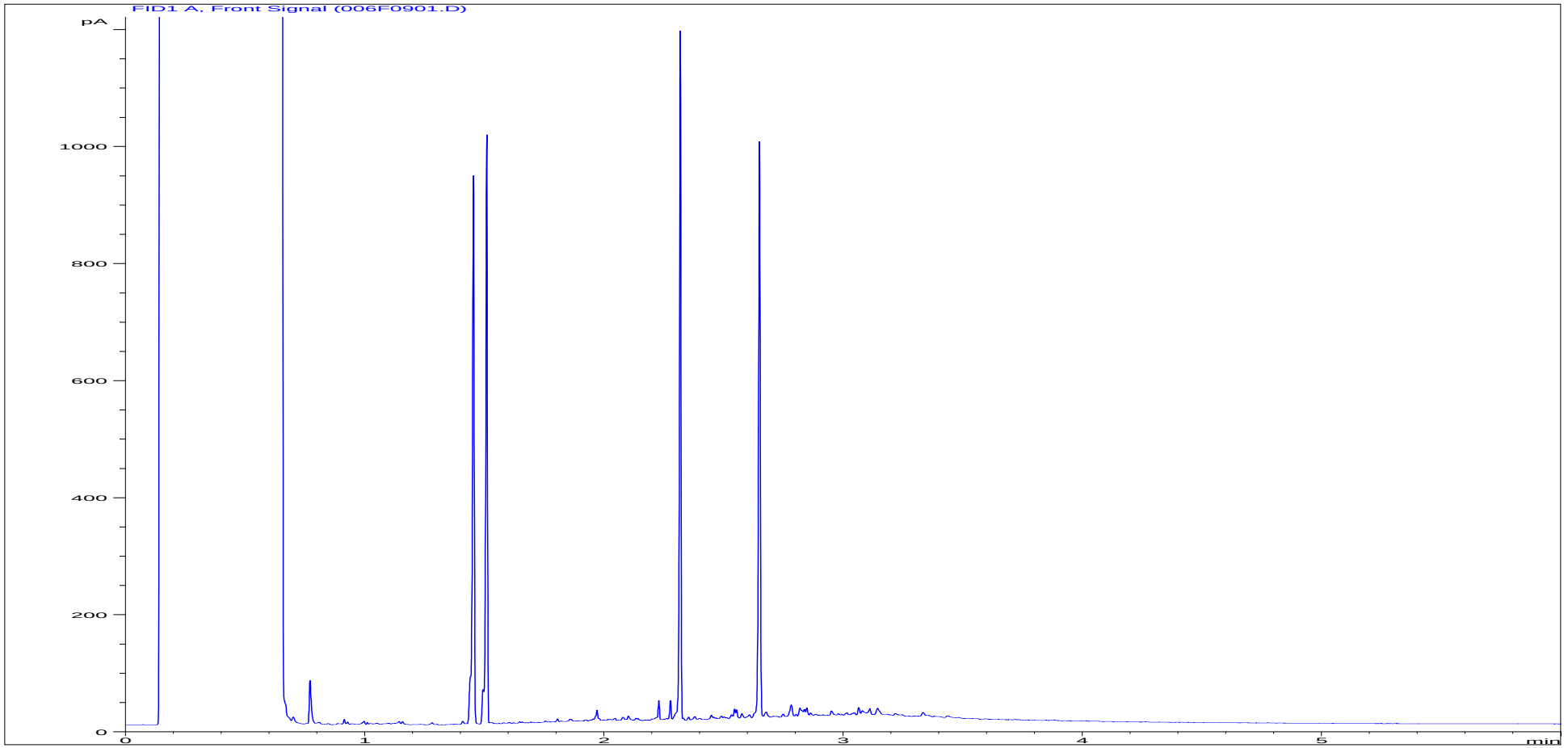
Total Petroleum Hydrocarbons (TPH) Carbon Ranges

Customer and Site Details:	ESG Geoenvironmental Consulting : Coursers Farm, Colney Heath	**Matrix:**	Soil
Job Number:	S12_8590M	**Date Booked in:**	16-Nov-12
QC Batch Number:	121033	**Date Extracted:**	20-Nov-12
Directory:	D:\TES\DATA\11\1120TPH_GC14\112012 2012-11-20 15-00-06\015F0901.D	**Date Analysed:**	20-Nov-12, 16:38:15
Method:	Ultra Sonic		
Accreditation code:	U		

		Concentration, (mg/kg) - as dry weight.				
Sample ID	**Client ID**	**>C8 - C10**	**>C10 - C12**	**>C12 - C16**	**>C16 - C21**	**>C21 - C35**
CL1282430	TP1 ES 2 2.7	<2	<2	6.52	25.6	96.9
CL1282431	TP2 ES 1 1.3	<2	<2	<2	3.53	27.7
CL1282433	TP3 ES 1 0.1	<2	<2	<2	2.69	26.7
CL1282436	TP5 ES 1 1.0	<3	<3	3.41	14.8	143
CL1282438	TP6 ES 2 2.6	<3	4	24.8	55.1	142
CL1282439	TP7 ES 1 1.1	<3	<3	<3	17.6	174
CL1282441	TP8 ES 1 0.4	<2	<2	<2	2.54	34.3
CL1282442	TP8 ES 2 2.4	<3	<3	15	45.4	168
CL1282444	TP10 ES 1 0.7	<3	<3	<3	8.44	59.2
CL1282445	TP10 ES 2 0.3	<2	2.66	11	36.5	185

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appropriat e, in accordance with the MCERTS standard.

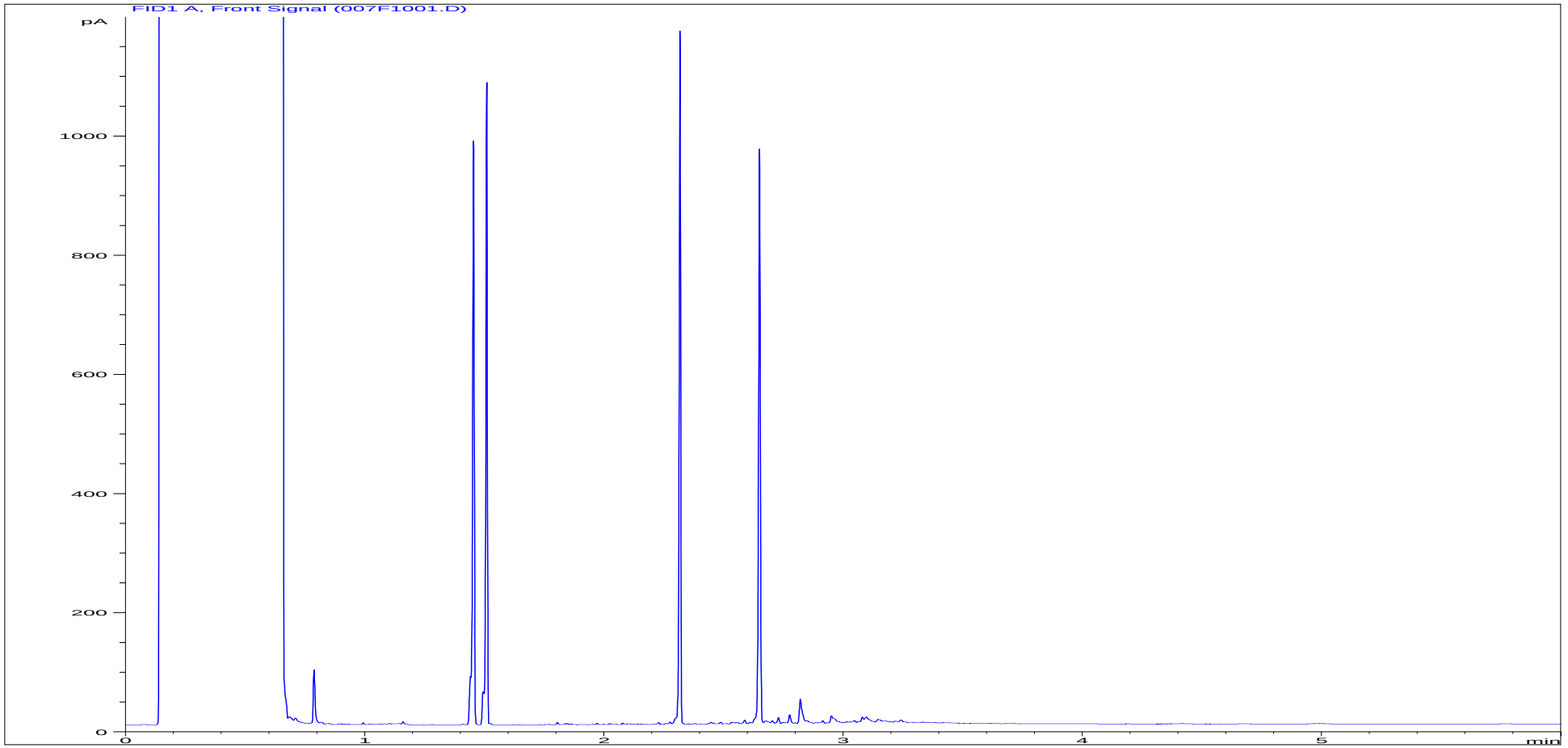
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1282430	**Job Number:**	S12_8590M
Multiplier:	8	**Client:**	ESG Geoenvironmental Consulting
Dilution:	1	**Site:**	Coursers Farm, Colney Heath
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP1 ES 2 2.7
Acquisition Date/Time:	20-Nov-12, 14:30:17		
Datafile:	D:\TES\DATA\11\1120TPH_GC14\112012 2012-11-20 12-49-42\006F0901.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

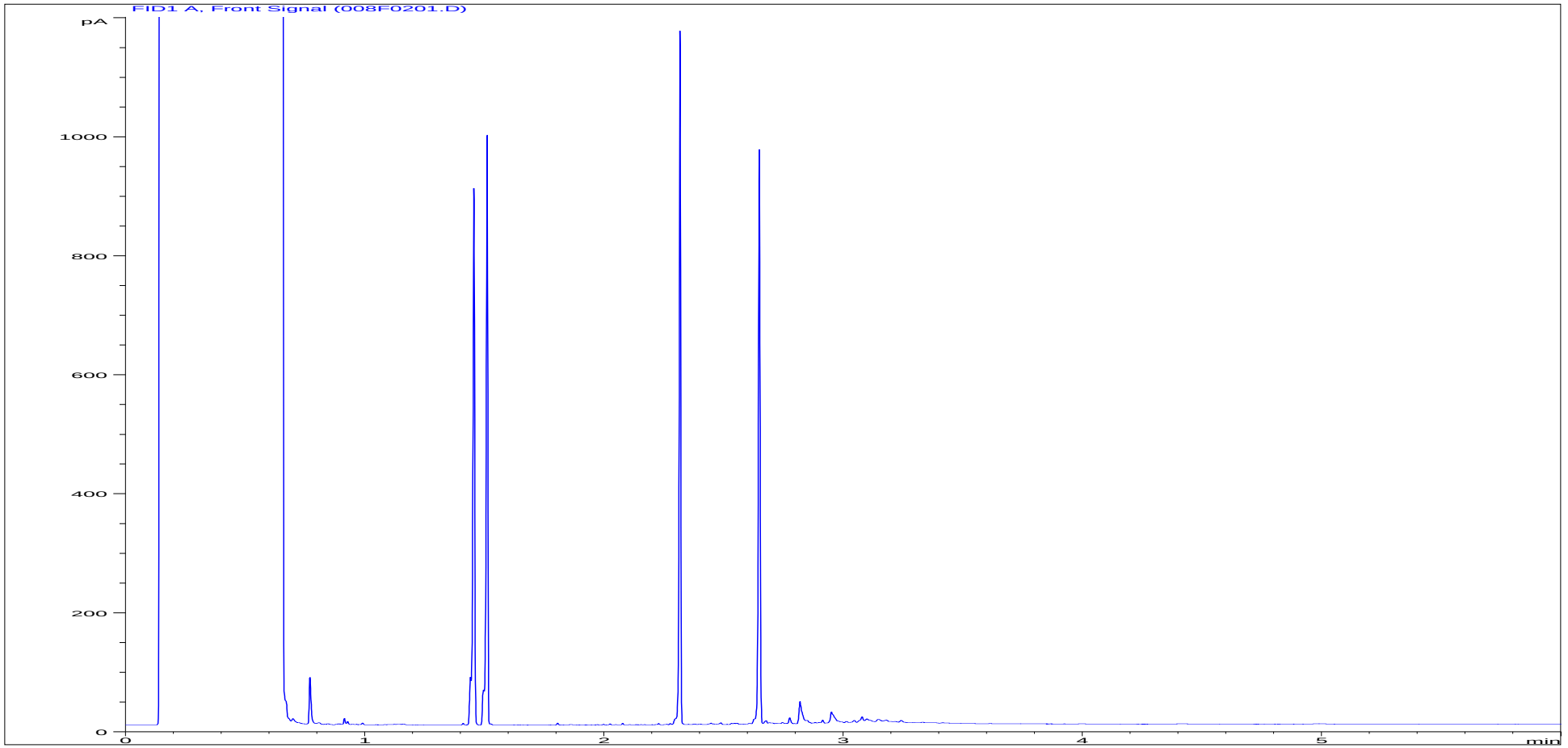
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1282431	**Job Number:**	S12_8590M
Multiplier:	8	**Client:**	ESG Geoenvironmental Consulting
Dilution:	1	**Site:**	Coursers Farm, Colney Heath
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP2 ES 1 1.3
Acquisition Date/Time:	20-Nov-12, 14:42:23		
Datafile:	D:\TES\DATA\11\1120TPH_GC14\112012 2012-11-20 12-49-42\007F1001.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

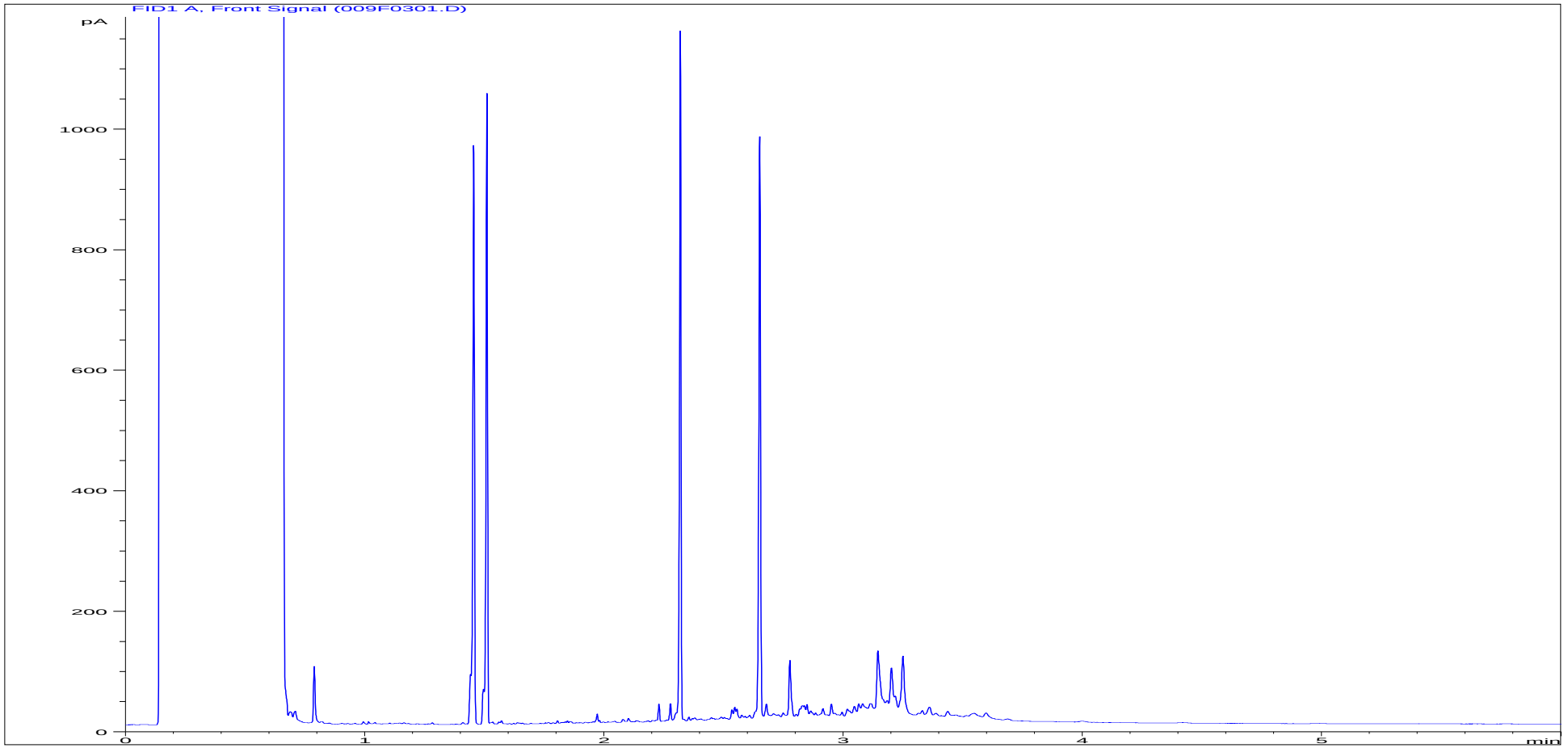
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1282433	**Job Number:**	S12_8590M
Multiplier:	8	**Client:**	ESG Geoenvironmental Consulting
Dilution:	1	**Site:**	Coursers Farm, Colney Heath
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP3 ES 1 0.1
Acquisition Date/Time:	20-Nov-12, 15:13:53		
Datafile:	D:\TES\DATA\11\1120TPH_GC14\112012 2012-11-20 15-00-06\008F0201.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

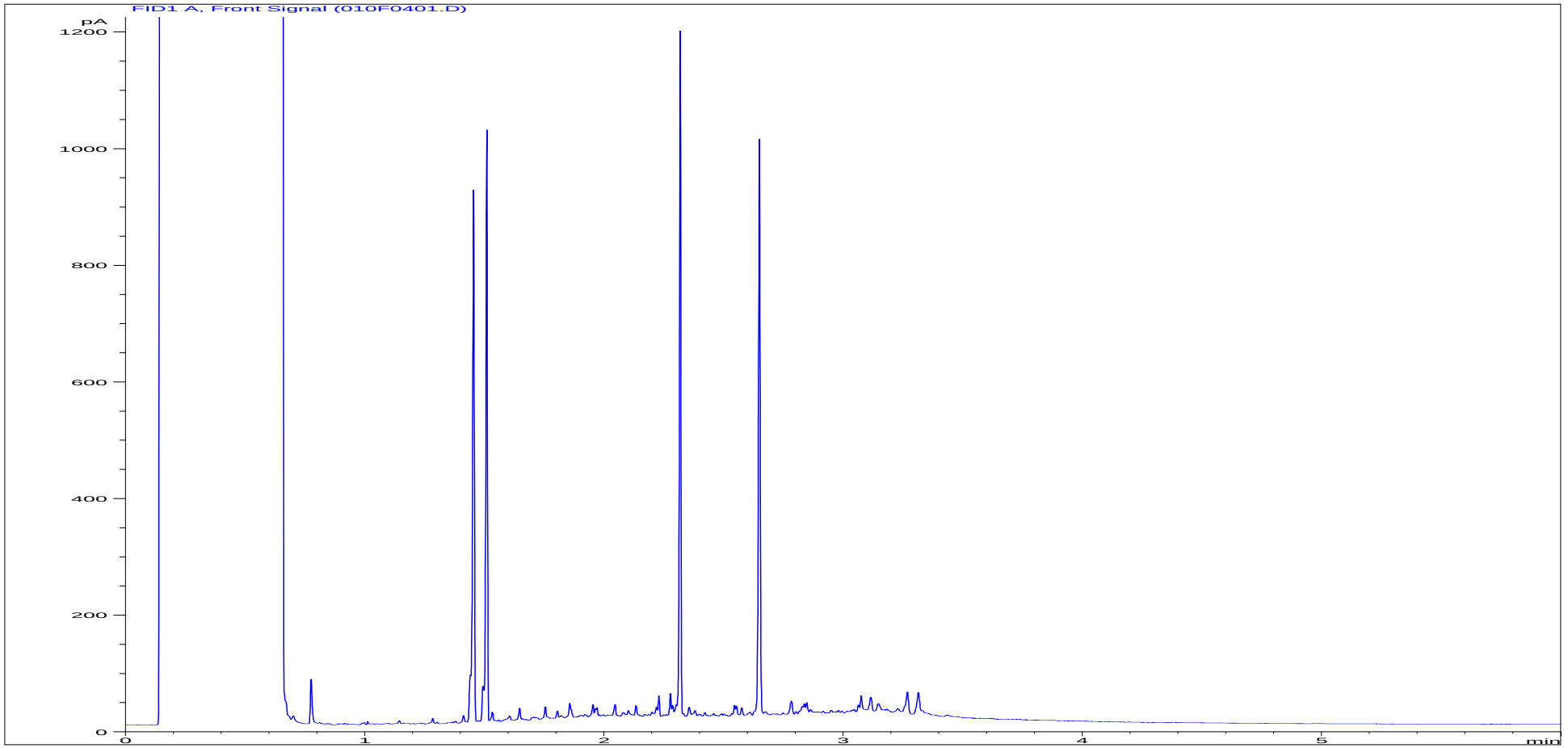
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1282436	**Job Number:**	S12_8590M
Multiplier:	8	**Client:**	ESG Geoenvironmental Consulting
Dilution:	1	**Site:**	Coursers Farm, Colney Heath
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP5 ES 1 1.0
Acquisition Date/Time:	20-Nov-12, 15:25:50		
Datafile:	D:\TES\DATA\11\1120TPH_GC14\112012 2012-11-20 15-00-06\009F0301.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

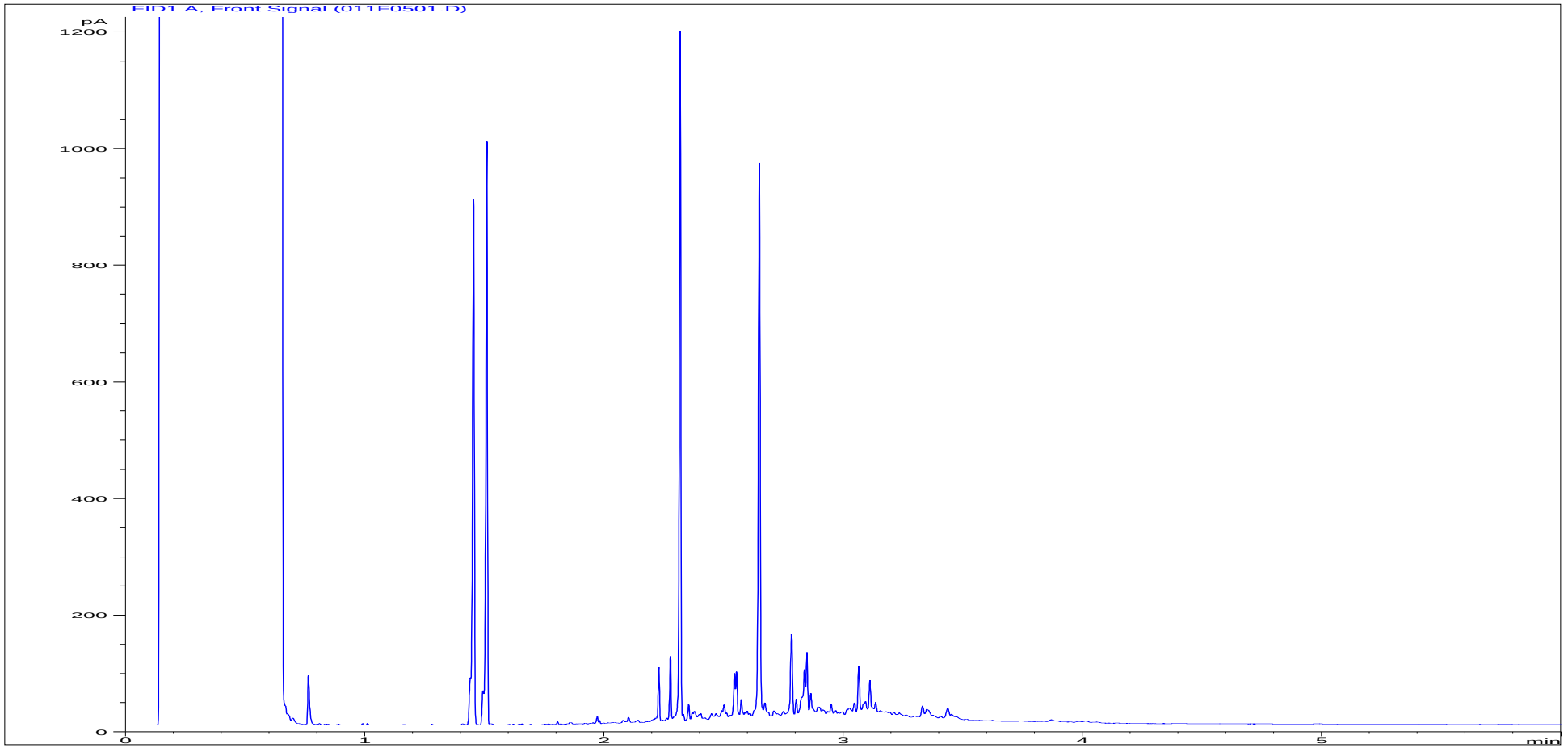
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1282438	**Job Number:**	S12_8590M
Multiplier:	8	**Client:**	ESG Geoenvironmental Consulting
Dilution:	1	**Site:**	Coursers Farm, Colney Heath
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP6 ES 2 2.6
Acquisition Date/Time:	20-Nov-12, 15:37:52		
Datafile:	D:\TES\DATA\11\1120TPH_GC14\112012 2012-11-20 15-00-06\010F0401.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

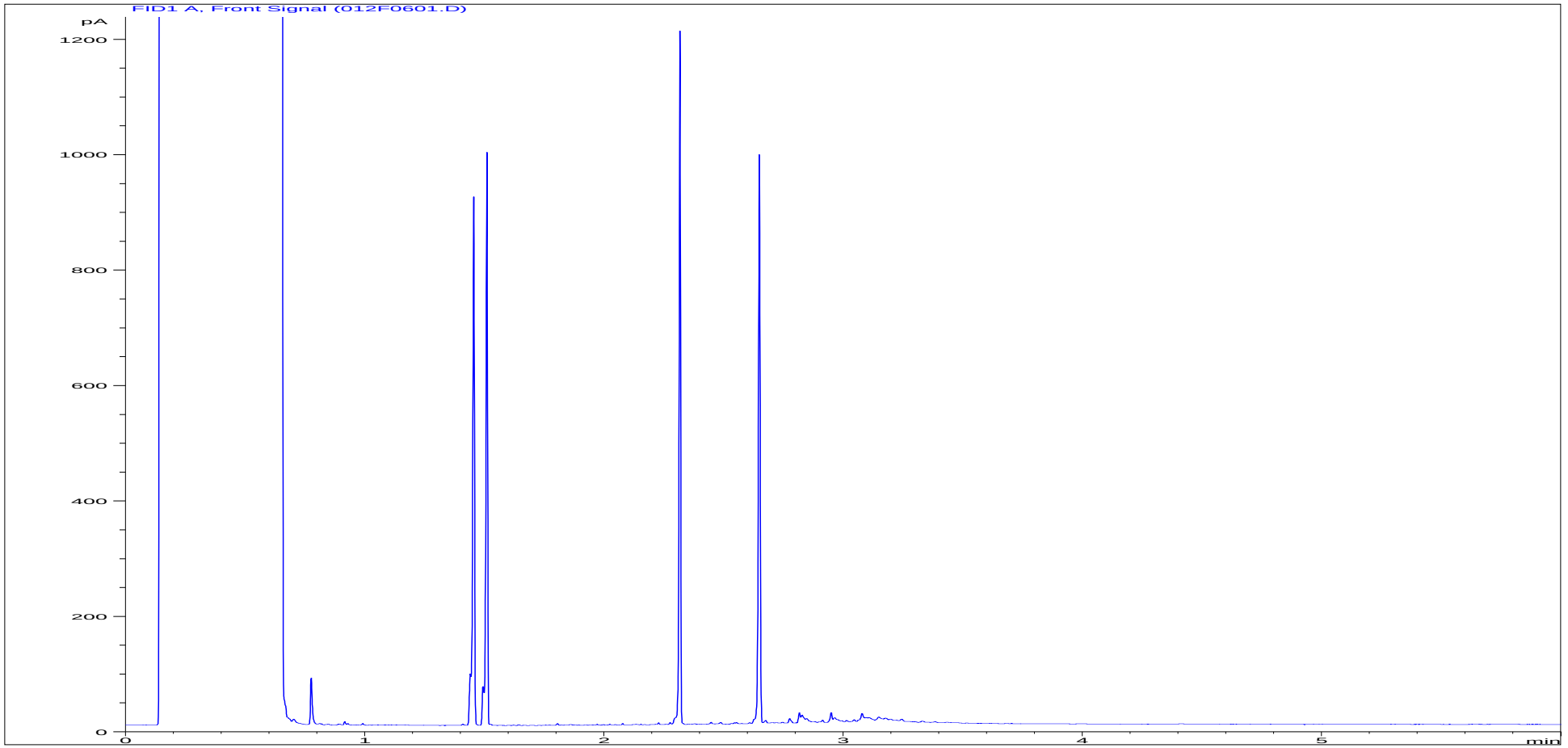
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1282439	**Job Number:**	S12_8590M
Multiplier:	8	**Client:**	ESG Geoenvironmental Consulting
Dilution:	1	**Site:**	Coursers Farm, Colney Heath
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP7 ES 1 1.1
Acquisition Date/Time:	20-Nov-12, 15:49:58		
Datafile:	D:\TES\DATA\11\1120TPH_GC14\112012 2012-11-20 15-00-06\011F0501.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

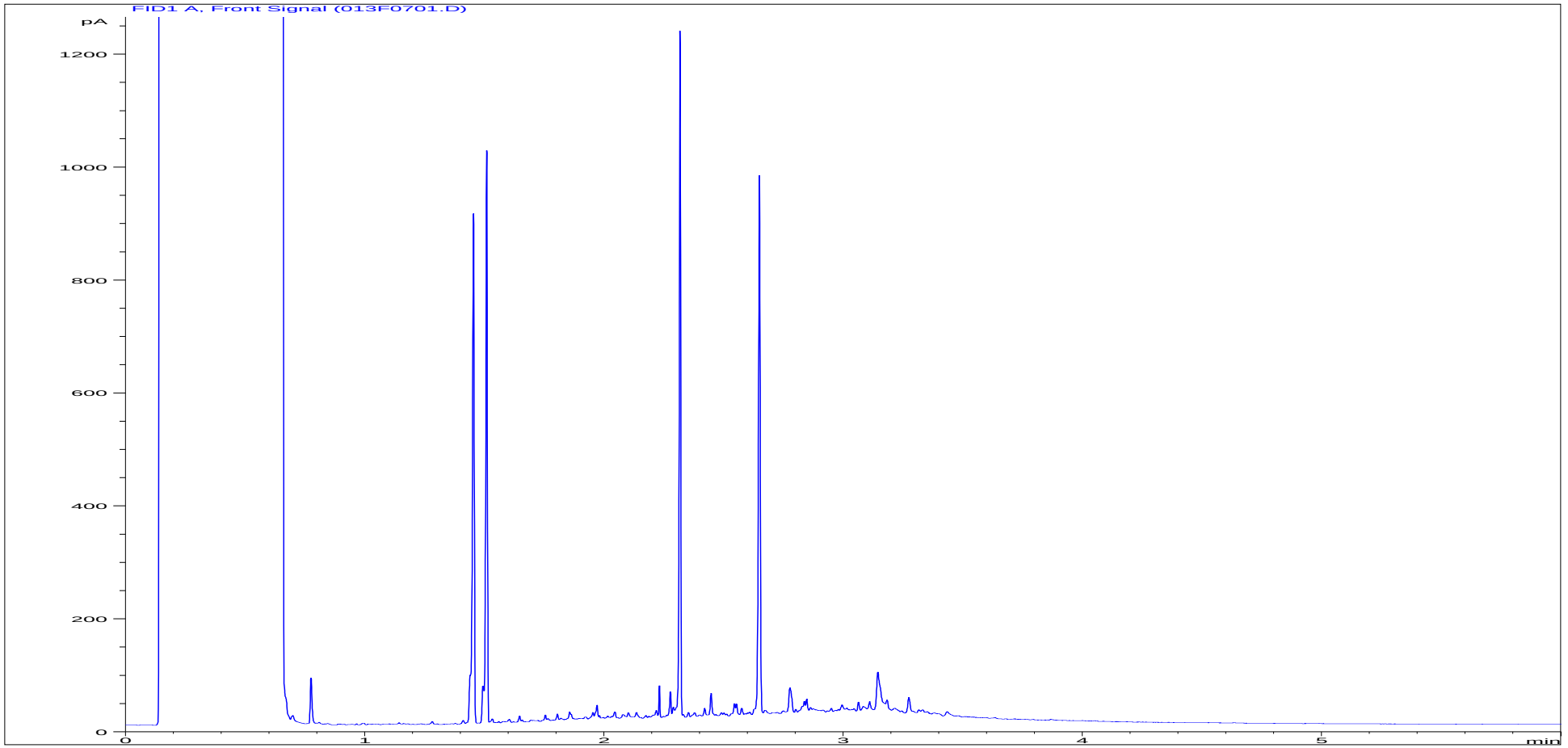
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1282441	**Job Number:**	S12_8590M
Multiplier:	8	**Client:**	ESG Geoenvironmental Consulting
Dilution:	1	**Site:**	Coursers Farm, Colney Heath
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP8 ES 1 0.4
Acquisition Date/Time:	20-Nov-12, 16:02:05		
Datafile:	D:\TES\DATA\11\1120TPH_GC14\112012 2012-11-20 15-00-06\012F0601.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

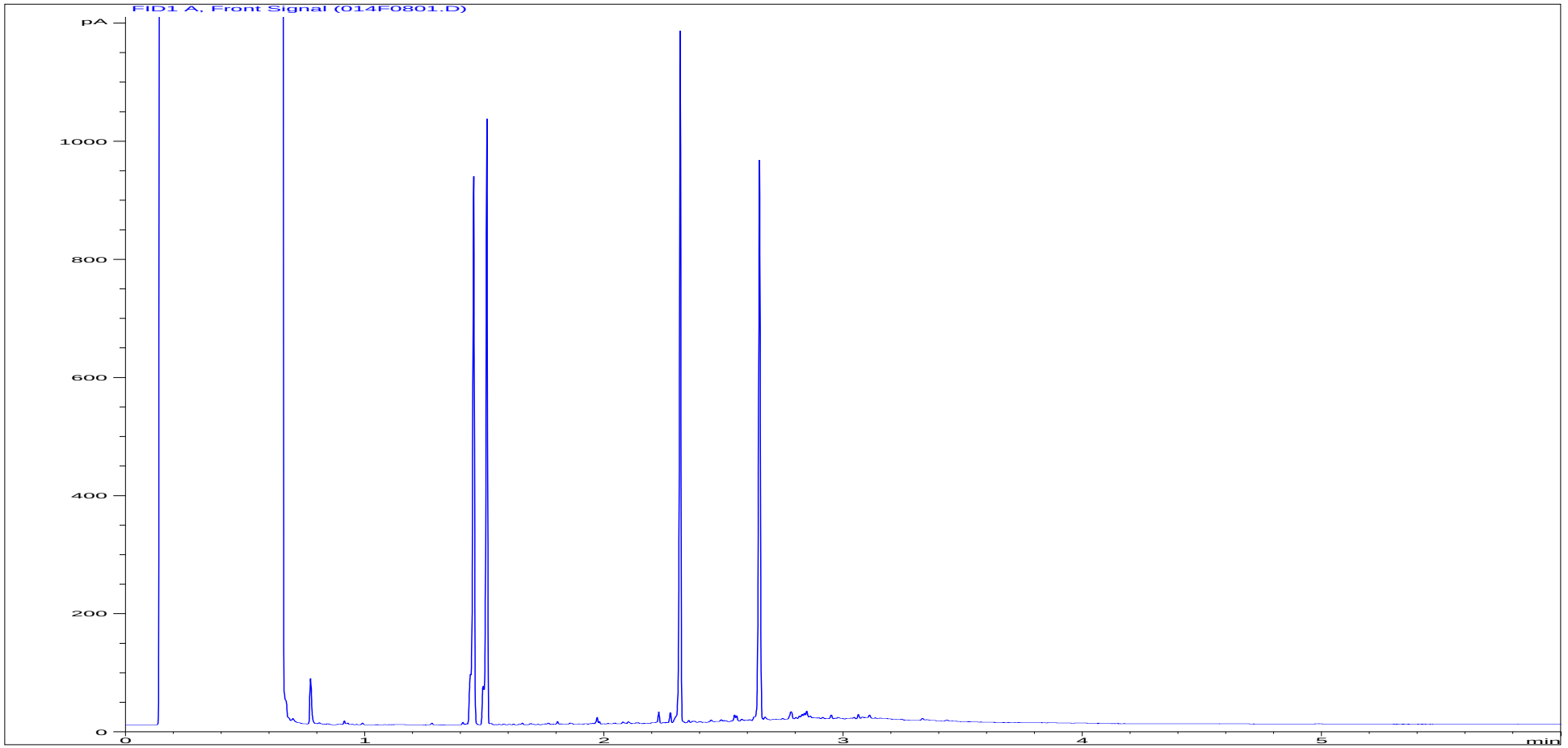
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1282442	**Job Number:**	S12_8590M
Multiplier:	8	**Client:**	ESG Geoenvironmental Consulting
Dilution:	1	**Site:**	Coursers Farm, Colney Heath
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP8 ES 2 2.4
Acquisition Date/Time:	20-Nov-12, 16:14:09		
Datafile:	D:\TES\DATA\11\1120TPH_GC14\112012 2012-11-20 15-00-06\013F0701.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

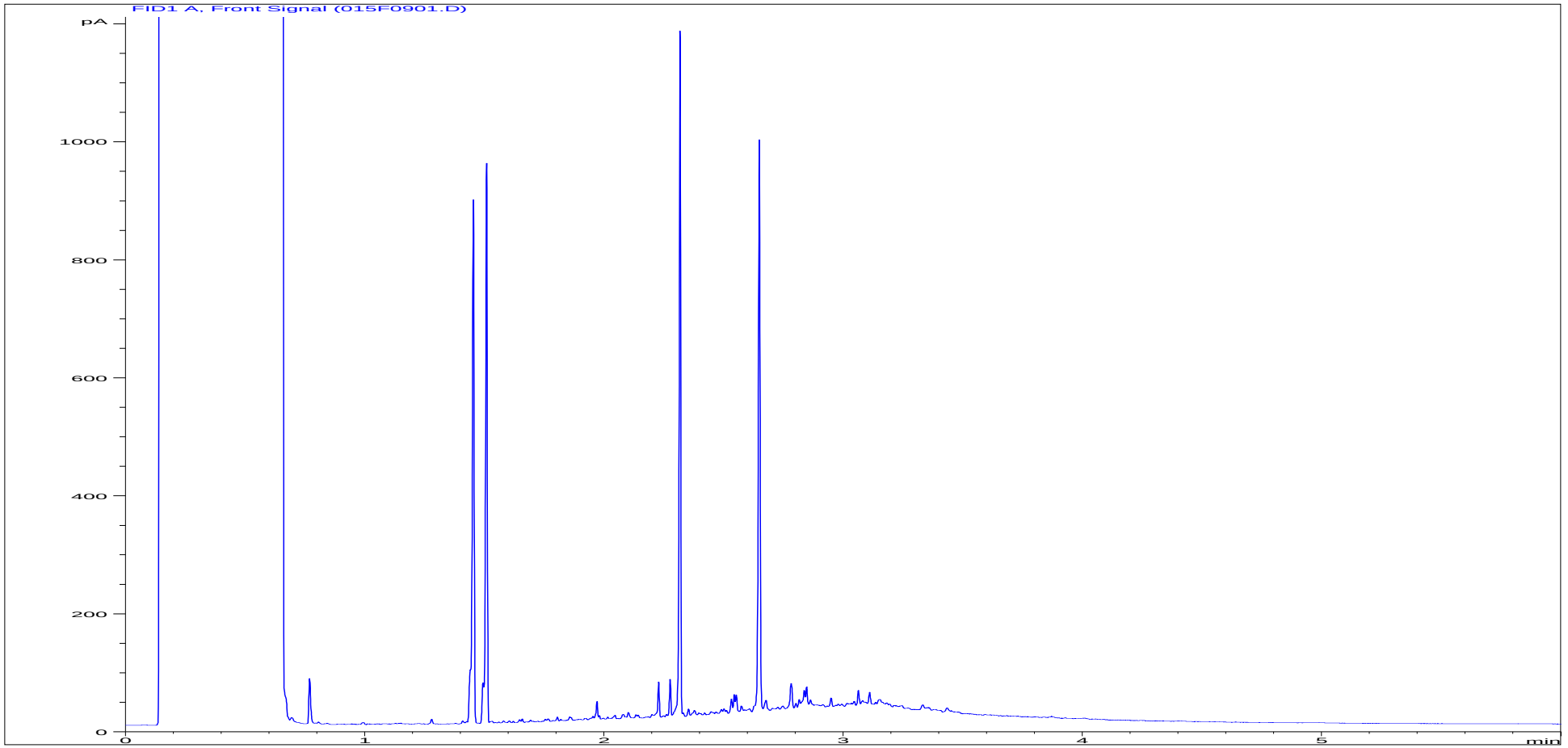
Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1282444	**Job Number:**	S12_8590M
Multiplier:	8	**Client:**	ESG Geoenvironmental Consulting
Dilution:	1	**Site:**	Coursers Farm, Colney Heath
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP10 ES 1 0.7
Acquisition Date/Time:	20-Nov-12, 16:26:13		
Datafile:	D:\TES\DATA\11\1120TPH_GC14\112012 2012-11-20 15-00-06\014F0801.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Petroleum Hydrocarbons (C8 to C40) by GC/FID



Sample ID:	CL1282445	**Job Number:**	S12_8590M
Multiplier:	8	**Client:**	ESG Geoenvironmental Consulting
Dilution:	1	**Site:**	Coursers Farm, Colney Heath
Acquisition Method:	5UL_RUNF.M	**Client Sample Ref:**	TP10 ES 2 0.3
Acquisition Date/Time:	20-Nov-12, 16:38:15		
Datafile:	D:\TES\DATA\11\1120TPH_GC14\112012 2012-11-20 15-00-06\015F0901.D		

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appr opriate, in accordance with the MCERTS standard.

Volatile Organic Compounds by HSA-GCMS

Accredited?: Yes

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath	**Directory/Quant file:**	121VOC_MS19\ Initial Calibration	**Matrix:**	Soil
Sample Details:	TP2 ES 2 3.1	**Date Booked in:**	16-Nov-12	**Method:**	Headspace
LIMS ID Number:	CL1282432	**Date Analysed:**	21-Nov-12	**Multiplier:**	1
Job Number:	S12_8590M	**Operator:**	TP	**Position:**	16

Target Compounds	CAS #	R.T. (min.)	Concentration µg/kg	% Fit	Accr. code
Dichlorodifluoromethane	75-71-8 **	-	< 1	-	N
Chloromethane	74-87-3 *	-	< 4	-	N
Vinyl Chloride	75-01-4 **	-	< 1	-	N
Bromomethane	74-83-9	-	< 1	-	UM
Chloroethane	75-00-3 **	-	< 3	-	N
Trichlorofluoromethane	75-69-4	-	< 1	-	UM
1,1-Dichloroethene	75-35-48 *	-	< 1	-	N
trans 1,2-Dichloroethene	156-60-5	-	< 1	-	UM
1,1-Dichloroethane	75-34-3	-	< 1	-	UM
MTBE	1634-04-4	-	< 1	-	UM
2,2-Dichloropropane	594-20-7	-	< 1	-	UM
cis 1,2-Dichloroethene	156-59-2	-	< 7	-	UM
Bromochloromethane	74-97-5	-	< 1	-	UM
Chloroform	67-66-3	-	< 1	-	UM
1,1,1-Trichloroethane	71-55-6	-	< 1	-	UM
Carbon Tetrachloride	56-23-5	-	< 1	-	UM
1,1-Dichloropropene	563-58-6	-	< 1	-	UM
Benzene	71-43-2	-	< 1	-	UM
1,2-Dichloroethane	107-06-2	-	< 1	-	UM
Trichloroethene	79-01-6	4.58	33	93	UM
1,2-Dichloropropane	78-87-5	-	< 1	-	UM
Dibromomethane	74-95-3	-	< 1	-	UM
Bromodichloromethane	75-27-4	-	< 1	-	UM
cis 1,3-Dichloropropene	10061-01-5	-	< 1	-	UM
Toluene	108-88-3	-	< 7	-	UM
trans 1,3-Dichloropropene	10061-02-6	-	< 1	-	UM
1,1,2-Trichloroethane	79-00-5	-	< 1	-	UM
Tetrachloroethene	127-18-4	5.28	8	M	UM
1,3-Dichloropropane	142-28-9	-	< 1	-	UM
Dibromochloromethane	124-48-1	-	< 1	-	UM
1,2-Dibromoethane	106-93-4	-	< 1	-	UM
Chlorobenzene	108-90-7	-	< 1	-	UM
Ethylbenzene	100-41-4	-	< 3	-	UM
1,1,1,2-Tetrachloroethane	630-20-6	-	< 1	-	UM
m and p-Xylene	108-38-3/106-42-3	-	< 5	-	UM

Target Compounds	CAS #	R.T. (min.)	Concentration µg/kg	% Fit	Accr. code
o-Xylene	95-47-6	-	< 3	-	UM
Styrene	100-42-5	-	< 1	-	UM
Bromoform	75-25-2	5.88	3	M	UM
iso-Propylbenzene	98-82-8	-	< 1	-	UM
1,1,2,2-Tetrachloroethane	79-34-5 **	-	< 1	-	N
Propylbenzene	103-65-1	-	< 1	-	UM
Bromobenzene	108-86-1	-	< 1	-	UM
1,2,3-Trichloropropane	96-18-4	-	< 1	-	UM
2-Chlorotoluene	95-49-8	-	< 1	-	UM
1,3,5-Trimethylbenzene	108-67-8	6.08	1	M	UM
4-Chlorotoluene	106-43-4	-	< 1	-	UM
tert-Butylbenzene	98-06-6	-	< 1	-	UM
1,2,4-Trimethylbenzene	95-63-6	6.22	4	M	UM
sec-Butylbenzene	135-98-8	-	< 1	-	UM
p-Isopropyltoluene	99-87-6	-	< 1	-	UM
1,3-Dichlorobenzene	541-73-1	-	< 1	-	UM
1,4-Dichlorobenzene	106-46-7	-	< 1	-	UM
n-Butylbenzene	104-51-8 *	-	< 1	-	N
1,2-Dichlorobenzene	95-50-1	-	< 1	-	UM
1,2-Dibromo-3-chloropropane	96-12-8	-	< 1	-	UM
1,2,4-Trichlorobenzene	120-82-1 *	-	< 4	-	N
Hexachlorobutadiene	87-68-3 **	-	< 3	-	N
Naphthalene	91-20-3	7.26	112	68	UM
1,2,3-Trichlorobenzene	87-61-6	-	< 4	-	UM

Concentrations are reported on a dry weight basis
Compounds marked ** are not UKAS or Mcerts accredited
"M" denotes that % fit has been manually interpreted
This analysis was conducted on an 'As Recieved' basis.

Internal standards	R.T.	Area %	Surrogates	% Rec
Pentafluorobenzene	4.13	100	Dibromofluoromethane	102
1,4-Difluorobenzene	4.47	99	Toluene-d8	97
Chlorobenzene-d5	5.58	92		
Bromofluorobenzene	5.97	82		
1,4-Dichlorobenzene-d4	6.37	74		
Naphthalene-d8	7.25	39		

Note: Volatile compounds degrade with time, and this may affect the integrity of the data depending on the timescale between sampling and analysis. It is recommended that analysis takes place within 7 days of sampling.

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appropriate, in accordance with the MCERTS standard.

Volatile Organic Compounds by HSA-GCMS

Accredited?: Yes

Customer and Site Details:	ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath	**Directory/Quant file:**	121VOC_MS19\ Initial Calibration	**Matrix:**	Soil
Sample Details:	TP5 ES 2 2.5	**Date Booked in:**	16-Nov-12	**Method:**	Headspace
LIMS ID Number:	CL1282437	**Date Analysed:**	21-Nov-12	**Multiplier:**	1
Job Number:	S12_8590M	**Operator:**	TP	**Position:**	17

Target Compounds	CAS #	R.T. (min.)	Concentration µg/kg	% Fit	Accr. code
Dichlorodifluoromethane	75-71-8 **	-	< 1	-	N
Chloromethane	74-87-3 *	-	< 4	-	N
Vinyl Chloride	75-01-4 **	-	< 1	-	N
Bromomethane	74-83-9	-	< 1	-	UM
Chloroethane	75-00-3 **	-	< 3	-	N
Trichlorofluoromethane	75-69-4	-	< 1	-	UM
1,1-Dichloroethene	75-35-48 *	-	< 1	-	N
trans 1,2-Dichloroethene	156-60-5	-	< 1	-	UM
1,1-Dichloroethane	75-34-3	-	< 1	-	UM
MTBE	1634-04-4	-	< 1	-	UM
2,2-Dichloropropane	594-20-7	-	< 1	-	UM
cis 1,2-Dichloroethene	156-59-2	-	< 6	-	UM
Bromochloromethane	74-97-5	-	< 1	-	UM
Chloroform	67-66-3	-	< 1	-	UM
1,1,1-Trichloroethane	71-55-6	-	< 1	-	UM
Carbon Tetrachloride	56-23-5	-	< 1	-	UM
1,1-Dichloropropene	563-58-6	-	< 1	-	UM
Benzene	71-43-2	-	< 1	-	UM
1,2-Dichloroethane	107-06-2	-	< 1	-	UM
Trichloroethene	79-01-6	4.58	3	M	UM
1,2-Dichloropropane	78-87-5	-	< 1	-	UM
Dibromomethane	74-95-3	-	< 1	-	UM
Bromodichloromethane	75-27-4	-	< 1	-	UM
cis 1,3-Dichloropropene	10061-01-5	-	< 1	-	UM
Toluene	108-88-3	-	< 6	-	UM
trans 1,3-Dichloropropene	10061-02-6	-	< 1	-	UM
1,1,2-Trichloroethane	79-00-5	-	< 1	-	UM
Tetrachloroethene	127-18-4	5.28	10	M	UM
1,3-Dichloropropane	142-28-9	-	< 1	-	UM
Dibromochloromethane	124-48-1	-	< 1	-	UM
1,2-Dibromoethane	106-93-4	-	< 1	-	UM
Chlorobenzene	108-90-7	-	< 1	-	UM
Ethylbenzene	100-41-4	-	< 3	-	UM
1,1,1,2-Tetrachloroethane	630-20-6	-	< 1	-	UM
m and p-Xylene	108-38-3/106-42-3	-	< 5	-	UM

Target Compounds	CAS #	R.T. (min.)	Concentration µg/kg	% Fit	Accr. code
o-Xylene	95-47-6	-	< 3	-	UM
Styrene	100-42-5	-	< 1	-	UM
Bromoform	75-25-2	5.89	3	M	UM
iso-Propylbenzene	98-82-8	-	< 1	-	UM
1,1,2,2-Tetrachloroethane	79-34-5 **	-	< 1	-	N
Propylbenzene	103-65-1	-	< 1	-	UM
Bromobenzene	108-86-1	-	< 1	-	UM
1,2,3-Trichloropropane	96-18-4	-	< 1	-	UM
2-Chlorotoluene	95-49-8	-	< 1	-	UM
1,3,5-Trimethylbenzene	108-67-8	6.08	1	M	UM
4-Chlorotoluene	106-43-4	-	< 1	-	UM
tert-Butylbenzene	98-06-6	-	< 1	-	UM
1,2,4-Trimethylbenzene	95-63-6	6.22	4	M	UM
sec-Butylbenzene	135-98-8	-	< 1	-	UM
p-Isopropyltoluene	99-87-6	-	< 1	-	UM
1,3-Dichlorobenzene	541-73-1	-	< 1	-	UM
1,4-Dichlorobenzene	106-46-7	-	< 1	-	UM
n-Butylbenzene	104-51-8 *	-	< 1	-	N
1,2-Dichlorobenzene	95-50-1	-	< 1	-	UM
1,2-Dibromo-3-chloropropane	96-12-8	-	< 1	-	UM
1,2,4-Trichlorobenzene	120-82-1 *	-	< 4	-	N
Hexachlorobutadiene	87-68-3 **	-	< 3	-	N
Naphthalene	91-20-3	7.27	76	68	UM
1,2,3-Trichlorobenzene	87-61-6	-	< 4	-	UM

Concentrations are reported on a dry weight basis
Compounds marked ** are not UKAS or Mcerts accredited
"M" denotes that % fit has been manually interpreted
This analysis was conducted on an 'As Recieved' basis.

Internal standards	R.T.	Area %	Surrogates	% Rec
Pentafluorobenzene	4.13	98	Dibromofluoromethane	106
1,4-Difluorobenzene	4.47	96	Toluene-d8	97
Chlorobenzene-d5	5.58	89		
Bromofluorobenzene	5.97	78		
1,4-Dichlorobenzene-d4	6.37	66		
Naphthalene-d8	7.25	35		

Note: Volatile compounds degrade with time, and this may affect the integrity of the data depending on the timescale between sampling and analysis. It is recommended that analysis takes place within 7 days of sampling.

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appropriate, in accordance with the MCERTS standard.

Volatile Organic Compounds by HSA-GCMS

Accredited?: Yes

Customer and Site Details: ESG Geoenvironmental Consulting: Coursers Farm, Colney Heath
Sample Details: TP7 ES 2 3.2
LIMS ID Number: CL1282440
Job Number: S12_8590M

Directory/Quant file: 121VOC_MS19\ Initial Calibration
Date Booked in: 16-Nov-12
Date Analysed: 21-Nov-12
Operator: TP

Matrix: Soil
Method: Headspace
Multiplier: 1
Position: 18

Target Compounds	CAS #	R.T. (min.)	Concentration µg/kg	% Fit	Accr. code
Dichlorodifluoromethane	75-71-8 **	-	< 1	-	N
Chloromethane	74-87-3 *	-	< 4	-	N
Vinyl Chloride	75-01-4 **	-	< 1	-	N
Bromomethane	74-83-9	-	< 1	-	UM
Chloroethane	75-00-3 **	-	< 3	-	N
Trichlorofluoromethane	75-69-4	-	< 1	-	UM
1,1-Dichloroethene	75-35-48 *	-	< 1	-	N
trans 1,2-Dichloroethene	156-60-5	-	< 1	-	UM
1,1-Dichloroethane	75-34-3	-	< 1	-	UM
MTBE	1634-04-4	-	< 1	-	UM
2,2-Dichloropropane	594-20-7	-	< 1	-	UM
cis 1,2-Dichloroethene	156-59-2	-	< 7	-	UM
Bromochloromethane	74-97-5	-	< 1	-	UM
Chloroform	67-66-3	-	< 1	-	UM
1,1,1-Trichloroethane	71-55-6	-	< 1	-	UM
Carbon Tetrachloride	56-23-5	-	< 1	-	UM
1,1-Dichloropropene	563-58-6	-	< 1	-	UM
Benzene	71-43-2	-	< 1	-	UM
1,2-Dichloroethane	107-06-2	-	< 1	-	UM
Trichloroethene	79-01-6	-	< 1	-	UM
1,2-Dichloropropane	78-87-5	-	< 1	-	UM
Dibromomethane	74-95-3	-	< 1	-	UM
Bromodichloromethane	75-27-4	-	< 1	-	UM
cis 1,3-Dichloropropene	10061-01-5	-	< 1	-	UM
Toluene	108-88-3	-	< 7	-	UM
trans 1,3-Dichloropropene	10061-02-6	-	< 1	-	UM
1,1,2-Trichloroethane	79-00-5	-	< 1	-	UM
Tetrachloroethene	127-18-4	5.28	5	M	UM
1,3-Dichloropropane	142-28-9	-	< 1	-	UM
Dibromochloromethane	124-48-1	-	< 1	-	UM
1,2-Dibromoethane	106-93-4	-	< 1	-	UM
Chlorobenzene	108-90-7	-	< 1	-	UM
Ethylbenzene	100-41-4	-	< 3	-	UM
1,1,1,2-Tetrachloroethane	630-20-6	-	< 1	-	UM
m and p-Xylene	108-38-3/106-42-3	-	< 5	-	UM

Target Compounds	CAS #	R.T. (min.)	Concentration µg/kg	% Fit	Accr. code
o-Xylene	95-47-6	-	< 3	-	UM
Styrene	100-42-5	-	< 1	-	UM
Bromoform	75-25-2	5.88	3	M	UM
iso-Propylbenzene	98-82-8	-	< 1	-	UM
1,1,2,2-Tetrachloroethane	79-34-5 **	-	< 1	-	N
Propylbenzene	103-65-1	-	< 1	-	UM
Bromobenzene	108-86-1	-	< 1	-	UM
1,2,3-Trichloropropane	96-18-4	-	< 1	-	UM
2-Chlorotoluene	95-49-8	-	< 1	-	UM
1,3,5-Trimethylbenzene	108-67-8	-	< 1	-	UM
4-Chlorotoluene	106-43-4	-	< 1	-	UM
tert-Butylbenzene	98-06-6	-	< 1	-	UM
1,2,4-Trimethylbenzene	95-63-6	6.22	1	M	UM
sec-Butylbenzene	135-98-8	-	< 1	-	UM
p-Isopropyltoluene	99-87-6	-	< 1	-	UM
1,3-Dichlorobenzene	541-73-1	-	< 1	-	UM
1,4-Dichlorobenzene	106-46-7	-	< 1	-	UM
n-Butylbenzene	104-51-8 *	-	< 1	-	N
1,2-Dichlorobenzene	95-50-1	-	< 1	-	UM
1,2-Dibromo-3-chloropropane	96-12-8	-	< 1	-	UM
1,2,4-Trichlorobenzene	120-82-1 *	-	< 4	-	N
Hexachlorobutadiene	87-68-3 **	-	< 3	-	N
Naphthalene	91-20-3	7.26	14	M	UM
1,2,3-Trichlorobenzene	87-61-6	-	< 4	-	UM

Concentrations are reported on a dry weight basis
Compounds marked ** are not UKAS or Mcerts accredited
"M" denotes that % fit has been manually interpreted
This analysis was conducted on an 'As Recieved' basis.

Internal standards	R.T.	Area %	Surrogates	% Rec
Pentafluorobenzene	4.13	96	Dibromofluoromethane	104
1,4-Difluorobenzene	4.47	96	Toluene-d8	99
Chlorobenzene-d5	5.58	92		
Bromofluorobenzene	5.97	86		
1,4-Dichlorobenzene-d4	6.37	83		
Naphthalene-d8	7.25	59		

Note: Volatile compounds degrade with time, and this may affect the integrity of the data depending on the timescale between sampling and analysis. It is recommended that analysis takes place within 7 days of sampling.

Where individual results are flagged see report notes for status.
Results corrected to dry weight at 105℃ where appropriate, in accordance with the MCERTS standard.

ESG Asbestos Limited

ASBESTOS ANALYSIS RESULTS - SOIL ANALYSIS

ESG Asbestos limited Certificate of Analysis for Asbestos in Soils

UKAS TESTING 1089

Detection limit of Method SCI-ASB-020 is 0.001%

Sampling has been carried out by client

Client:	ESG Environmental Chemistry	**Page 1 of 1**	
Address:	Etwall House, Bretby Business Park, Ashby Road, Burton upon Trent	**Report No:**	**ANO-0488-5401**
For the attention of:	ESG Geoenvironmental Consulting	**Report Date:**	**27/11/2012**
Site Address:	Coursers Farm, Colney Heath	**Project Number:**	**S128590**

Sample Number	Sample Date	Sample Location	Test Date	Total Sample Dry Weight (g)	Weight of <2mm Fraction (g)	Asbestos(g) in >8mm+>2mm	Asbestos(g) in <2mm	% Asbestos by weight of Total Dried Sample	Asbestos Fibre Types Identified
CL/1282430	14/11/12	TP1 2.7	27/11/2012					Screen Only	No Asbestos Identified In Sample
CL/1282434	14/11/12	TP3 3.2	27/11/2012					Screen Only	No Asbestos Identified In Sample
CL/1282435	14/11/12	TP4 1.1	27/11/2012					Screen Only	No Asbestos Identified In Sample
CL/1282437	13/11/12	TP5 2.5	27/11/2012					Screen Only	No Asbestos Identified In Sample
CL/1282440	13/11/12	TP7 3.2	27/11/2012					Screen Only	No Asbestos Identified In Sample
CL/1282442	13/11/12	TP8 2.4	27/11/2012					Screen Only	No Asbestos Identified In Sample
CL/1282444	13/11/12	TP10 0.7	27/11/2012					Screen & ID	Amosite/Chrysotile - Free Fibres

Keys

NAACR = Not Analysed at Clients Request

NAIIS = No Asbestos Identified in Sample (Screens Only)

NADIS = No Asbestos Detected in Sample (ID & Quant Only)

Name: Andrew Elsby

Position: Regional Manager

Authorised Signatory:

The sample analysis for the above results was carried out using the procedures detailed in ESG Asbestos Limited in house method (SCI-ASB-020) based on HSE document MDHS 90 - Asbestos Contaminated Land - Draft 5 - November 1997 (withdrawn). Fibre identification was carried out using ESG Asbestos Limited in house method of transmitted/polarised light microscopy and centre stop dispersion staining (SCI-ASB-007), based on HSE's HSG 248. The analysis of fine fraction for asbestos content only includes fibres and does not discriminate non-asbestos fibres. All fibres are assumed, unless specified, to be amphiboles. All tests were carried out at ESG Asbestos Laboratory, Ashbourne House, Bretby Business Park, Ashby Road, Burton-upon-Trent, Staffordshire. DE15 0XD, UKAS Laboratory Number 1089.

Form ESG-SOIL-011 v04 Oct'11

Where individual results are flagged see report notes for status.

ESG Asbestos Limited

ASBESTOS ANALYSIS RESULTS - SOIL ANALYSIS

ESG Asbestos limited Certificate of Analysis for Asbestos in Soils

UKAS TESTING 1089

Detection limit of Method SCI-ASB-020 is 0.001%

Sampling has been carried out by client

Client:	Environmental Scientifics Group	**Page 1 of 1**	
Address:	Etwall House, Bretby Business Park, Burton-on-Trent DE15 0YZ	**Report No:**	**ANO-0503-1865**
For the attention of:	ESG Geoenvironmental Consulting	**Report Date:**	**20/12/2012**
Site Address:	Coursers Farm, Colney Heath	**Project Number:**	**S128590**

Sample Number	Sample Date	Sample Location	Test Date	Total Sample Dry Weight (g)	Weight of <2mm Fraction (g)	Asbestos(g) in >8mm+>2mm	Asbestos(g) in <2mm	% Asbestos by weight of Total Dried Sample	Asbestos Fibre Types Identified
CL/1282444	13/11/2012	TP10 0.7	20/12/2012	1022.8	756.3	0.0022	0.0016	<0.001	Chrysotile (Free Fibres) - Amphiboles in Fines

Keys

NAACR = Not Analysed at Clients Request

NAIIS = No Asbestos Identified in Sample (Screens Only)

NADIS = No Asbestos Detected in Sample (ID & Quant Only)

Name: Andrew Elsby

Position: Regional Manager

Authorised Signatory:

The sample analysis for the above results was carried out using the procedures detailed in ESG Asbestos Limited in house method (SCI-ASB-020) based on HSE document MDHS 90 - Asbestos Contaminated Land - Draft 5 - November 1997 (withdrawn). Fibre identification was carried out using ESG Asbestos Limited in house method of transmitted/polarised light microscopy and centre stop dispersion staining (SCI-ASB-007), based on HSE's HSG 248. The analysis of fine fraction for asbestos content only includes fibres and does not discriminate non-asbestos fibres. All fibres are assumed, unless specified, to be amphiboles. All tests were carried out at ESG Asbestos Laboratory, Ashbourne House, Bretby Business Park, Ashby Road, Burton-upon-Trent, Staffordshire. DE15 0XD, UKAS Laboratory Number 1089.

Where individual results are flagged see report notes for status.

SOIL Analysis

ESG Environmental Chemistry
Analytical and Deviating Sample Overview

S128590

Customer ESG Geoenvironmental Consulting
Site Coursers Farm, Colney Heath
Report No S128590

Consignment No S32178
Date Logged 16-Nov-2012
Report Due 17-Dec-2012

ID Number	Description	MethodID	BTEXHSA	CEN Leachate	CustServ	GROHSA	ICPMSS									KONECR	MCertS	PAHMSUS	PCBUSECOAR	PHSOIL	SFAPI		Sub002	Sub002a	SVOCMSUS	TMSS	TPHFIDUS
		Sampled	BTEX-HSA Analysis	CEN Leac(P)C	Report B	GRO	Arsenic (MS)	Cadmium (MS)	Chromium (MS)	Copper (MS)	Lead (MS)	Mercury (MS)	Nickel (MS)	Selenium (MS)	Zinc (MS)	Chromium vi:	MCertS Analysis	PAH (16) by GCMS	PCB-12 Congeners Analysis	pH units (AR)	Cyanide(Total) (AR)	Phenol Index.(AR)	^Asbestos ID and Quant (1 to 3)	^Asbestos Screen	SVOC by GCMS (AR)	Tot.Moisture @ 105C	TPH by GCFID (AR)
Accredited to ISO17025			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		✓	✓
CL/1282429	TP1 0.5	14/11/12																									
CL/1282430	TP1 2.7	14/11/12																									
CL/1282431	TP2 1.3	14/11/12																									
CL/1282432	TP2 3.1	14/11/12																									
CL/1282433	TP3 0.1	14/11/12																									
CL/1282434	TP3 3.2	14/11/12																									
CL/1282435	TP4 1.1	14/11/12																									
CL/1282436	TP5 1.0	13/11/12																									
CL/1282437	TP5 2.5	13/11/12																									
CL/1282438	TP6 2.6	13/11/12																									
CL/1282439	TP7 1.1	13/11/12																									
CL/1282440	TP7 3.2	13/11/12																									
CL/1282441	TP8 0.4	13/11/12																									
CL/1282442	TP8 2.4	13/11/12																									
CL/1282443	TP9 0.1	13/11/12																									

Note: For analysis where the scheduled turnaround is greater than the holding time we will do our utmost to prioritise these samples. However, it is possible that samples could become deviant whilst being processed in the laboratory.

In this instance please contact the laboratory immediately should you wish to discuss how you would like us to proceed. If you do not respond within 24 hours, we will proceed as originally requested.

Deviating Sample Key

A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time

Requested Analysis Key

	Analysis Required
	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
	No analysis scheduled
^	Analysis Subcontracted

Where individual results are flagged see report notes for status.
The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.

SOIL Analysis

ESG Environmental Chemistry
Analytical and Deviating Sample Overview

S128590

Customer ESG Geoenvironmental Consulting
Site Coursers Farm, Colney Heath
Report No S128590

Consignment No S32178
Date Logged 16-Nov-2012

Report Due 17-Dec-2012

ID Number	Description	MethodID	TPHFIDUS	VOCHSAS	WSLM59
		Sampled	TPH Carbon Banding.	VOC HSA-GCMS	Total Organic Carbon
	Accredited to ISO17025		✓	✓	
CL/1282429	TP1 0.5	14/11/12			
CL/1282430	TP1 2.7	14/11/12			
CL/1282431	TP2 1.3	14/11/12			
CL/1282432	TP2 3.1	14/11/12			
CL/1282433	TP3 0.1	14/11/12			
CL/1282434	TP3 3.2	14/11/12			
CL/1282435	TP4 1.1	14/11/12			
CL/1282436	TP5 1.0	13/11/12			
CL/1282437	TP5 2.5	13/11/12			
CL/1282438	TP6 2.6	13/11/12			
CL/1282439	TP7 1.1	13/11/12			
CL/1282440	TP7 3.2	13/11/12			
CL/1282441	TP8 0.4	13/11/12			
CL/1282442	TP8 2.4	13/11/12			
CL/1282443	TP9 0.1	13/11/12			

Note: For analysis where the scheduled turnaround is greater than the holding time we will do our utmost to prioritise these samples. However, it is possible that samples could become deviant whilst being processed in the laboratory.

In this instance please contact the laboratory immediately should you wish to discuss how you would like us to proceed. If you do not respond within 24 hours, we will proceed as originally requested.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time

Requested Analysis Key	
	Analysis Required
	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
	No analysis scheduled
^	Analysis Subcontracted

Where individual results are flagged see report notes for status.
The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.

SOIL Analysis

ESG Environmental Chemistry
Analytical and Deviating Sample Overview

S128590

Customer ESG Geoenvironmental Consulting
Site Coursers Farm, Colney Heath
Report No S128590

Consignment No S32178
Date Logged 16-Nov-2012
Report Due 17-Dec-2012

ID Number	Description	MethodID	BTEXHSA	CEN Leachate	CustServ	GROHSA	ICPMSS								KONECR	MCertS	PAHMSUS	PCBUSECDAR	PHSOIL	SFAPI		Sub002	Sub002a	SVOCMSUS	TMSS	TPHFIDUS
		Sampled	BTEX-HSA Analysis	CEN Leac(P)C	Report B	GRO	Arsenic (MS)	Cadmium (MS)	Chromium (MS)	Copper (MS)	Lead (MS)	Mercury (MS)	Nickel (MS)	Selenium (MS)	Zinc (MS)	Chromium vi:	MCertS Analysis	PAH (16) by GCMS	PCB-12 Congeners Analysis	pH units (AR)	Cyanide(Total) (AR)	Phenol Index.(AR)	^Asbestos ID and Quant (1 to 3)	^Asbestos Screen	SVOC by GCMS (AR)	Tot.Moisture @ 105C	TPH by GCFID (AR)
Accredited to ISO17025			✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		✓	✓
CL/1282444	TP10 0.7	13/11/12																									
CL/1282445	TP10 0.3	13/11/12																									

Note: For analysis where the scheduled turnaround is greater than the holding time we will do our utmost to prioritise these samples. However, it is possible that samples could become deviant whilst being processed in the laboratory.

In this instance please contact the laboratory immediately should you wish to discuss how you would like us to proceed. If you do not respond within 24 hours, we will proceed as originally requested.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time

Requested Analysis Key	
	Analysis Required
	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
	No analysis scheduled
^	Analysis Subcontracted

Where individual results are flagged see report notes for status.
The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.

SOIL Analysis

ESG Environmental Chemistry
Analytical and Deviating Sample Overview

S128590

Customer ESG Geoenvironmental Consulting
Site Coursers Farm, Colney Heath
Report No S128590

Consignment No S32178
Date Logged 16-Nov-2012

Report Due 17-Dec-2012

ID Number	Description	MethodID	TPHFIDUS	VOCHSAS	WSLM59
		Sampled	TPH Carbon Banding.	VOC HSA-GCMS	Total Organic Carbon
	Accredited to ISO17025		✓	✓	
CL/1282444	TP10 0.7	13/11/12			
CL/1282445	TP10 0.3	13/11/12			

Note: For analysis where the scheduled turnaround is greater than the holding time we will do our utmost to prioritise these samples. However, it is possible that samples could become deviant whilst being processed in the laboratory.

In this instance please contact the laboratory immediately should you wish to discuss how you would like us to proceed. If you do not respond within 24 hours, we will proceed as originally requested.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time

Requested Analysis Key	
	Analysis Required
	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
	No analysis scheduled
^	Analysis Subcontracted

Where individual results are flagged see report notes for status.
The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	BTEXHSA	As Received	Determination of Benzene, Toluene, Ethyl benzene and Xylenes (BTEX) by Headspace GCFID
Soil	GROHSA	As Received	Determination of Total Gasoline Range Organics Hydrocarbons (GRO) by Headspace GCFID
Soil	ICPMSS	Air Dried	Determination of Metals in soil samples by aqua regia digestion followed by ICPMS
Soil	KONECR	Air Dried	Determination of Chromium vi in soil samples by water extraction followed by colorimetric detection
Soil	PAHMSUS	As Received	Determination of Polycyclic Aromatic Hydrocarbons (PAH) by hexane/acetone extraction followed by GCMS detection
Soil	PCBUSECDAR	As Received	Determination of Polychlorinated Biphenyl (PCB) congeners/aroclors by hexane/acetone extraction followed by GCECD detection
Soil	PHSOIL	As Received	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.
Soil	SFAPI	As Received	Segmented flow analysis with colorimetric detection
Soil	SubCon*	*	Contact Laboratory for details of the methodology used by the sub-contractor.
Soil	SVOCMSUS	As Received	Determination of Semi Volatile Organic Compounds in soil samples by Dichloromethane/Acetone extraction followed by GCMS detection
Soil	TMSS	As Received	Determination of the Total Moisture content at 105ºC by loss on oven drying gravimetric analysis
Soil	TPHFIDUS	As Received	Determination of hexane/acetone extractable Hydrocarbons in soil with GCFID detection.
Soil	VOCHSAS	As Received	Determination of Volatile Organic Compounds (VOC) by Headspace GCMS
Soil	WSLM59	Air Dried	Determination of Organic Carbon in soil using sulphurous Acid digestion followed by high temperature combustion and IR detection

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,
- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
  All results on MCERTS reports are reported on a 105ºC dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,
- Results are expressed as mg/kg
- SG is expressed as g/cm^3@ 15^{o}C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile
CR Denotes Crocidolite
AM Denotes Amosite
NAIIS No Asbestos Identified in Sample
NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.
$$ Unable to analyse due to the nature of the sample
¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols. This may have resulted in deterioration of the sample(s) during transit to the laboratory. Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling
¥ Results for guidance only due to possible interference
& Blank corrected result
I.S Insufficient sample to complete requested analysis
I.S(g) Insufficient sample to re-analyse, results for guidance only
Intf Unable to analyse due to interferences
N.D Not determined **N.Det** Not detected
NS Information Not Supplied
Req Analysis requested, see attached sheets for results
Þ Raised detection limit due to nature of the sample
***** All accreditation has been removed by the laboratory for this result
‡ MCERTS accreditation has been removed for this result

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

Sample Descriptions

Client : ESG Geoenvironmental Consulting

Site : Coursers Farm, Colney Heath

Report Number : S12_8590M

Note: major constituent in upper case

Lab ID Number	Client ID	Description
CL/1282429	TP1 ES 1 0.5	Brown Gravel CLAY
CL/1282430	TP1 ES 2 2.7	Brown Stone CLAY
CL/1282431	TP2 ES 1 1.3	Brown Stone CLAY
CL/1282432	TP2 ES 2 3.1	Brown Stone CLAY
CL/1282433	TP3 ES 1 0.1	Brown SILT
CL/1282434	TP3 ES 2 3.2	Brown Gravel SILT
CL/1282435	TP4 ES 1 1.1	Brown Stone CLAY
CL/1282436	TP5 ES 1 1.0	Brown Stone CLAY
CL/1282437	TP5 ES 2 2.5	Brown Gravel CLAY
CL/1282438	TP6 ES 2 2.6	Brown Stone CLAY
CL/1282439	TP7 ES 1 1.1	Brown Gravel CLAY
CL/1282440	TP7 ES 2 3.2	Brown Stone CLAY
CL/1282441	TP8 ES 1 0.4	Brown Gravel CLAY
CL/1282442	TP8 ES 2 2.4	Brown Stone SILT
CL/1282443	TP9 ES 1 0.1	Brown Stone SILT
CL/1282444	TP10 ES 1 0.7	Brown Stone CLAY
CL/1282445	TP10 ES 2 0.3	Grey Stone SILT

END OF REPORT

APPENDIX B2
LEACHATE CHEMICAL TESTING RESULTS

Our Ref: EXR/146626 (Ver. 1)
Your Ref: 22056

November 29, 2012

Environmental Chemistry
ESG
Bretby Business Park
Ashby Road
Burton-on-Trent
Staffordshire
DE15 0YZ

Telephone: 01283 554400
Facsimile: 01283 554422

Mr S Mason
ESG Geoenvironmental Consulting
Glossop House
Hogwood Lane
Wokingham
Berkshire
RG40 4QW

For the attention of Mr S Mason

Dear Mr Mason

CEN Leachate 10:1 - Coursers Farm, Colney Heath

Samples from the above site have been analysed in accordance with the schedule supplied.
The sample details and the results of analyses for these samples are given in the appended report.

An invoice for this work will follow under a separate cover.

Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with Environmental Scientifics Group Ltd (Laboratory and Analytical) Standard Terms and Conditions of Contract.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

for ESG

J Elstub
Project Co-ordinator
01283 554500

TEST REPORT
CEN LEACHATE 10:1

1252

Report No. EXR/146626 (Ver. 1)

ESG Geoenvironmental Consulting
Glossop House
Hogwood Lane
Wokingham
Berkshire
RG40 4QW

Site: Coursers Farm, Colney Heath

The 5 samples described in this report were registered for analysis by ESG on 16-Nov-2012. This report supersedes any versions previously issued by the laboratory.
The analysis was completed by: 29-Nov-2012

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited
Any opinions or interpretations expressed herein are outside the scope of any UKAS accreditation held by ESG.

The following tables are contained in this report:

On behalf of
ESG :
Declan Burns

Operations Director
Laboratory and Analytical Business

Date of Issue: 29-Nov-2012

Tests marked '^' have been subcontracted to another laboratory.

ESG accepts no responsibility for any sampling not carried out by our personnel.

Where individual results are flagged see report notes for status.

Units :			pH units	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l				
Method Codes :			WSLM3	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	ICPMSW	KONENS	SFAPI				
Method Reporting Limits :				0.001	0.001	0.0001	0.001	0.001	0.002	0.001	0.0001	0.001	0.01	0.02				
UKAS Accredited :			Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes				
LAB ID Number EXR	**Client Sample Description**	**Sample Date**	**pH units w**	**Nickel as Ni (Dissolved)**	**Chromium as Cr (Dissolved)**	**Cadmium as Cd (Dissolved)**	**Copper as Cu (Dissolved)**	**Lead as Pb (Dissolved)**	**Zinc as Zn (Dissolved)**	**Arsenic as As (Dissolved)**	**Mercury as Hg (Dissolved)**	**Selenium as Se (Dissolved)**	**Chromium VI as Cr**	**Cyanide (Free) as CN**				
1340699	TP2 1.3	14-Nov-12	9.2	0.003	<0.001	<0.0001	0.016	0.002	0.031	0.005	<0.0001	0.001	<0.01	<0.02				
1340700	TP3 3.2	14-Nov-12	8.3	0.005	0.001	<0.0001	0.016	0.002	0.011	0.008	<0.0001	0.001	<0.01	<0.02				
1340701	TP5 1.0	13-Nov-12	8.3	0.004	0.002	0.0006	0.01	0.009	0.123	0.002	<0.0001	<0.001	<0.01	<0.02				
1340702	TP7 3.2	13-Nov-12	8.1	0.003	0.002	<0.0001	0.01	0.002	0.013	0.005	<0.0001	0.002	<0.01	<0.02				
1340703	TP10 0.3	13-Nov-12	8.1	0.005	0.001	<0.0001	0.021	0.004	0.041	0.007	<0.0001	<0.001	<0.01	<0.02				

ESG Environmental Scientifics Group
Bretby Business Park, Ashby Road
Burton-on-Trent, Staffordshire, DE15 0YZ
Tel +44 (0) 1283 554400
Fax +44 (0) 1283 554422

Client Name ESG Geoenvironmental Consulting

Contact Mr S Mason

Coursers Farm, Colney Heath

CEN Leachate 10:1

Date Printed	**29-Nov-2012**
Report Number	**EXR/146626**
Table Number	**1**

Analytical and Deviating Sample Overview

Customer ESG Geoenvironmental Consulting
Site Coursers Farm, Colney Heath
Report No W146626

Consignment No S32178
Date Logged 16-Nov-2012

Report Due 29-Nov-2012

ID Number	Description	MethodID	CUSTSERV	ICPMSW									KONENS	LeachPrep	SFAPI	WSLM3
		Sampled	Report B (CENC)	Nickel as Ni MS (Dissolved)	Chromium as Cr MS (Dissolved)	Cadmium as Cd MS (Dissolved)	Copper as Cu MS (Dissolved)	Lead as Pb MS (Dissolved)	Zinc as Zn MS (Dissolved)	Arsenic as As MS (Dissolved)	Mercury as Hg MS (Dissolved)	Selenium as Se MS (Dissolved)	Chromium VI. as Cr (Kone)	Leachate Prep	Cyanide (Free) as CN SFA	pH units
Accredited to ISO17025				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
EX/1340699	TP2 1.3	14/11/12														
EX/1340700	TP3 3.2	14/11/12														
EX/1340701	TP5 1.0	13/11/12														
EX/1340702	TP7 3.2	13/11/12														
EX/1340703	TP10 0.3	13/11/12														

Note: For analysis where the Report Due date is greater than 7 days (PAH, Pesticides, PCB, Phenols, Herbicides) or 3 days (BOD) after the sampling date, although we will do our utmost to prioritise your samples, they may become deviant whilst being processed in the Laboratory.

In this instance, please contact the Laboratory immediately should you wish to discuss how you would like us to proceed. If you do not respond within 24 hours, we will proceed as originally requested.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time

Requested Analysis Key	
	Analysis Required
	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
	No analysis scheduled
^	Analysis Subcontracted

Where individual results are flagged see report notes for status.

The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Water	ICPMSW	As Received	Direct quantitative determination of Metals in water samples using ICPMS
Water	KONENS	As Received	Direct analysis using discrete colorimetric analysis
Water	SFAPI	As Received	Segmented flow analysis with colorimetric detection
Water	WSLM3	As Received	Determination of the pH of water samples by pH probe

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,
- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
  All results on MCERTS reports are reported on a 105ºC dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,
- Results are expressed as mg/kg
- SG is expressed as g/cm^3@ 15^{o}C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile
CR Denotes Crocidolite
AM Denotes Amosite
NAIIS No Asbestos Identified in Sample
NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.
$$ Unable to analyse due to the nature of the sample
¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols. This may have resulted in deterioration of the sample(s) during transit to the laboratory. Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling
¥ Results for guidance only due to possible interference
& Blank corrected result
I.S Insufficient sample to complete requested analysis
I.S(g) Insufficient sample to re-analyse, results for guidance only
Intf Unable to analyse due to interferences
N.D Not determined **N.Det** Not detected
NS Information Not Supplied
Req Analysis requested, see attached sheets for results
Þ Raised detection limit due to nature of the sample
***** All accreditation has been removed by the laboratory for this result
‡ MCERTS accreditation has been removed for this result

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

END OF REPORT

Where individual results are flagged see report notes for status.

APPENDIX C
GEOTECHNICAL LABORATORY TESTING RESULTS

DOCUMENT TRANSMITTAL SHEET

To	Peter Eldred
Address	ESG
	Wokingham
Email	
Fax	
Tel No.	
From	Clive Marshall
Address	ESG
	Doncaster
Despatch Date	01-Mar
Project Name	COURSERS FARM
Project Number	22056

METHOD OF DESPATCH	
POST	
FAX	
EMAIL	*

Issuer Name:
C Marshall

Issuer Signature:

Document Title	Issue No.	No. of Pages	Comments
Lab Results	1	25	Complete

Please sign and return to confirm receipt.

Signed:		Date	
Name:			

Project Name

COURSERS FARM

Project No.

22056

Details of Report Contents

*Tests in the following list marked * are not UKAS accredited*

ITEM	Sheet Nos			Comments
Covering letter	page(s)	1	to 1	
Contents	page(s)	1	to 1	

SOIL TESTS

Index Properties - Summary of Results	INDX	1	to 1	
UU triaxial compression test - Summary of Results	UUSUM	1	to 1	
Particle Size Distribution Analyses	PSD	1	to 9	
California Bearing Ratio - single test	CBR	1	to 7	
One Dimensional Consolidation test - Oedometer	OED	1	to 5	
END OF REPORT				

ESG Environmental Scientifics Group

Total number of pages in this report 25

INDEX PROPERTIES - SUMMARY OF RESULTS

Project No	Project Name
22056	Coursers Farm, Colney Heath, Hertfordshire

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	ρ Mg/m^3	ρ_d Mg/m^3	w %	< 425 µm sieve %	W_L %	W_P %	I_P	ρ_s Mg/m^3	Remarks
BH1	3	1.50	1.95	U	Firm yellowish brown slightly sandy slightly gravelly CLAY with flint.			13	58 s	39 a	17	22		
BH1	11	7.20		D	Brown slightly sandy CLAY.			32	100 n	68 a	24	44		
BH1	13	7.50	7.95	U	Firm yellowish brown sandy gravelly CLAY with flint becoming yellowish brown gravelly			16	47 s	31 a	15	16		
BH1	16	8.71		D	Brownish grey slightly sandy slightly gravelly silty CLAY.			24	98 n	35 a	20	15		
BH1	23	15.00	15.45	D	Grey slightly sandy slightly gravelly CLAY. Gravel is chalk.			16	94 s	46 a	18	28		
BH2	4	1.50	1.95	U	Firm yellowish brown slightly sandy silty CLAY.			23	100 n	34 a	19	15		
BH2	7	2.50	2.95	D	Brown slightly sandy slightly gravelly CLAY.			19	98 n	35 a	18	17		
BH2	12	7.50	7.95	U	Firm to stiff orangish brown and grey slightly sandy CLAY.			30	100 n	65 a	27	38		
BH2	14	8.20		D	Brown slightly sandy gravelly CLAY.			17	49 s	35 a	17	18		
BH2	19	14.50		D	Grey and brown slightly sandy slightly gravelly CLAY.			19	99 n	41 a	14	27		
BH3	4	1.50	1.95	U	Firm yellowish brown slightly sandy slightly gravelly silty CLAY.			21	98 n	35 a	18	17		
BH3	6	2.25		D	Brown slightly sandy slightly gravelly CLAY.			21	98 n	37 a	18	19		
BH3	12	7.50	7.95	U	Orangish brown slightly gravelly SAND.			8.0	35 s	24 b	NP			
BH3	22	16.50	16.95	U	Very stiff greyish brown slightly sandy slightly gravelly CLAY.			18	87 s	48 a	19	29		
BH4	4	1.50	1.95	U	Soft orangish brown slightly sandy slightly gravelly CLAY.			22	96 n	40 a	19	21		
BH4	8	6.00	6.45	B	Multicoloured slightly sandy slightly gravelly CLAY.			31	69 s	81 a	29	52		
BH4	13	13.50	13.95	U	Very stiff greyish brown slightly sandy slightly gravelly CLAY with chalk.			17	95 s	49 a	19	30		
BH4	15	15.00	15.45	D	Grey slightly sandy slightly gravelly CLAY. Gravel is chalk.			15	89 s	44 a	16	28		
BH5	13	13.50	13.95	U	Very stiff brownish grey slightly sandy slightly gravelly CLAY. Gravel is mainly			15	89 s	46 a	18	28		
BH5	15	14.50		D	Grey slightly sandy slightly gravelly CLAY with chalk.			15	89 s	46 a	17	29		
BH6	12	12.00	12.45	U	Very stiff brownish grey slightly sandy slightly gravelly CLAY. Gravel contains			16	92 s	49 a	18	31		
BH6	15	13.50	13.95	D	Grey slightly sandy slightly gravelly CLAY with chalk.			14	89 s	45 a	17	28		
BH6	17	15.00	15.45	U	Very stiff greyish brown slightly sandy slightly gravelly CLAY.			12	80 s	50 a	18	32		
BH7	3	0.50		D	Brown slightly sandy slightly gravelly CLAY.			7.4	46 s	30 a	17	13		
BH7	30	13.70	14.15	U	Very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is mainly			17	94 s	49 a	19	30		
BH7	32	15.20	15.65	D	Brown slightly sandy slightly gravelly CLAY. Gravel is chalk.			16	88 s	48 a	19	29		

General notes: All above tests carried out to BS1377 : 1990 unless annotated otherwise. See individual test reports for further details.

Key :

ρ	bulk density, linear	W_L Liquid limit	W_P	Plastic limit	<425um preparation	ρ_s	particle density
ρ_d	dry density	a 4 point cone test	NP	non - plastic	n from natural soil	-g = gas jar	
w	moisture content	b 1 point cone test	I_P	Plasticity Index	s sieved specimen	-p = small pyknometer	

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS WITHOUT MEASUREMENT OF PORE PRESSURE - SUMMARY OF RESULTS

Project No	Project Name
22056	Coursers Farm, Colney Heath, Hertfordshire

Hole No.	Sample No.	Depth (m) from	Depth (m) to	type	Soil Description	Density bulk Mg/m³	Density dry Mg/m³	*w* %	Test type	Dia. mm	$ó_3$ kPa	At failure / end of stage: Axial strain %	$ó_1 - ó_3$ kPa	c_u kPa	MODE	Remarks
BH1	3	1.50	1.95	U	Firm yellowish brown slightly sandy slightly gravelly CLAY with flint.	2.21	1.96	13	UU	105.6	30	19.7	99	49	P	
BH2	4	1.50	1.95	U	Firm yellowish brown slightly sandy silty CLAY.	2.06	1.68	23	UU	103.9	30	17.3	79	39	P	
BH2	12	7.50	7.95	U	Firm to stiff orangish brown and grey slightly sandy CLAY.	1.94	1.49	30	UU	105.4	150	13.8	115	58	P	
BH3	4	1.50	1.95	U	Firm yellowish brown slightly sandy slightly gravelly silty CLAY.	2.12	1.75	21	UU	104.2	30	19.3	63	31	P	
BH3	22	16.50	16.95	U	Very stiff greyish brown slightly sandy slightly gravelly CLAY.	2.18	1.84	18	UU	105.9	330	19.8	388	194	P	
BH4	4	1.50	1.95	U	Soft orangish brown slightly sandy slightly gravelly CLAY.	2.04	1.68	22	UU	104.5	30	16.8	91	46	P	
BH4	13	13.50	13.95	U	Very stiff greyish brown slightly sandy slightly gravelly CLAY with chalk.	2.15	1.83	17	UU	105.6	270	19.7	458	229	C	
BH5	13	13.50	13.95	U	Very stiff brownish grey slightly sandy slightly gravelly CLAY. Gravel is mainly chalk.	2.14	1.86	15	UU	105.6	270	19.8	565	282	C	
BH6	12	12.00	12.45	U	Very stiff brownish grey slightly sandy slightly gravelly CLAY. Gravel contains chalk.	2.19	1.88	16	UU	105.1	240	19.8	425	213	C	
BH6	17	15.00	15.45	U	Very stiff greyish brown slightly sandy slightly gravelly CLAY.	2.14	1.91	12	UU	106.2	300	19.8	567	284	C	
BH7	30	13.70	14.15	U	Very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is mainly chalk.	2.14	1.83	17	UU	105.3	270	9.9	573	286	B	

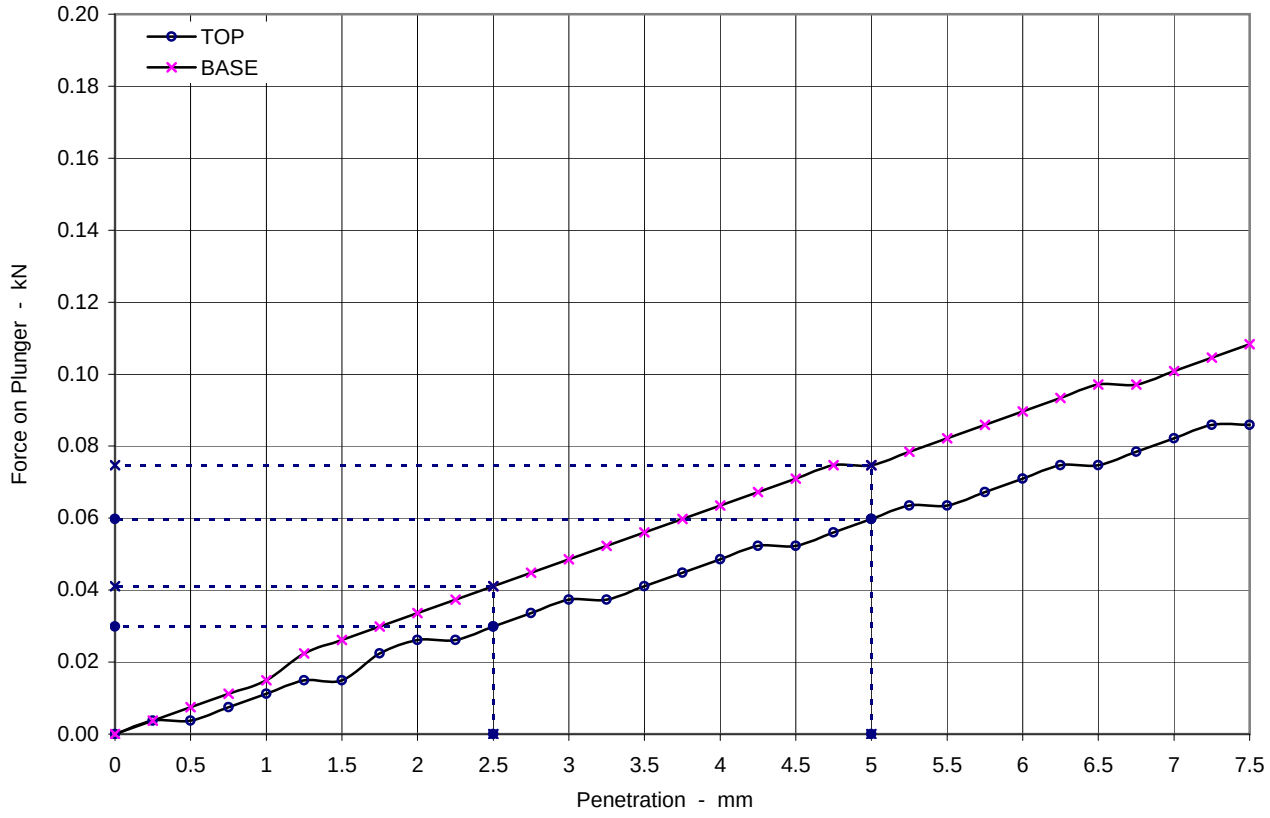
General notes: Tests carried out in accordance with BS1377: Part 7: 1990, clause 8 for single stage, clause 9 for multistage tests. Specimens nominally 2:1 height diameter ratio and tested at a rate of strain of 2%/minute, unless annotated otherwise. See individual test reports for further details.

Legend

UU - single stage test (may be in sets of specimens)	$ó_3$	cell pressure	Mode of failure	P	plastic
UUM - multistage test on a single specimen	$ó_1 - ó_3$	deviator stress		B	brittle
suffix R - remoulded or recompacted	c_u	undrained shear strength		C	compound

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	22056	Sample Details:	Hole No	BH1		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	0.50		
			Samp No	2	Type	B
			ID	ESG22056201301310000000021		
			Spec Ref			



Soil description	Brown slightly sandy CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	0
	kPa	0

Notes :

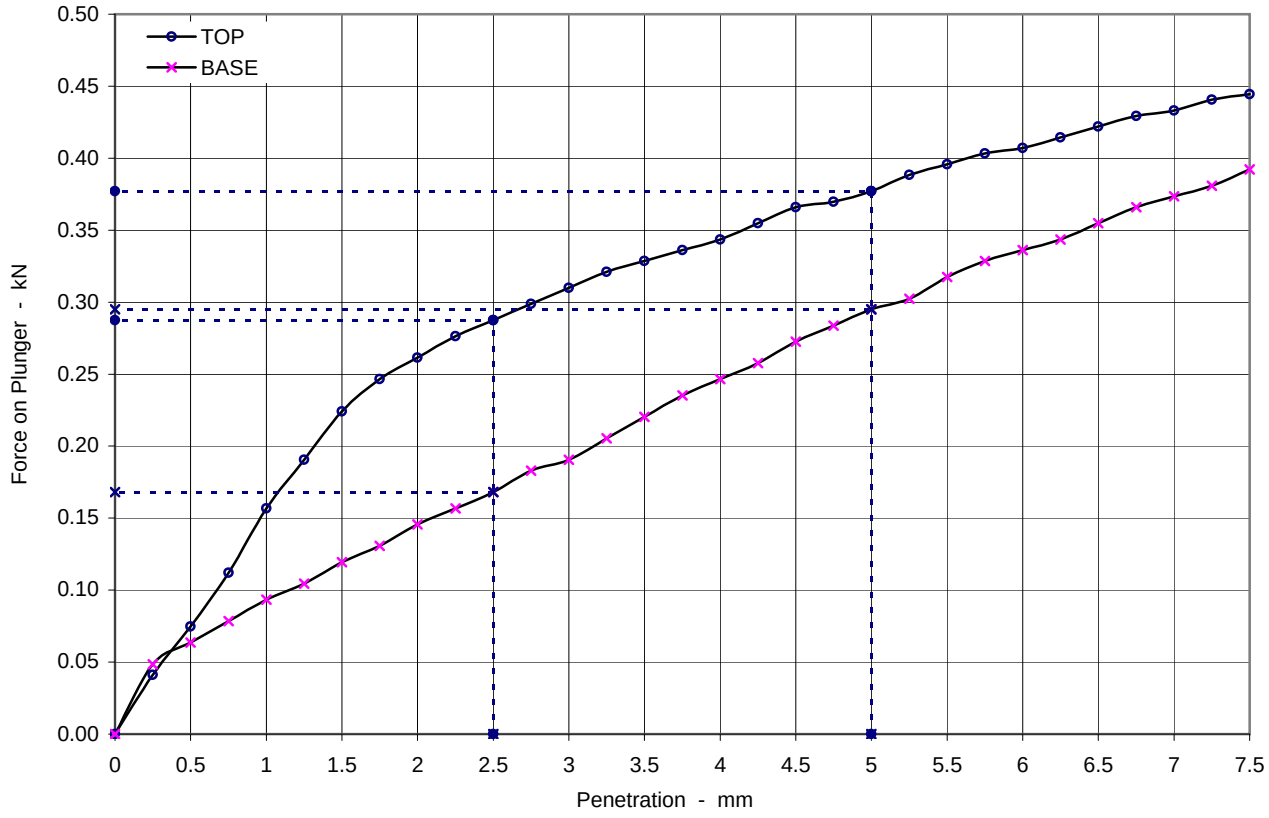
Sample Conditions		
Initial Moisture Content	%	27
Bulk Density	Mg/m³	1.95
Dry Density	Mg/m³	1.54
Moisture Content - TOP	%	26
Moisture Content - BASE	%	26

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.23	0.31
5.0	0.30	0.37

Accepted CBR %	**0.30**	**0.37**

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	22056	Sample Details:	Hole No	BH3		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	0.50		
			Samp No	2	Type	B
			ID	ESG22056201301310000000048		
			Spec Ref			



Soil description	Brownish grey slightly sandy slightly gravelly CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	3

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	0
	kPa	0

Notes :

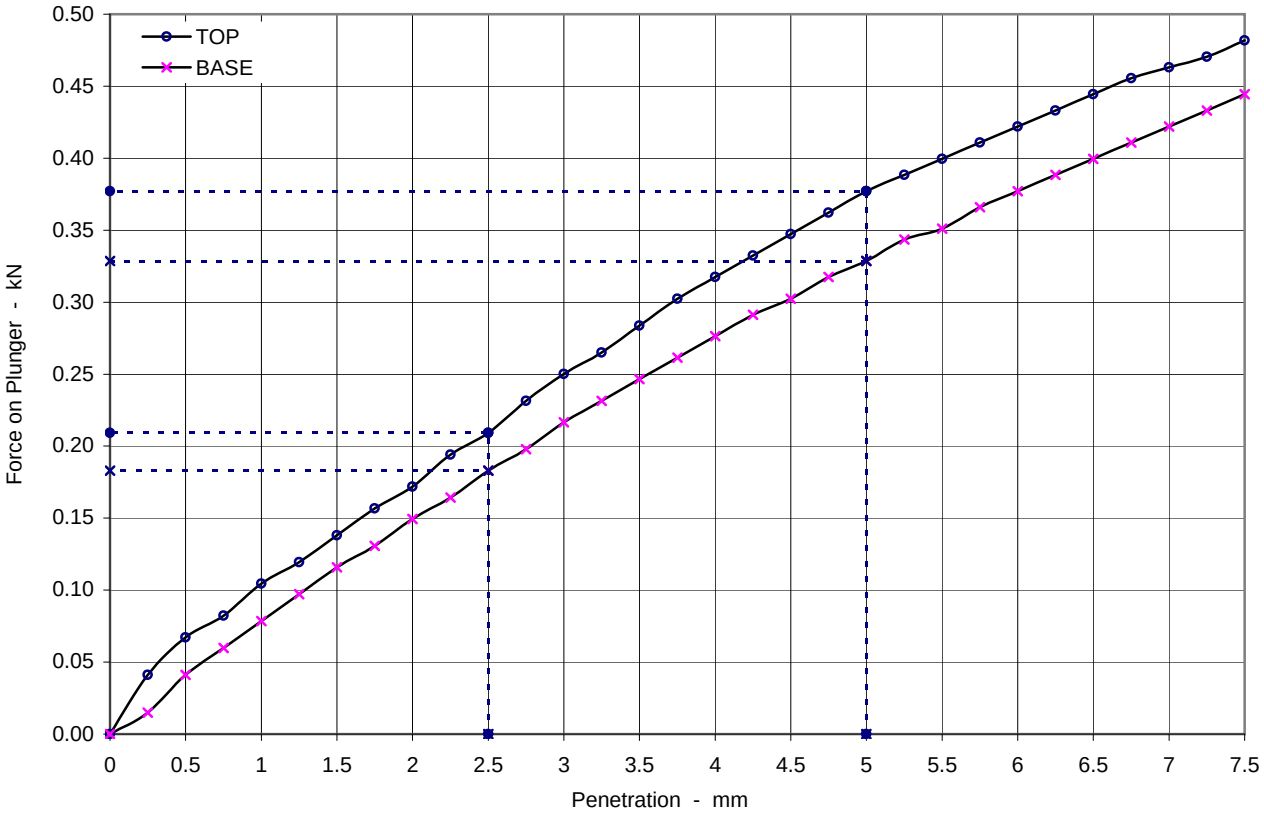
Sample Conditions		
Initial Moisture Content	%	20
Bulk Density	Mg/m³	2.10
Dry Density	Mg/m³	1.75
Moisture Content - TOP	%	20
Moisture Content - BASE	%	20

Penetration mm	CBR Values %	
	TOP	BASE
2.5	2.2	1.3
5.0	1.9	1.5

Accepted CBR %	**2.2**	**1.5**

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	22056	Sample Details:	Hole No	BH4		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	0.50		
			Samp No	2	Type	B
			ID	ESG2205620130131000000065		
			Spec Ref			



Soil description	Brown slightly sandy slightly gravelly CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	5

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	0
	kPa	0

Notes :

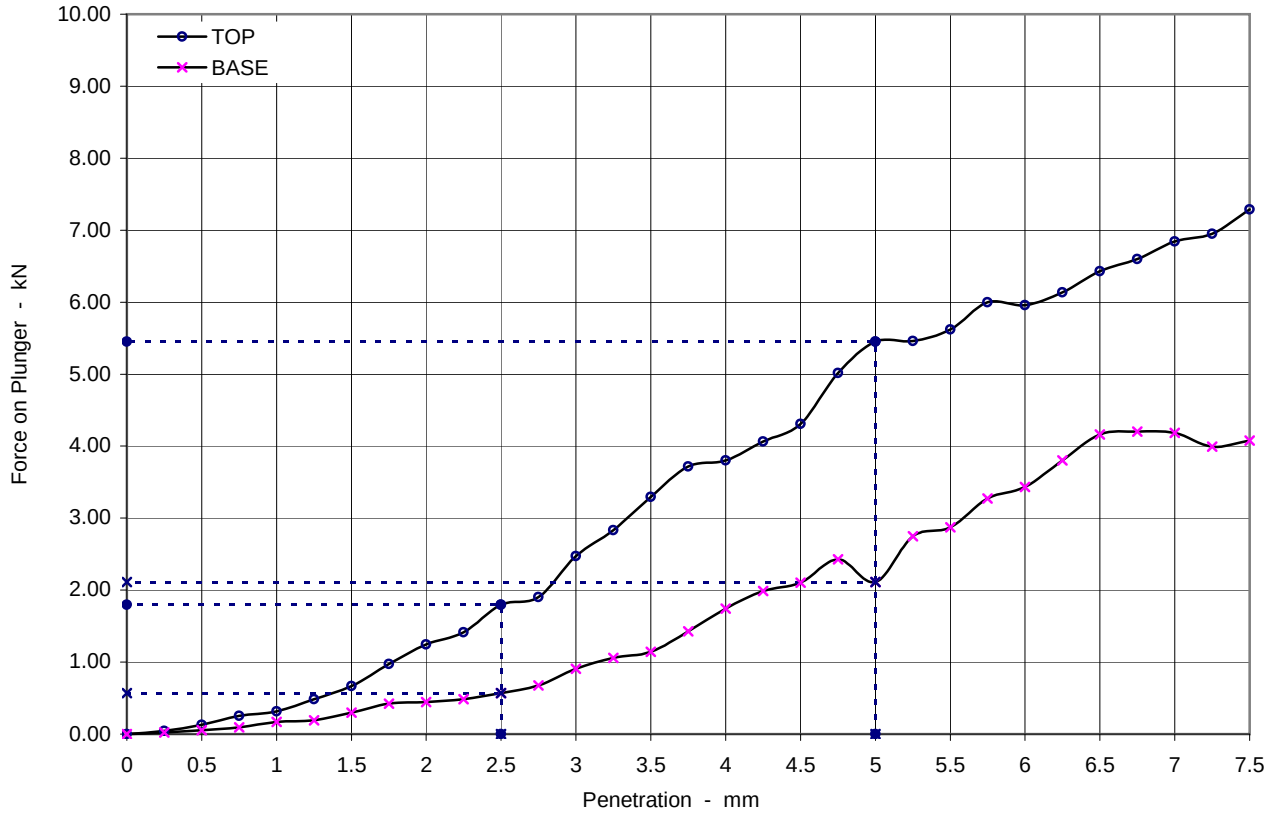
Sample Conditions		
Initial Moisture Content	%	18
Bulk Density	Mg/m³	2.13
Dry Density	Mg/m³	1.81
Moisture Content - TOP	%	18
Moisture Content - BASE	%	18

Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.6	1.4
5.0	1.9	1.6

Accepted CBR %	**1.9**	**1.6**

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	22056	Sample Details:	Hole No	BH4		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	2.50		
			Samp No	5	Type	B
			ID	ESG2205620130131963488		
			Spec Ref			



Soil description	Brown sandy GRAVEL with rare clay pockets.

Test Conditions		
Sample Retained on 20 mm sieve	%	20

	Method of Compaction		
Preparation	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	0
	kPa	0

Notes :

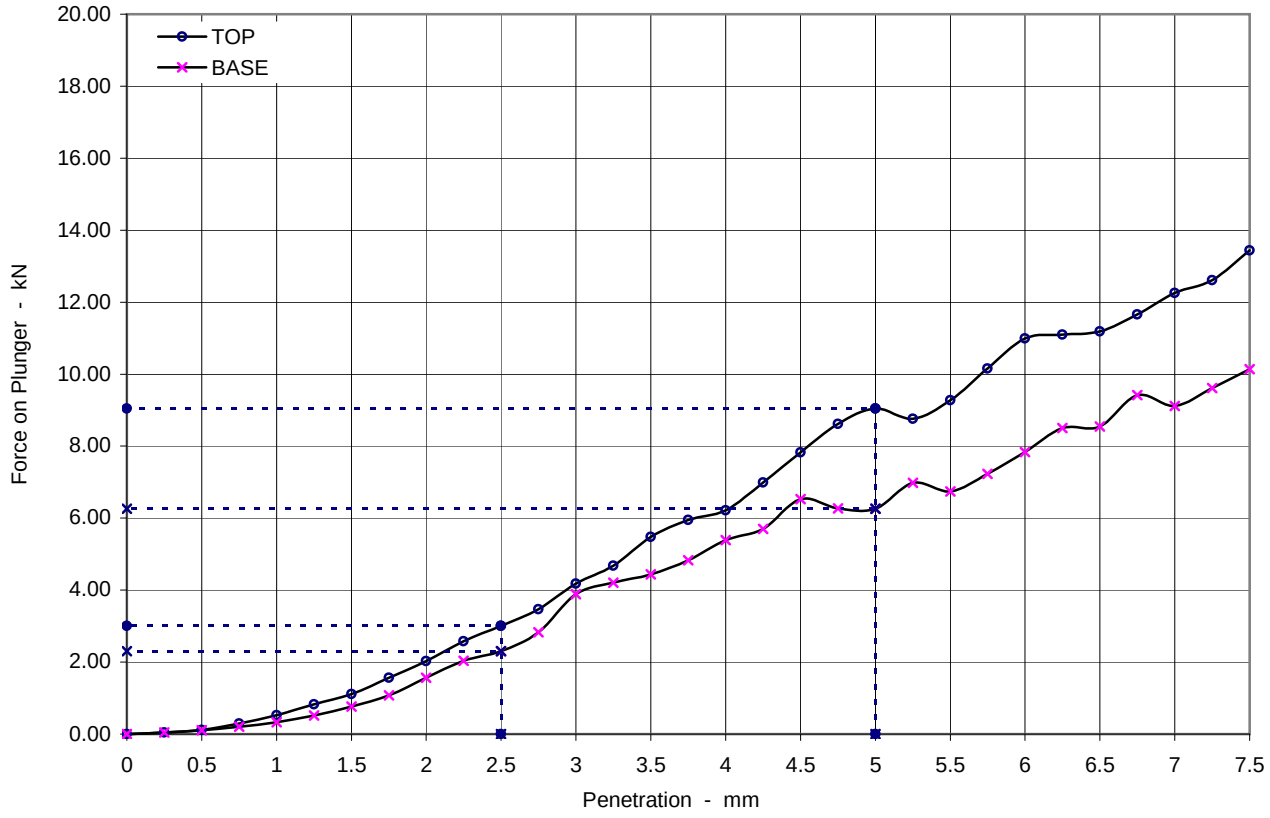
Sample Conditions		
Initial Moisture Content	%	5.3
Bulk Density	Mg/m³	2.08
Dry Density	Mg/m³	1.97
Moisture Content - TOP	%	5.2
Moisture Content - BASE	%	5.4

Penetration mm	CBR Values %	
	TOP	BASE
2.5	14	4.3
5.0	27	11

Accepted CBR %	**27**	**11**

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	22056	Sample Details:	Hole No	BH5		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	1.50		
			Samp No	3	Type	B
			ID	ESG2205620130131075669		
			Spec Ref			



Soil description	Yellowish brown gravelly SAND with occasional clay pockets.

Test Conditions		
Sample Retained on 20 mm sieve	%	17

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	0
	kPa	0

Notes :

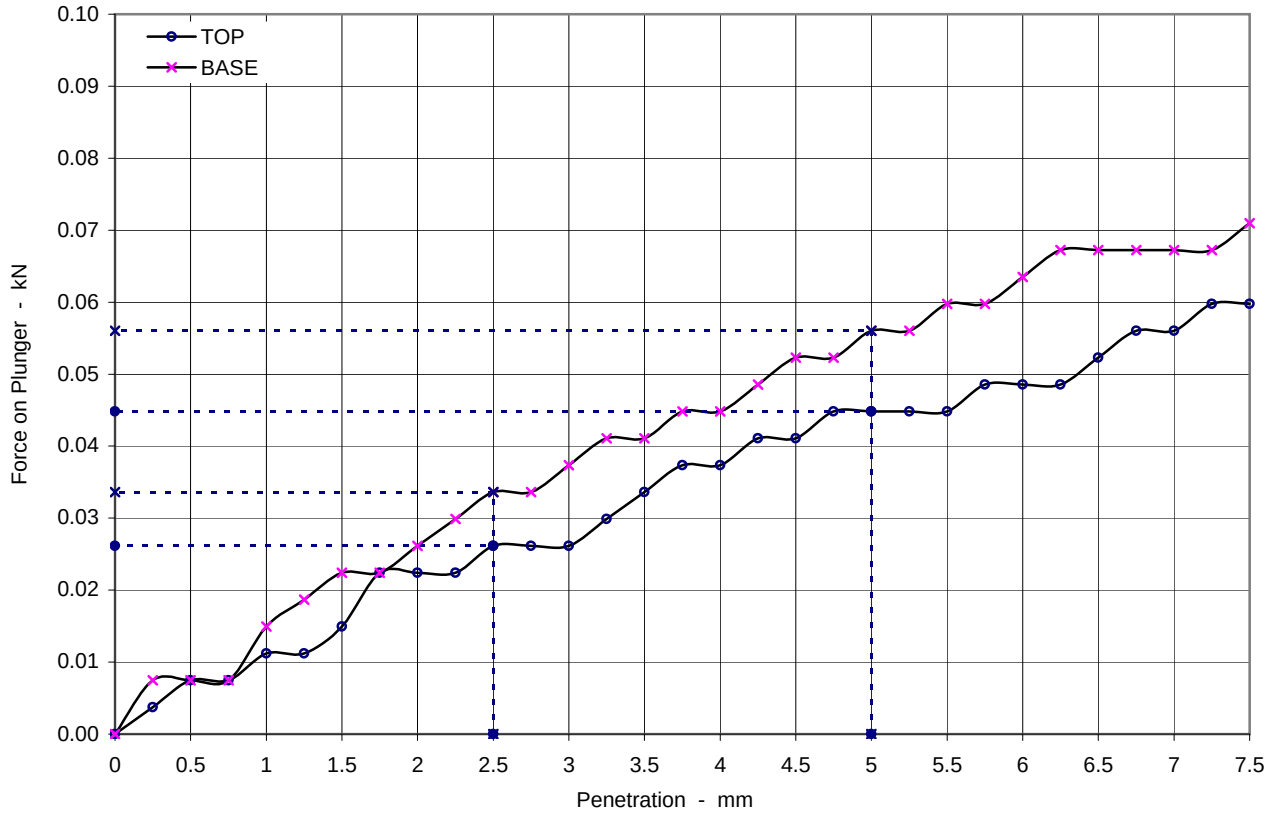
Sample Conditions		
Initial Moisture Content	%	6.4
Bulk Density	Mg/m³	2.23
Dry Density	Mg/m³	2.09
Moisture Content - TOP	%	6.3
Moisture Content - BASE	%	6.5

Penetration mm	CBR Values %	
	TOP	BASE
2.5	23	17
5.0	45	31

Accepted CBR %	**45**	**31**

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	22056	Sample Details:	Hole No	BH6		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	0.50		
			Samp No	2	Type	B
			ID	ESG22056201301310000000077		
			Spec Ref			



Soil description	Greyish brown slightly sandy slightly gravelly silty CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	5

Preparation	Method of Compaction		
	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	0
	kPa	0

Notes :

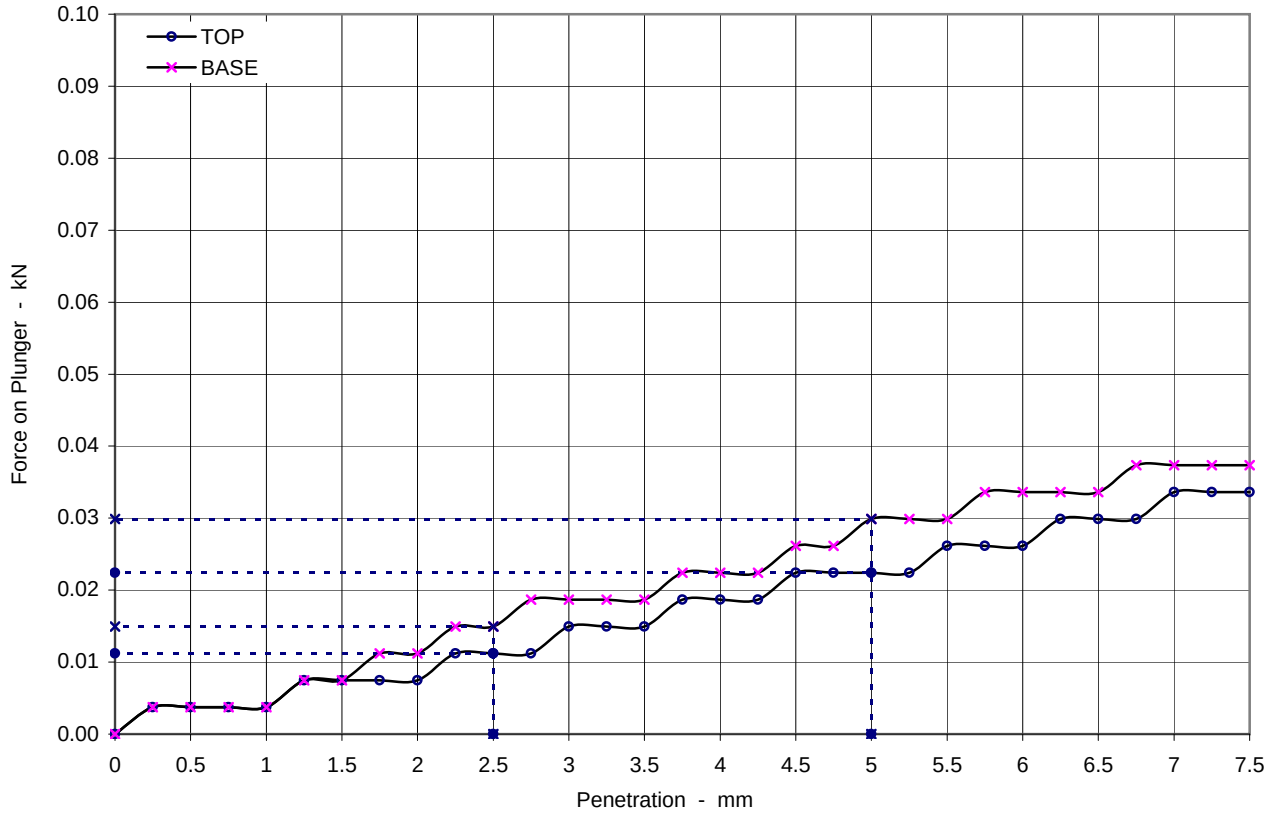
Sample Conditions		
Initial Moisture Content	%	20
Bulk Density	Mg/m³	2.04
Dry Density	Mg/m³	1.70
Moisture Content - TOP	%	20
Moisture Content - BASE	%	17

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.20	0.25
5.0	0.22	0.28

Accepted CBR %	**0.22**	**0.28**

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	22056	Sample Details:	Hole No	BH7		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	0.50		
			Samp No	4	Type	B
			ID	ESG22056201301310000000087		
			Spec Ref			



Soil description	Brownish grey slightly sandy gravelly CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	10

	Method of Compaction		
Preparation	Recompacted - Rammer compaction with specified effort (4.5kg)		
	Soaked test		NO
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Surcharge applied	kg	0
	kPa	0

Notes :

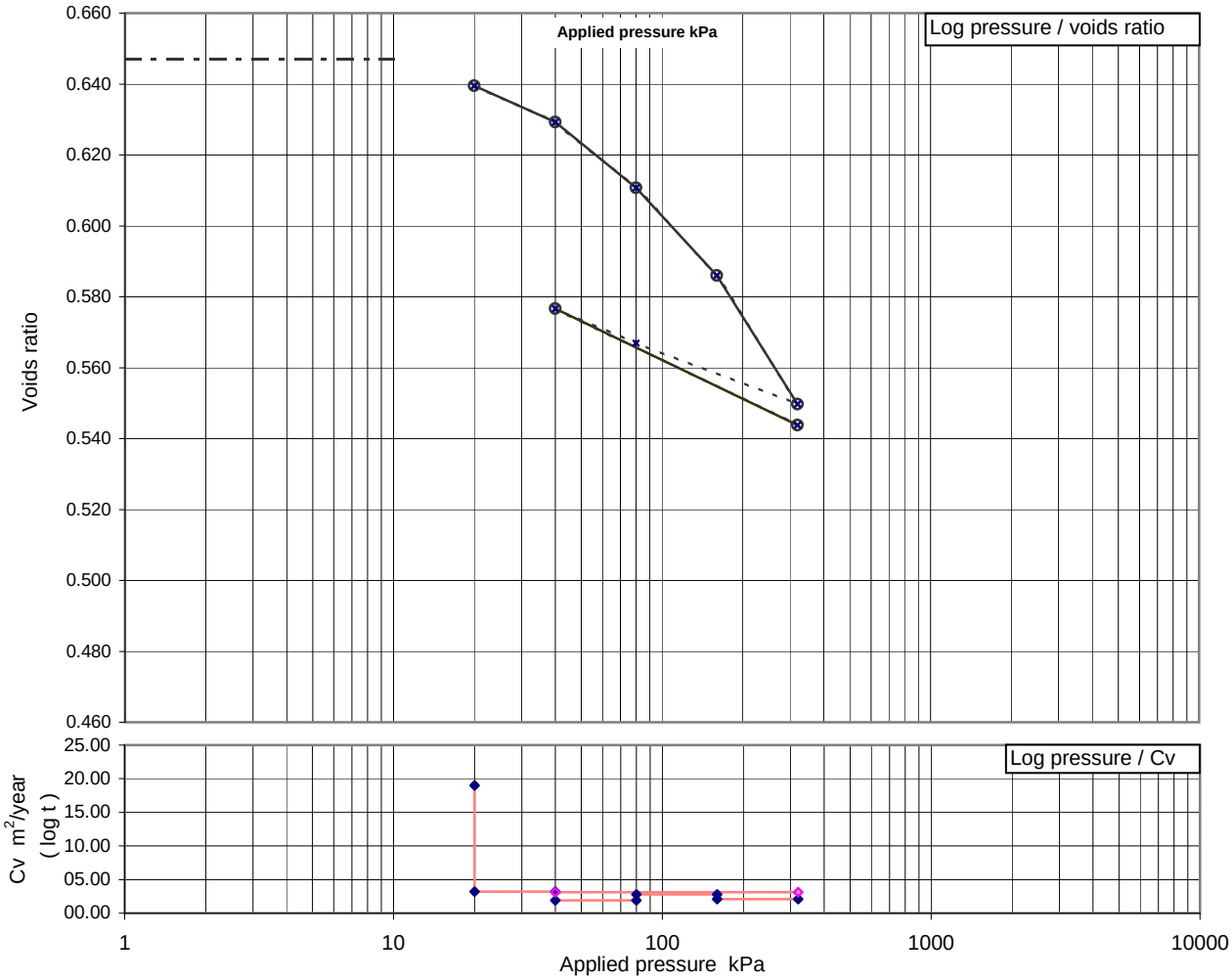
Sample Conditions		
Initial Moisture Content	%	15
Bulk Density	Mg/m³	2.16
Dry Density	Mg/m³	1.89
Moisture Content - TOP	%	15
Moisture Content - BASE	%	14

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.085	0.11
5.0	0.11	0.15

Accepted CBR %	**0.11**	**0.15**

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	22056	Sample Details:	Hole No	BH2		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	7.50		
			Samp No	12	Type	U
			ID	ESG2205620130131000000043		
			Spec Ref			



Soil description	Firm to stiff orangish brown and grey slightly sandy CLAY.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	65	Plastic limit %	27

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m³
Diameter	75.01		mm
Height	19.10	17.91	mm
Voids ratio	0.647	0.544	
Moisture content	25	22	%
Bulk density	2.02	2.09	Mg/m³
Dry density	1.61	1.72	Mg/m³
Saturation	104	105	%
Average temperature for test	20		°C

Swelling pressure: not measured kPa

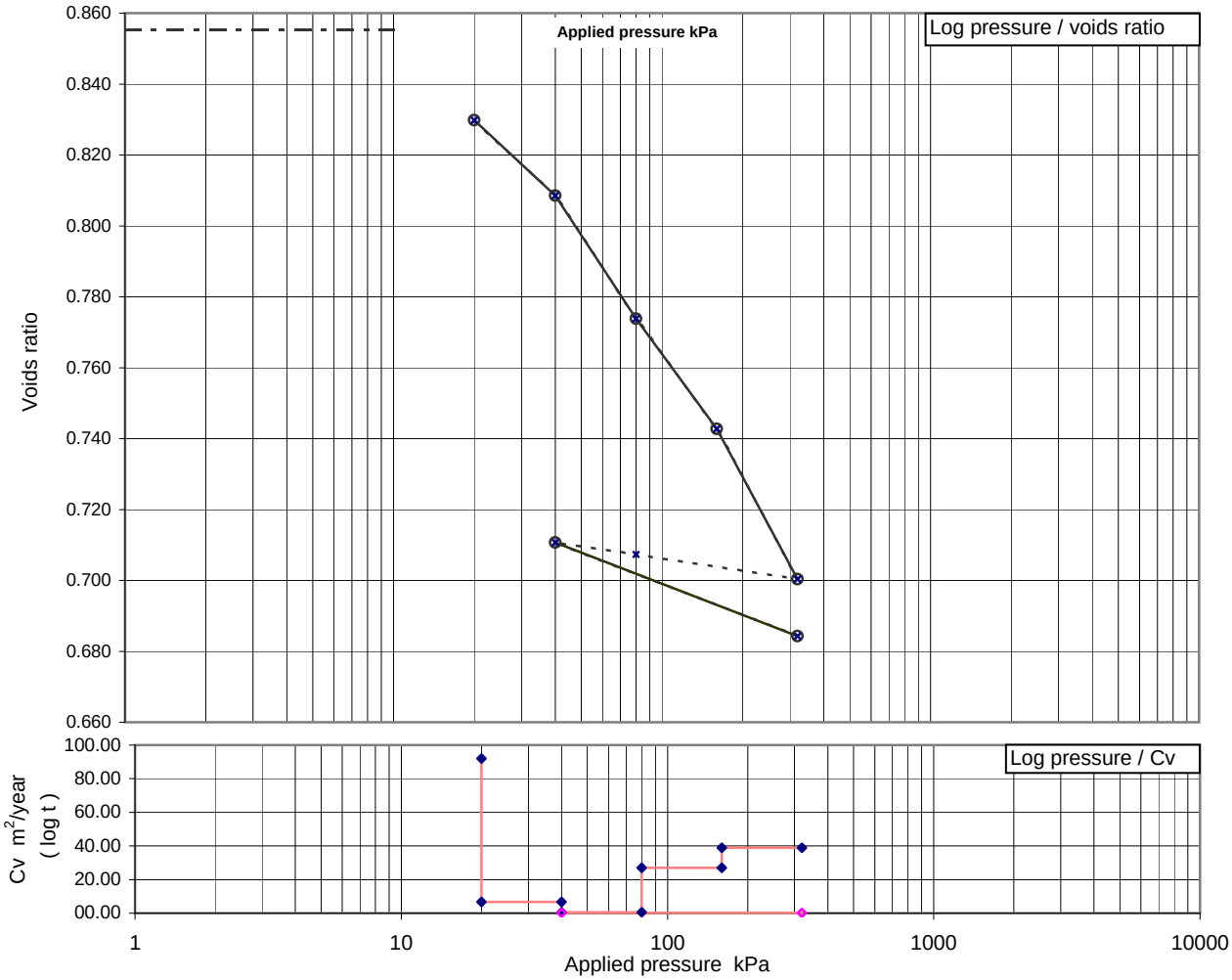
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	0.6469				
20	0.6395	0.225	19	19	
40	0.6293	0.313	3.2	4	
80	0.6107	0.284	1.9	2.1	
160	0.5860	0.192	2.8	2.9	
320	0.5497	0.143	2.1	2.3	
80	0.5669	0.046	-	-	
40	0.5767	0.155	-	-	
320	0.5438	0.074	3.1	3.3	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	22056	Sample Details:	Hole No	BH3		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	7.50		
			Samp No	12	Type	U
			ID	ESG2205620130131000000054		
			Spec Ref			



Soil description	Orangish brown slightly gravelly SAND.
Preparation	Undisturbed
Index properties (if available)	Liquid limit % 24 Plastic limit % NP

Specimen details	Initial	Final	
Particle density	2.65	assumed	Mg/m³
Diameter	75.00		mm
Height	18.89	17.15	mm
Voids ratio	0.855	0.684	
Moisture content	11	26	%
Bulk density	1.59	1.98	Mg/m³
Dry density	1.43	1.57	Mg/m³
Saturation	35	100	%
Average temperature for test	20		°C

Swelling pressure: not measured kPa

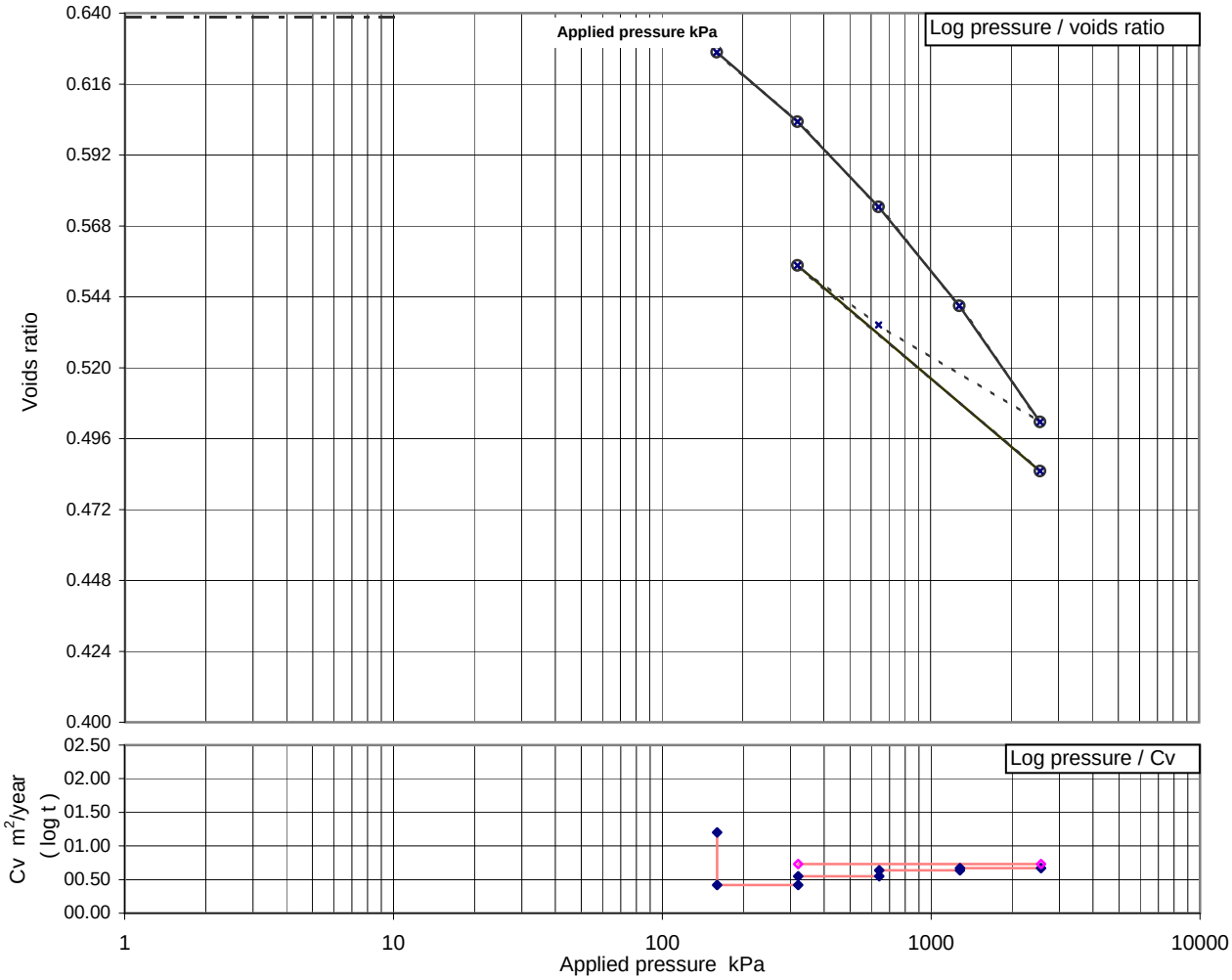
Notes :

Specimen taken 0 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	0.8552				
20	0.8298	0.686	92	99	
40	0.8086	0.580	6.7	6.4	
80	0.7738	0.481	0.65	0.69	
160	0.7428	0.219	27	29	
320	0.7003	0.152	39	37	
80	0.7073	0.017	-	-	
40	0.7106	0.049	-	-	
320	0.6843	0.055	0.1	0.11	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	22056	Sample Details:	Hole No	BH3		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	16.50		
			Samp No	22	Type	U
			ID	ESG22056201301310000000059		
			Spec Ref			



Soil description	Very stiff greyish brown slightly sandy slightly gravelly CLAY.
Preparation	Undisturbed
Index properties (if available)	Liquid limit % 48 Plastic limit % 19

Specimen details	Initial	Final	
Particle density	2.75	assumed	Mg/m³
Diameter	74.98		mm
Height	19.00	17.22	mm
Voids ratio	0.639	0.485	
Moisture content	24	19	%
Bulk density	2.08	2.19	Mg/m³
Dry density	1.68	1.85	Mg/m³
Saturation	103	105	%
Average temperature for test	21		°C

Swelling pressure >80 kPa

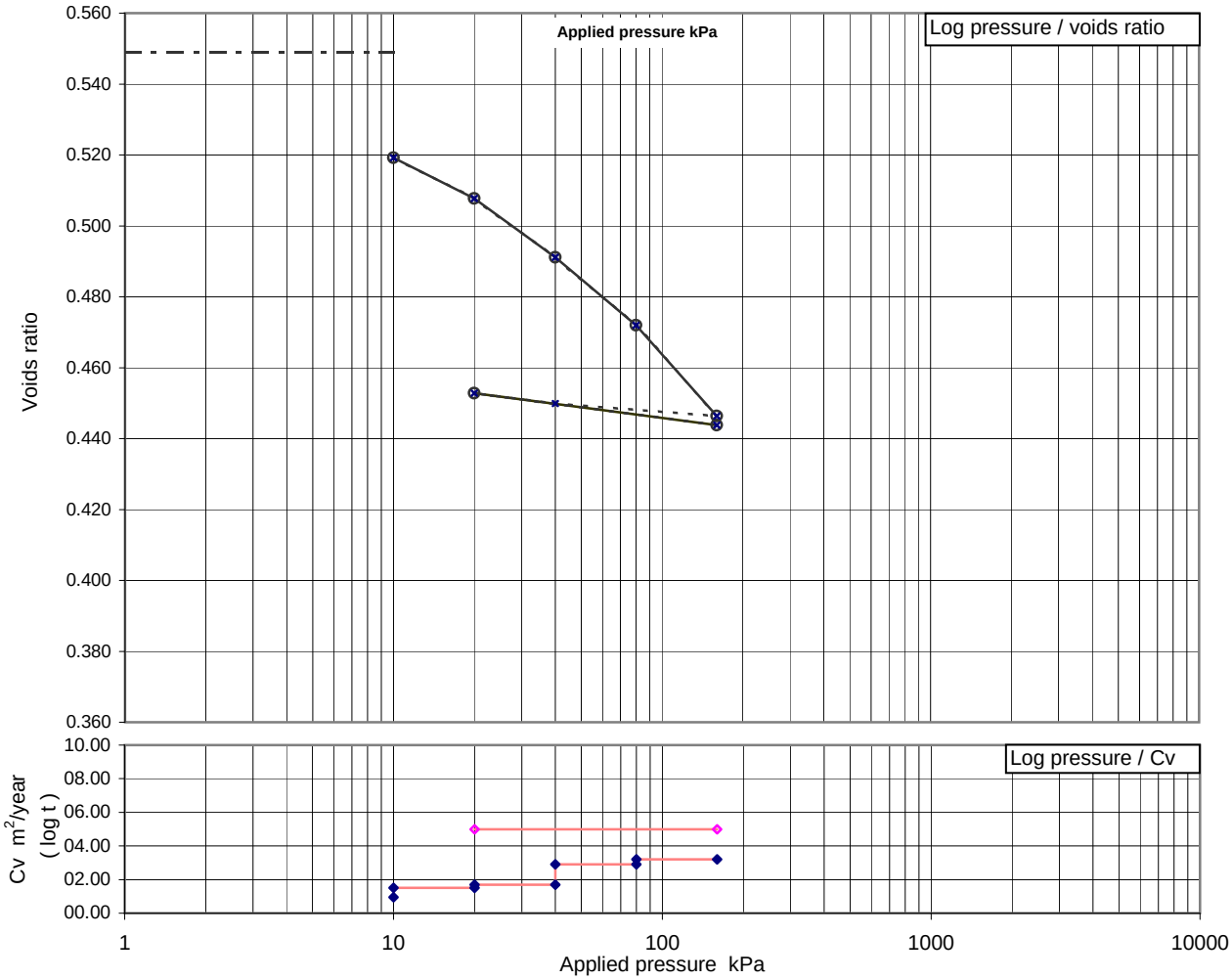
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
80	0.6387				
160	0.6268	0.091	1.2	1.4	
320	0.6033	0.090	0.42	0.43	
640	0.5744	0.056	0.55	0.58	
1280	0.5409	0.033	0.64	0.68	
2560	0.5016	0.020	0.67	0.71	
640	0.5345	0.011	-	-	
320	0.5546	0.041	-	-	
2560	0.4850	0.020	0.73	0.79	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	22056	Sample Details:	Hole No	BH4		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	1.50		
			Samp No	4	Type	U
			ID	ESG2205620130131000000067		
			Spec Ref			



Soil description	Soft orangish brown slightly sandy slightly gravelly CLAY.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	40	Plastic limit %	19

Specimen details	Initial	Final	
Particle density	2.67	assumed	Mg/m^3
Diameter	74.98		mm
Height	18.93	17.65	mm
Voids ratio	0.549	0.444	
Moisture content	21	17	%
Bulk density	2.09	2.17	Mg/m^3
Dry density	1.72	1.85	Mg/m^3
Saturation	103	105	%
Average temperature for test	20		°C

Swelling pressure: not measured kPa

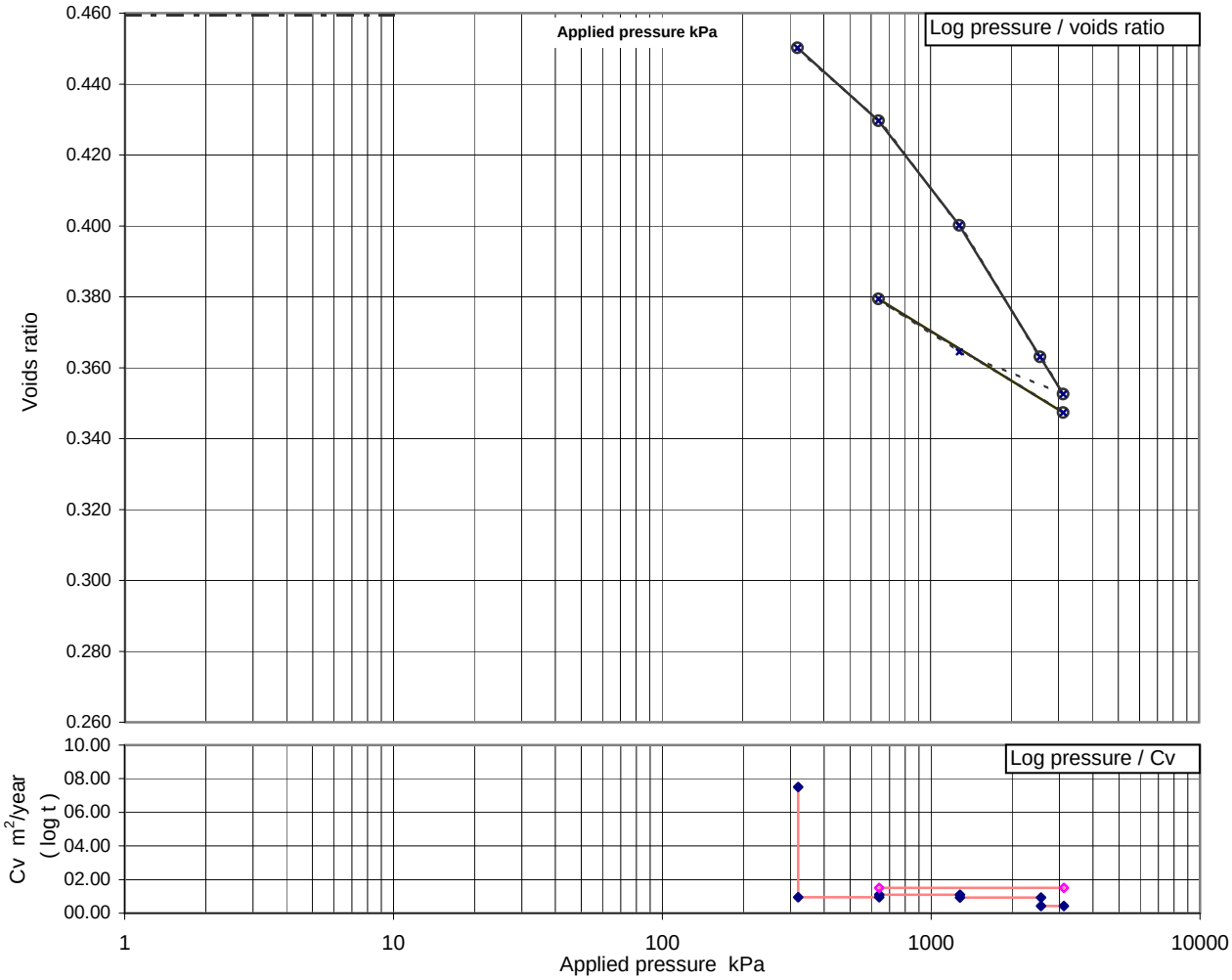
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m^2/MN	C_v ($t_{50, log}$) m^2/year	C_v ($t_{90, root}$) m^2/year	
0	0.5491				
10	0.5192	1.928	0.95	1	
20	0.5077	0.754	1.5	1.8	
40	0.4911	0.551	1.7	1.8	
80	0.4720	0.321	2.9	3	
160	0.4464	0.217	3.2	3.1	
40	0.4499	0.020	-	-	
20	0.4528	0.102	-	-	
160	0.4438	0.044	5	5.2	

ONE DIMENSIONAL CONSOLIDATION TEST
BS 1377 : Part 5 : 1990 : clause 3

Project No	22056	Sample Details:	Hole No	BH7		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	13.70		
			Samp No	30	Type	U
			ID	ESG22056201301310000000112		
			Spec Ref			



Soil description	Very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is mainly chalk.			
Preparation	Undisturbed			
Index properties (if available)	Liquid limit %	49	Plastic limit %	19

Specimen details	Initial	Final	
Particle density	2.70	assumed	Mg/m³
Diameter	74.97		mm
Height	18.82	17.37	mm
Voids ratio	0.459	0.347	
Moisture content	17	14	%
Bulk density	2.17	2.27	Mg/m³
Dry density	1.85	2.00	Mg/m³
Saturation	102	105	%
Average temperature for test	21		°C

Swelling pressure: not measured kPa

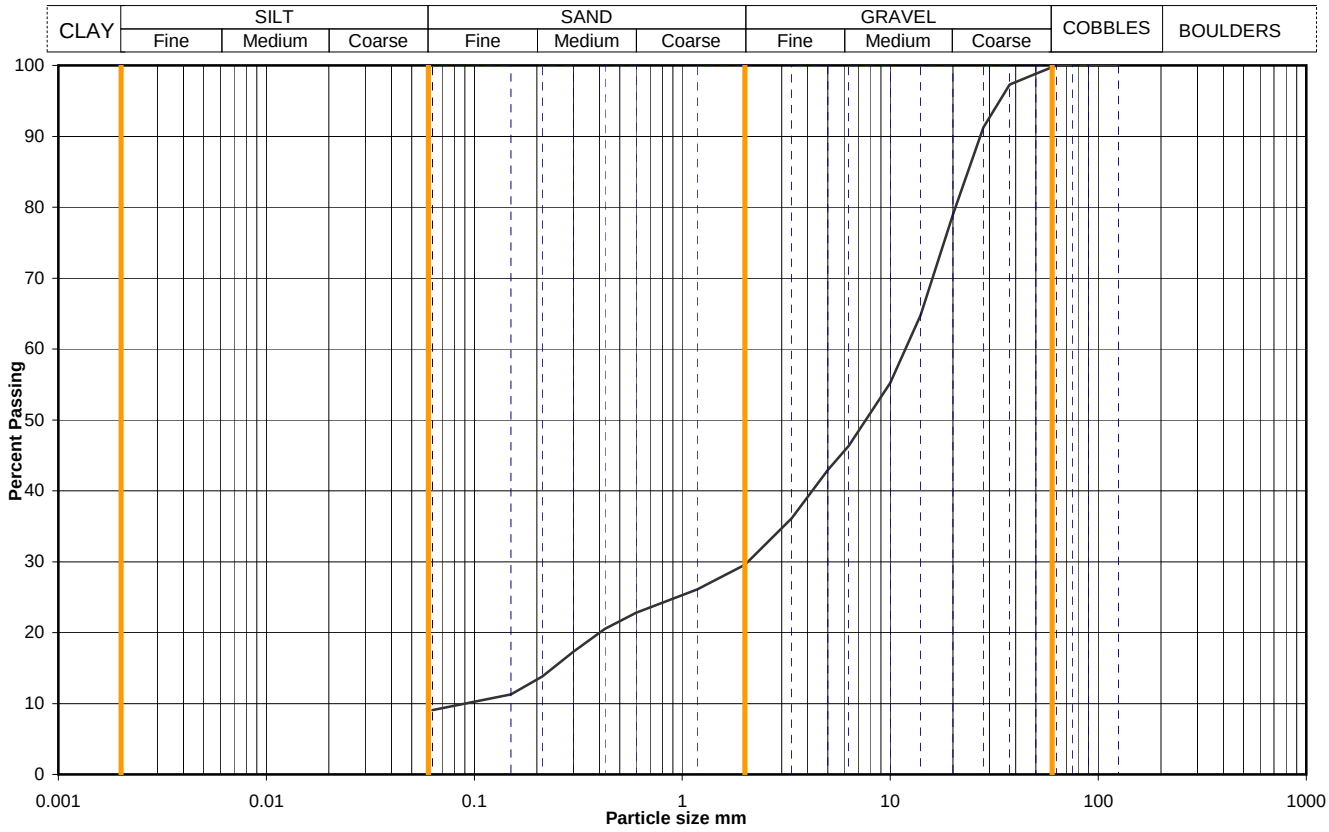
Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	M_v m²/MN	C_v ($t_{50, log}$) m²/year	C_v ($t_{90, root}$) m²/year	
0	0.4595				
320	0.4502	0.020	7.5	9.6	
640	0.4296	0.044	0.95	0.96	
1280	0.4002	0.032	1.1	1.2	
2560	0.3630	0.021	0.94	0.91	
3120	0.3526	0.014	0.42	0.43	
1280	0.3644	0.005	-	-	
640	0.3794	0.017	-	-	
3120	0.3474	0.009	1.5	1.6	

Particle Size Distribution Analysis

Project No	22056	Sample Details:	Hole No	BH1		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	9.50		
			Samp No	18	Type	B
			ID	ESG22056201301310000000033		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	99		
37.5	97		
28	91		
20	79		
14	65		
10	55		
6.3	46		
5.0	43		
3.35	36		
2.00	30		
1.18	26		
0.600	23		
0.425	21		
0.300	17	Dry mass of sample, kg	
0.212	14		
0.150	11	10.6	
0.063	9		

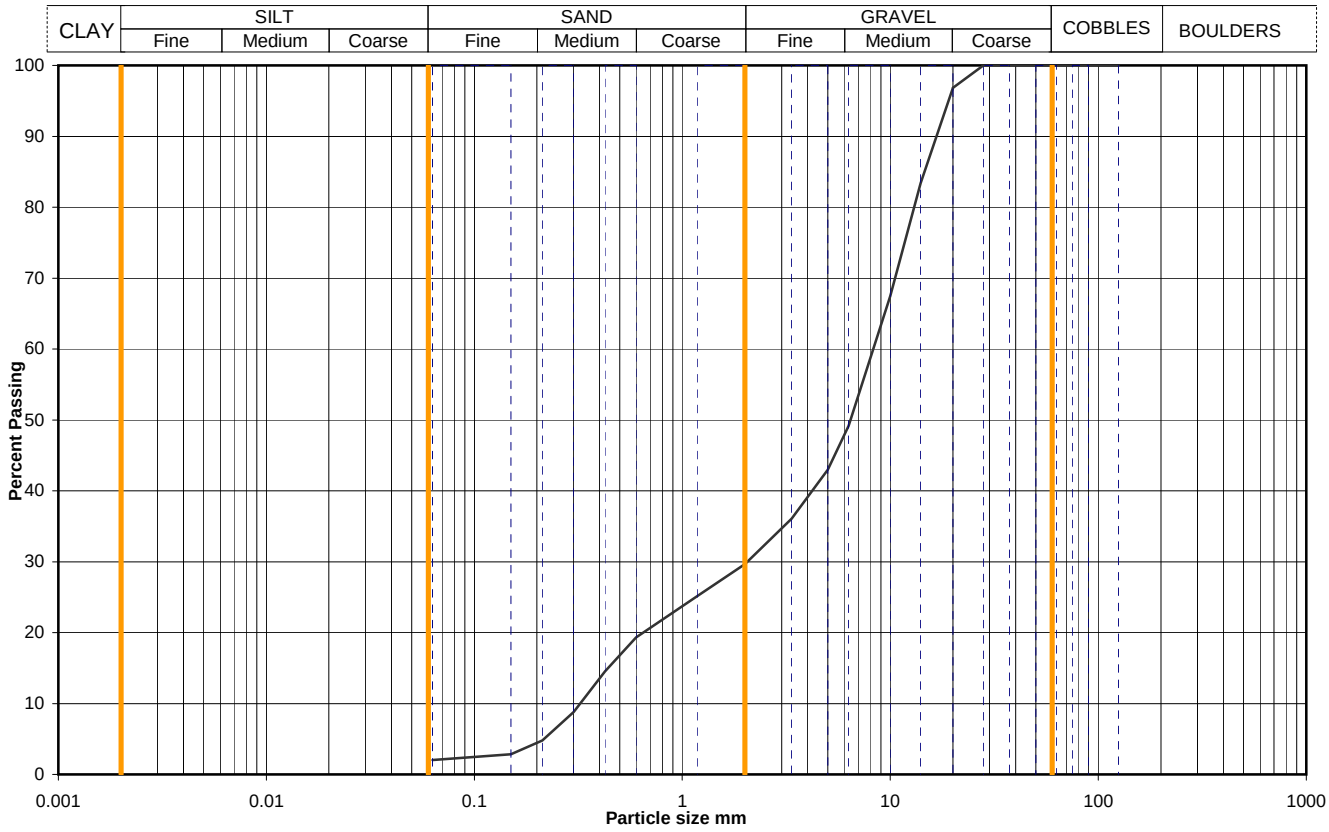
Soil description	Grey very sandy clayey GRAVEL.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	70	70
	Sand	21	21
	Silt	silt+clay =	
	Clay	9	9

Uniformity Coefficient	D_{60} / D_{10}	130

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

Particle Size Distribution Analysis

Project No	22056	Sample Details:	Hole No	BH2		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	3.50		
			Samp No	8	Type	B
			ID	ESG2205620130131286202		
			Spec Ref			



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	97		
14	83		
10	67		
6.3	49		
5.0	43		
3.35	36		
2.00	30		
1.18	25		
0.600	19		
0.425	15		
0.300	9	Dry mass of sample, kg	
0.212	5		
0.150	3	13.2	
0.063	2		

Soil description	Brown very sandy GRAVEL.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	70	70
	Sand	28	28
	Silt	silt+clay =	
	Clay	2	2

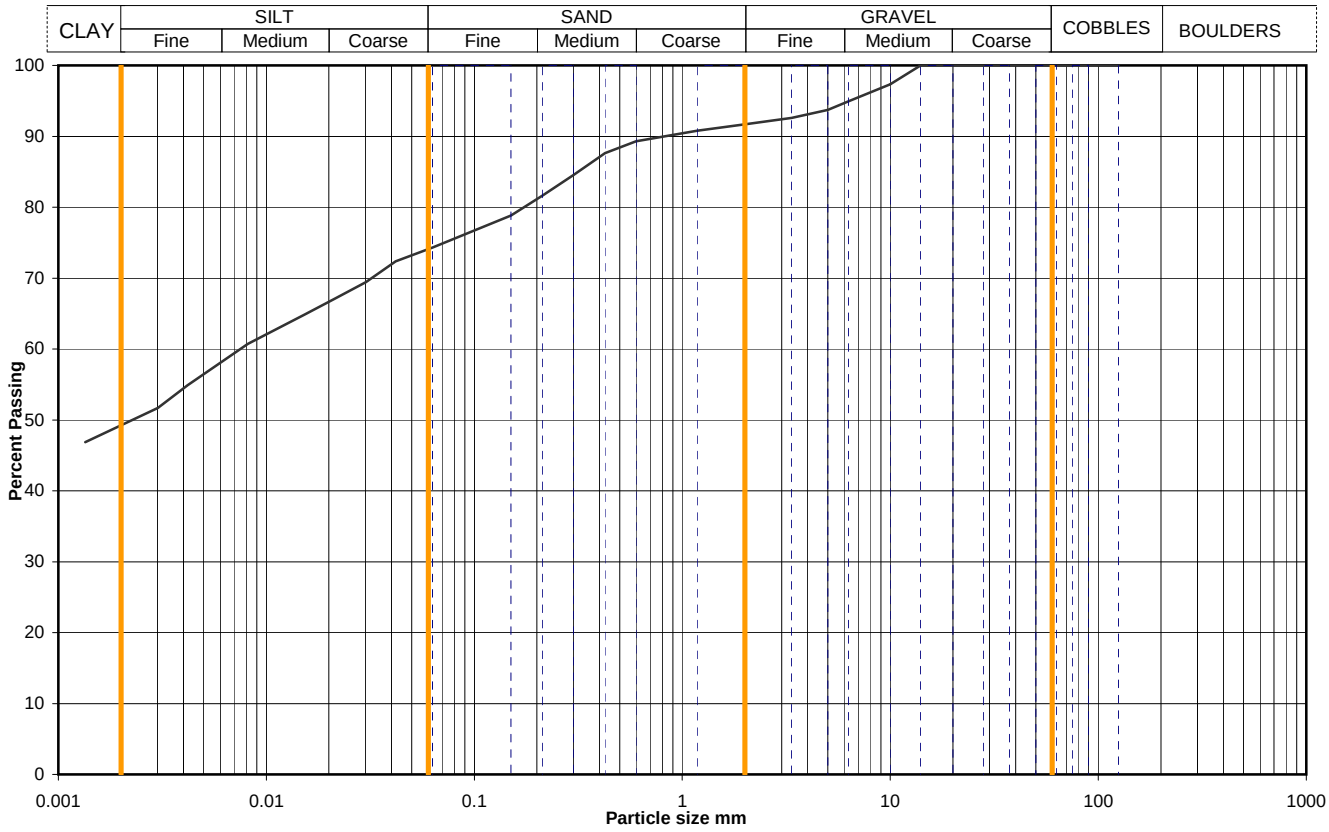
Uniformity Coefficient	D_{60} / D_{10}	26

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:01/03/2013 12:01	**Figure** **PSD 2**

Particle Size Distribution Analysis

Project No	22056	Sample Details:	Hole No	BH3		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	7.00		
			Samp No	11	Type	B
			ID	ESG22056201301310000000053		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	74
90	100	0.0419	72
75	100	0.0301	69
63	100	0.0216	67
50	100	0.0154	65
37.5	100	0.0081	61
28	100	0.0042	55
20	100	0.0030	52
14	100	0.0013	47
10	97		
6.3	95		
5.0	94		
3.35	93		
2.00	92		
1.18	91	Particle density, Mg/m3	
0.600	89		
0.425	88	2.65 assumed	
0.300	85	Dry mass of sample, kg	
0.212	82		
0.150	79	6.2	
0.063	74		

Soil description	Brown slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	8	8
	Sand	18	18
	Silt	25	25
	Clay	49	49

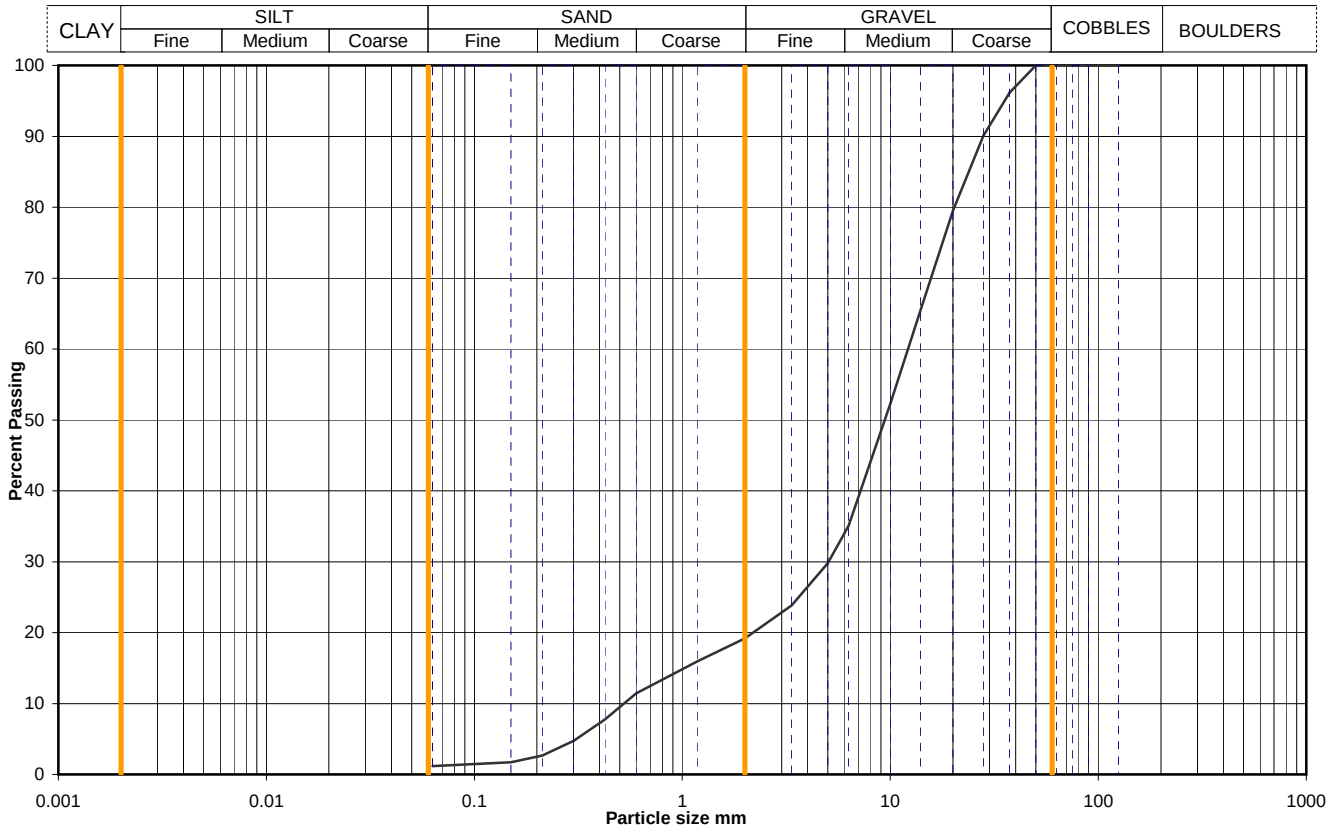
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:01/03/2013 12:01	**Figure** **PSD 3**

Particle Size Distribution Analysis

Project No	22056	Sample Details:	Hole No	BH4		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	2.50		
			Samp No	5	Type	B
			ID	ESG2205620130131963488		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	96		
28	90		
20	80		
14	65		
10	52		
6.3	35		
5.0	30		
3.35	24		
2.00	19		
1.18	16		
0.600	11		
0.425	8		
0.300	5	Dry mass of sample, kg	
0.212	3		
0.150	2	13.0	
0.063	1		

Soil description	Brown sandy GRAVEL with rare clay pockets.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	81	81
	Sand	18	18
	Silt	silt+clay =	
	Clay	1	1

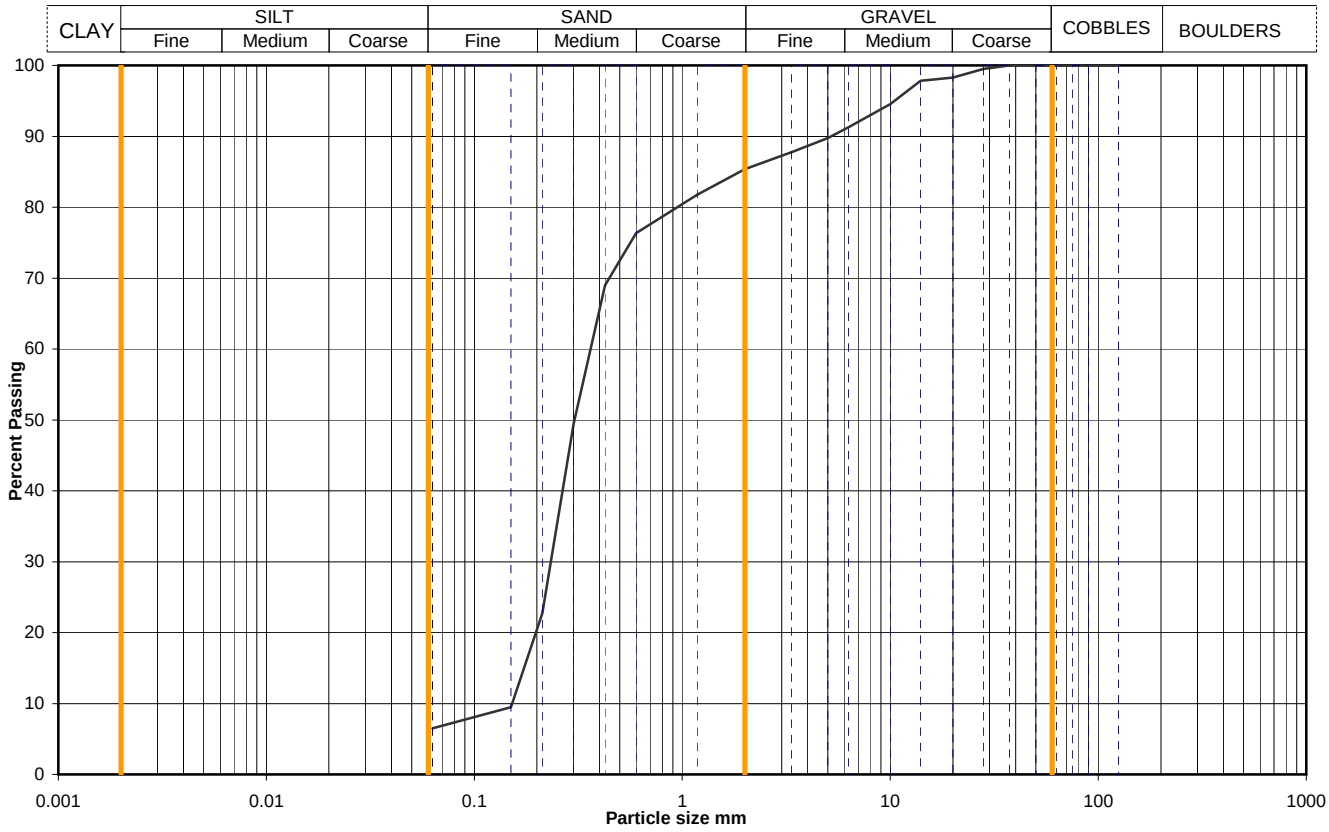
Uniformity Coefficient	D_{60} / D_{10}	23

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:01/03/2013 12:01	**Figure** **PSD 4**

Particle Size Distribution Analysis

Project No	22056	Sample Details:	Hole No	BH5		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	6.00		
			Samp No	7	Type	B
			ID	ESG2205620130131083759		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	99		
20	98		
14	98		
10	95		
6.3	91		
5.0	90		
3.35	88		
2.00	85		
1.18	82		
0.600	76		
0.425	69		
0.300	49	Dry mass of sample, kg	
0.212	23		
0.150	9	10.8	
0.063	6		

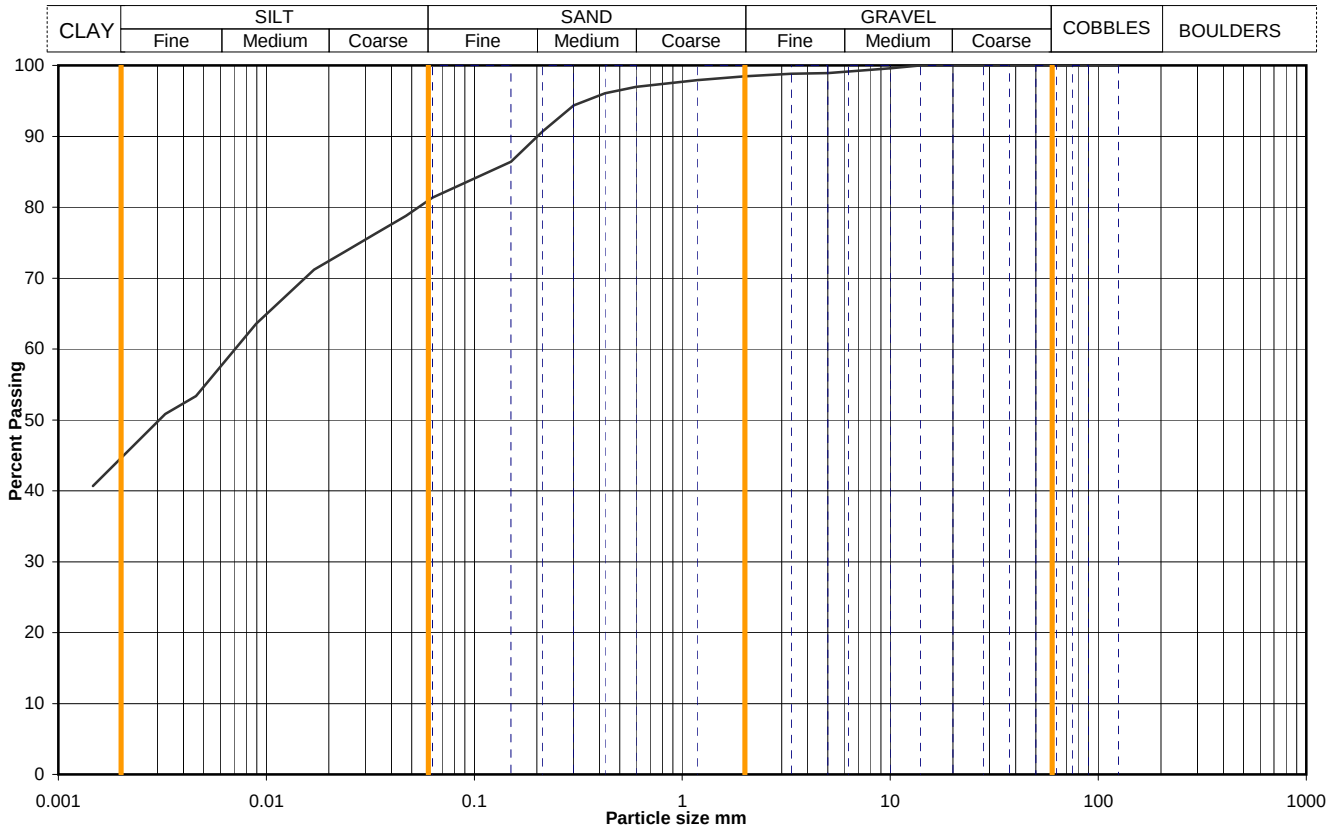
Soil description	Brown gravelly SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	15	15
	Sand	79	79
	Silt	silt+clay =	
	Clay	6	6

Uniformity Coefficient	D_{60} / D_{10}	2

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

Particle Size Distribution Analysis

Project No	22056	Sample Details:	Hole No	BH6		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	11.50		
			Samp No	11	Type	B
			ID	ESG22056201301310000000078		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	81
90	100	0.0469	79
75	100	0.0334	76
63	100	0.0238	74
50	100	0.0169	71
37.5	100	0.0089	64
28	100	0.0046	53
20	100	0.0033	51
14	100	0.0015	41
10	100		
6.3	99		
5.0	99		
3.35	99		
2.00	98		
1.18	98	Particle density, Mg/m3	
0.600	97		
0.425	96	2.65 assumed	
0.300	94	Dry mass of sample, kg	
0.212	91		
0.150	86	8.3	
0.063	81		

Soil description	Grey slightly sandy slightly gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	2	2
	Sand	18	18
	Silt	36	36
	Clay	44	44

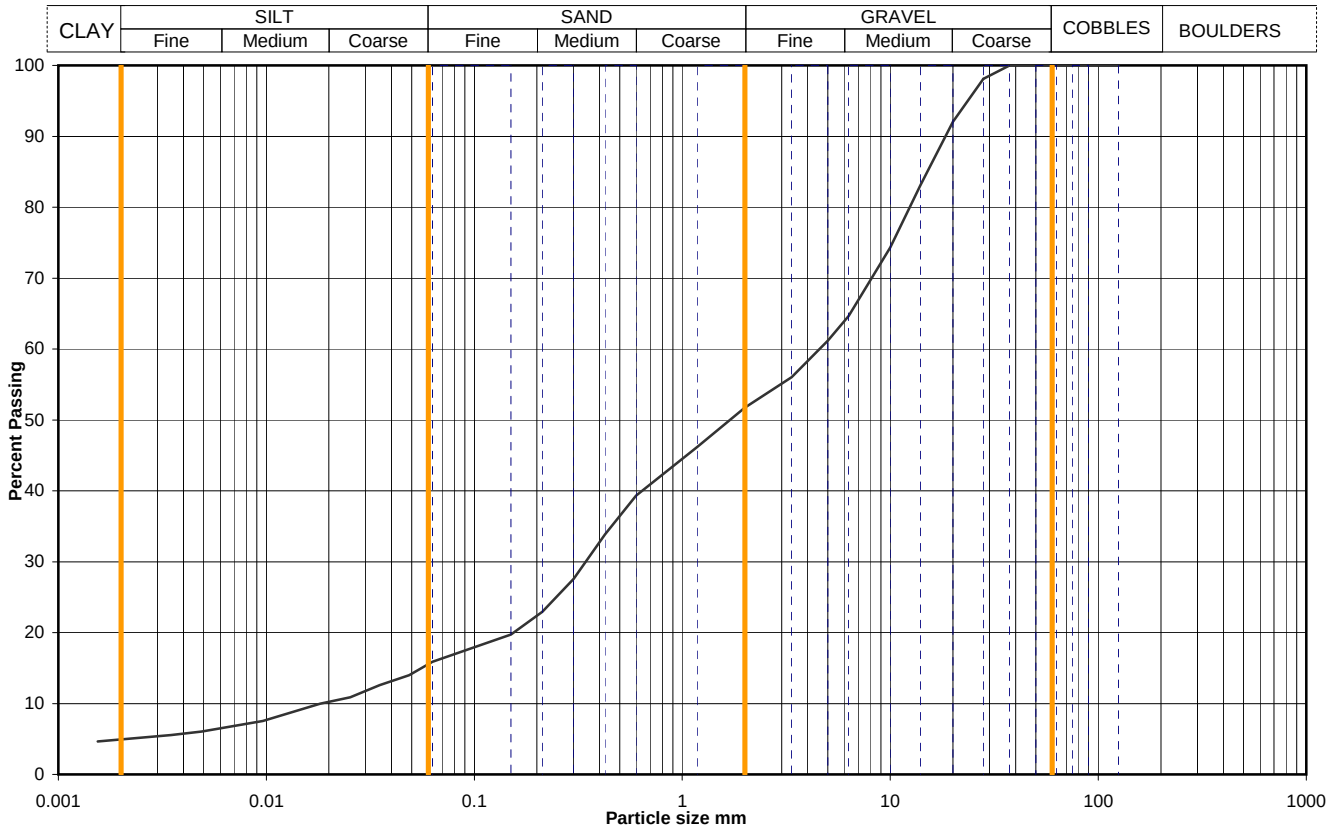
Uniformity Coefficient	D_{60} / D_{10}	Not applicable

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:01/03/2013 12:01	**Figure** **PSD 6**

Particle Size Distribution Analysis

Project No	22056	Sample Details:	Hole No	BH7		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	1.20		
			Samp No	6	Type	B
			ID	ESG22056201301310000000089		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	16
90	100	0.0487	14
75	100	0.0351	13
63	100	0.0253	11
50	100	0.0181	10
37.5	100	0.0096	8
28	98	0.0049	6
20	92	0.0035	6
14	83	0.0015	5
10	74		
6.3	65		
5.0	61		
3.35	56		
2.00	52		
1.18	46	Particle density, Mg/m3	
0.600	39		
0.425	34	2.65 assumed	
0.300	28	Dry mass of sample, kg	
0.212	23		
0.150	20	16.8	
0.063	16		

Soil description	Brown sandy gravelly CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	48	48
	Sand	36	36
	Silt	11	11
	Clay	5	5

Uniformity Coefficient	D_{60} / D_{10}	249

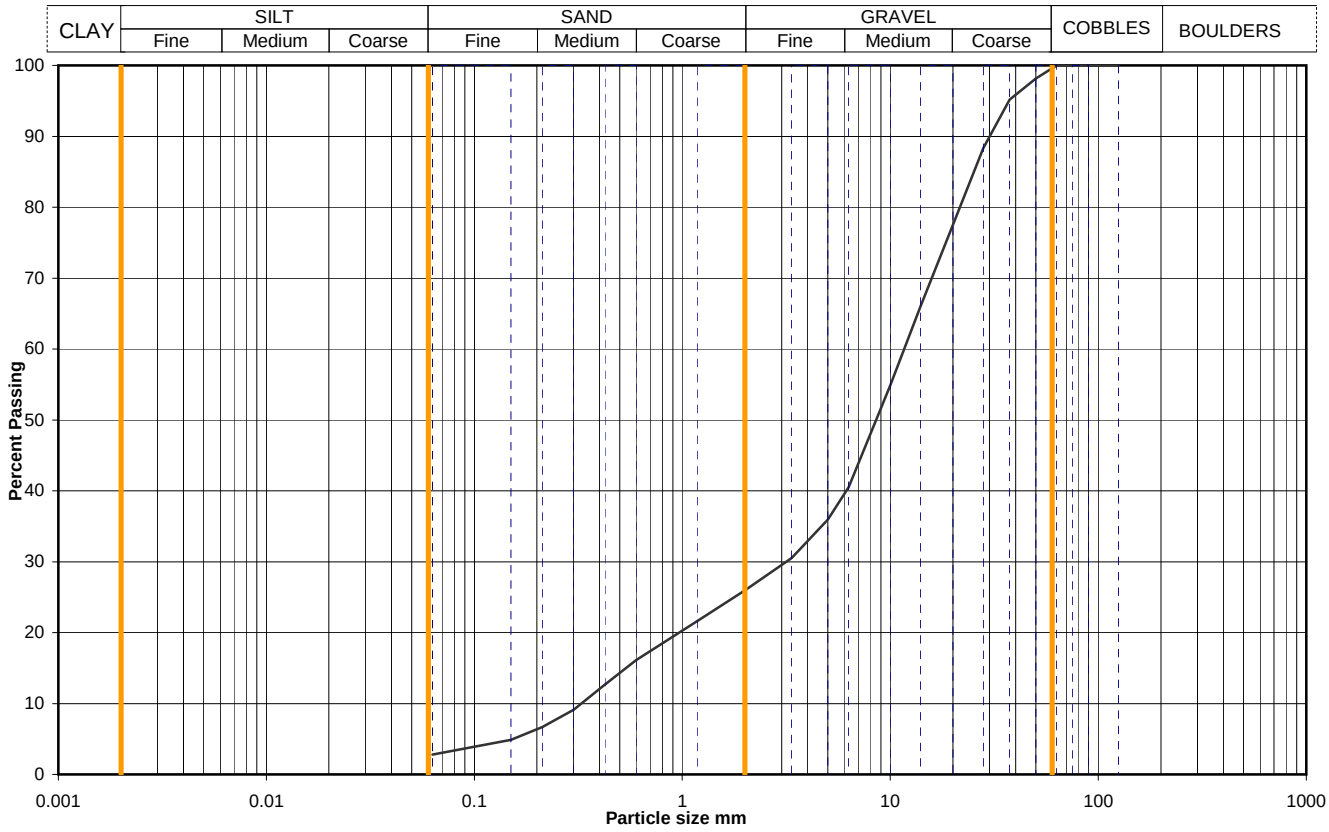
Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:01/03/2013 12:01

Figure **PSD 7**

Particle Size Distribution Analysis

Project No	22056	Sample Details:	Hole No	BH7		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	5.20		
			Samp No	17	Type	B
			ID	ESG22056201301310000000099		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	98		
37.5	95		
28	88		
20	77		
14	66		
10	55		
6.3	41		
5.0	36		
3.35	31		
2.00	26		
1.18	22		
0.600	16		
0.425	13		
0.300	9	Dry mass of sample, kg	
0.212	7		
0.150	5	26.0	
0.063	3		

Soil description	Brown very sandy GRAVEL with occasional clay pockets.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	74	74
	Sand	23	23
	Silt	silt+clay =	
	Clay	3	3

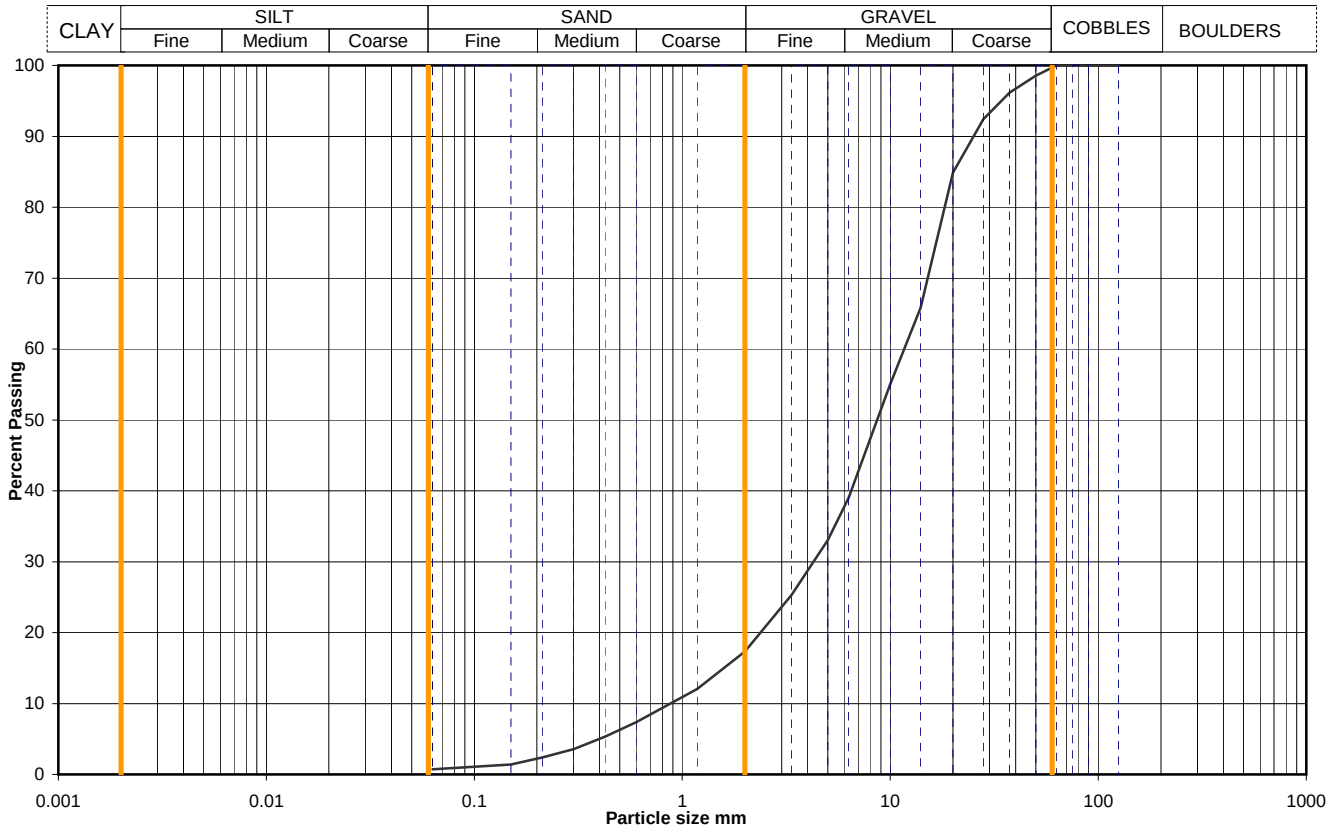
Uniformity Coefficient	D_{60} / D_{10}	36

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:01/03/2013 12:01	**Figure** **PSD 8**

Particle Size Distribution Analysis

Project No	22056	Sample Details:	Hole No	BH7		
Project Name	Coursers Farm, Colney Heath, Hertfordshire		Depth (m BGL)	18.20		
			Samp No	40	Type	B
			ID	ESG22056201301310000000121		
			Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	99		
37.5	96		
28	92		
20	85		
14	66		
10	55		
6.3	39		
5.0	33		
3.35	25		
2.00	17		
1.18	12		
0.600	7		
0.425	5		
0.300	4	Dry mass of sample, kg	
0.212	2		
0.150	1	16.3	
0.063	1		

Soil description	Brown sandy GRAVEL.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions *<60mm values to aid description only		Whole	*<60mm
	Cobbles / boulders	0	0
	Gravel	83	83
	Sand	17	17
	Silt	silt+clay =	
	Clay	0	0

Uniformity Coefficient	D_{60} / D_{10}	13

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

QA Ref SLR 2,9 Rev 88 Aug 11	ESG Environmental Scientifics Group	UKAS TESTING 1157	Printed:01/03/2013 12:02	**Figure** **PSD 9**

Our Ref: EFS/130742 (Ver. 1)
Your Ref: 22056

February 18, 2013

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Bretby Business Park
Ashby Road
Burton-on-Trent
Staffordshire
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Facsimile: 01283 554422

Mr S Mason
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Glossop House
Hogwood Lane
Finchampstead
Berkshire
RG40 4QW

For the attention of Mr S Mason

Dear Mr Mason

Soil Sample Analysis - Coursers Farm, Colney Heath

Samples from the above site have been analysed in accordance with the schedule supplied.
The sample details and the results of analyses for these samples are given in the appended report.

An invoice for this work will follow under a separate cover.

Where appropriate the samples will be kept until 19/03/13 when they will be discarded. Please call 01283 554493 for an extension of this date.
Please be aware that our policy for the retention of paper based laboratory records and analysis reports is 6 years.

The work was carried out in accordance with Environmental Scientifics Group Ltd (Laboratory and Analytical) Standard Terms and Conditions of Contract.

If I can be of any further assistance please do not hesitate to contact me.

Yours sincerely

for ESG

C Higgins-Jones
Project Co-ordinator
01283 554493

TEST REPORT
SOIL SAMPLE ANALYSIS

1252

Report No. EFS/130742 (Ver. 1)

ESG Geoenvironmental Consulting
Glossop House
Hogwood Lane
Finchampstead
Berkshire
RG40 4QW

Site: Coursers Farm, Colney Heath

The 12 samples described in this report were registered for analysis by ESG on 05-Feb-2013. This report supersedes any versions previously issued by the laboratory.
The analysis was completed by: 18-Feb-2013

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited
Any opinions or interpretations expressed herein are outside the scope of any UKAS accreditation held by ESG.

The following tables are contained in this report:

On behalf of
ESG :
Declan Burns

Operations Director
Laboratory and Analytical Business

Date of Issue: 18-Feb-2013

Tests marked '^' have been subcontracted to another laboratory.

ESG accepts no responsibility for any sampling not carried out by our personnel.

Where individual results are flagged see report notes for status.

		Units :	mg/kg	mg/l	pH Units	mg/l	mg/l	mg/l	mg/kg	%									
		Method Codes :	ICPACIDS	ICPWSS	PHSOIL	ICPBRE	KONECL	KoneNO3	KONENS	TSBRE1									
		Method Reporting Limits :	20	10		0.0001	1	0.2	0.5	0.005									
		UKAS Accredited :	Yes	Yes	Yes	No	No	No	No	No									
LAB ID Number CL/	**Client Sample Description**	**Sample Date**	**SO4-- (acid sol)**	**SO4-- (H2O sol) mg/l**	**pH units (AR)**	**Magnesium (BRE)**	**Chloride:(2:1)**	**Nitrate (2:1): mg/l**	**Ammoniacal Nitrogen:**	**Total Sulphur.**									
1303177	BH1 D 1 0.05	17-Jan-13	515	17	7.4	0.0017	10	2.9	12.3	0.043									
1303178	BH1 B 5 3.5	18-Jan-13	55	26	7.8	0.0019	6	0.3	2.1	0.024									
1303179	BH2 D 5 2.0	25-Jan-13	184	24	7.9	0.0013	8	0.3	2.9	0.019									
1303180	BH2 D 11 7.2	25-Jan-13	169	<10	7.9	0.0029	11	0.7	15.7	0.015									
1303181	BH3 D 1 0.05	08-Jan-13	423	47	7.2	0.0026	5	<0.2	7.3	0.026									
1303182	BH3 D 21 16.0	10-Jan-13	1430	376	8.3	0.0020	9	0.7	7.7	0.658									
1303183	BH4 D 3 1.25	26-Jan-13	247	45	7.7	0.0015	8	<0.2	4.9	0.029									
1303184	BH5 D 1 0.05	16-Jan-13	413	24	8.1	0.0020	6	<0.2	7.5	0.027									
1303185	BH5 B 6 4.5	16-Jan-13	61	16	8.1	0.0023	12	1.6	1.4	0.018									
1303186	BH6 B 2 0.5	14-Jan-13	312	16	7.6	0.0043	23	<0.2	4.9	0.018									
1303187	BH7 D 5 1.2	22-Jan-13	102	15	8.5	0.0020	5	0.7	2.1	0.008									
1303188	BH7 D 33 15.5	24-Jan-13	229	30	9.0	0.0023	5	7.3	4.4	0.032									

ESG Environmental Scientifics Group
Bretby Business Park, Ashby Road
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Client Name ESG Geoenvironmental Consulting

Contact Mr S Mason

Coursers Farm, Colney Heath

Soil Sample Analysis

Date Printed	**18-Feb-2013**
Report Number	**EFS/130742**
Table Number	**1**

Where individual results are flagged see report notes for status.

Customer ESG Geoenvironmental Consulting
Site Coursers Farm, Colney Heath
Report No S130742

Consignment No S33391
Date Logged 05-Feb-2013
Report Due 18-Feb-2013

ID Number	Description	Sampled	MethodID	CustServ	ICPACIDS	ICPBRE	ICPWSS	KONECL	KoneNO3	KONENS	PHSOIL	TSBRE1
				Report B	SO4-- (acid sol)	Magnesium (BRE)	SO4-- (H2O sol) mg/l	Chloride:(2:1)	Nitrate (2:1): mg/l	Ammoniacal Nitrogen:	pH units (AR)	Total Sulphur.
	Accredited to ISO17025				✓		✓				✓	
CL/1303177	BH1 0.05	17/01/13										
CL/1303178	BH1 3.50	18/01/13										
CL/1303179	BH2 2.00	25/01/13										
CL/1303180	BH2 7.20	25/01/13										
CL/1303181	BH3 0.05	08/01/13										
CL/1303182	BH3 16.00	10/01/13										
CL/1303183	BH4 1.25	26/01/13										
CL/1303184	BH5 0.05	16/01/13										
CL/1303185	BH5 4.50	16/01/13										
CL/1303186	BH6 0.50	14/01/13										
CL/1303187	BH7 1.20	22/01/13										
CL/1303188	BH7 15.50	24/01/13										

Note: For analysis where the scheduled turnaround is greater than the holding time we will do our utmost to prioritise these samples. However, it is possible that samples could become deviant whilst being processed in the laboratory.

In this instance please contact the laboratory immediately should you wish to discuss how you would like us to proceed. If you do not respond within 24 hours, we will proceed as originally requested.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time

Requested Analysis Key	
	Analysis Required
	Analysis dependant upon trigger result - **Note: due date may be affected if triggered**
	No analysis scheduled
^	Analysis Subcontracted

Where individual results are flagged see report notes for status.

The integrity of data for samples/analysis that have been categorised as Deviating may be compromised. Data may not be representative of the sample at the time of sampling.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ICPACIDS	Air Dried	Determination of Total Sulphate in soil samples by Hydrochloric Acid extraction followed by ICPOES detection
Soil	ICPBRE	Air Dried	Determination of Magnesium (BRE) in soil samples by water extraction followed by ICPOES detection
Soil	ICPWSS	Air Dried	Determination of Water Soluble Sulphate in soil samples by water extraction followed by ICPOES detection
Soil	KONECL	Air Dried	Determination of Chloride in Soil using water extraction at the stated water:soil ratio, discrete colorimetric detection
Soil	KoneNO3	Air Dried	Determination of Nitrate in soil samples by water extraction followed by colorimetric detection
Soil	KONENS	Air Dried	Determination of Ammonium in Soil using Potassium Chloride extraction, discrete colorimetric detection
Soil	PHSOIL	As Received	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.
Soil	TSBRE1	Air Dried	Determination of Total Carbon and/or Total Sulphur in solid samples by high temperature combustion/infrared detection

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,
- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
  All results on MCERTS reports are reported on a 105ºC dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,
- Results are expressed as mg/kg
- SG is expressed as g/cm^3@ 15^{o}C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile
CR Denotes Crocidolite
AM Denotes Amosite
NAIIS No Asbestos Identified in Sample
NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.
$$ Unable to analyse due to the nature of the sample
¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols. This may have resulted in deterioration of the sample(s) during transit to the laboratory. Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling
¥ Results for guidance only due to possible interference
& Blank corrected result
I.S Insufficient sample to complete requested analysis
I.S(g) Insufficient sample to re-analyse, results for guidance only
Intf Unable to analyse due to interferences
N.D Not determined **N.Det** Not detected
NS Information Not Supplied
Req Analysis requested, see attached sheets for results
Þ Raised detection limit due to nature of the sample
***** All accreditation has been removed by the laboratory for this result
‡ MCERTS accreditation has been removed for this result

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

END OF REPORT

Where individual results are flagged see report notes for status.

APPENDIX D
HORTICULTURAL LABORATORY TESTING RESULTS

Certificate of Analysis

Client	:	Agrivert Limited	Our Ref.	:	22056
Date Sampled	:	13 and 14-Nov-12	Date	:	23-Nov-12
Suite ID	:	LP1 - Topsoil	Sampled by	:	ESG
Site Details	:	Coursers Farm, Colney Heath, Hertfordshire			

Soil Sample Reference		**TP3**	**TP10**
Particle Size Distribution	**(USDA Classification)**		
Clay (<0.002mm)	%	29	27
Silt (0.002-0.05mm)	%	49	43
Sand (0.05-2.0mm)	%	22	30
Textural Class		CL	CL
Stone Content (Dry Weight Basis)			
Stones 2-20mm	%w/w	1.6	8
Stones 20-50mm	%w/w	3	12
Stones >50mm	%w/w	0	0
Soil Reaction & Soluble Salts			
pH Value †	units	6.3	6.2
Electrical Conductivity (Water)†	µS/cm	116	130
Organic Matter & Nutrient Status			
Organic Matter*	%	3.7 M	3.9 M
Total Nitrogen	%	0.14 ×	0.17 M
Extractable Phosphorous	mg/kg	15 ×	28 M
Extractable Potassium	mg/kg	307 ✓	407 ✓
Extractable Magnesium	mg/kg	47 ×	59 M

Notes:

† 1:2.5 water extract

* Walkley-Black

pH & EC Value

- Acid
- Alkaline
- Low salinity

Organic Matter & Nutrient Status

- ✓ No Improvement required
- M May benefit from improvement
- × Improvement recommended

USDA Soil Texture Classification

C	Clay	ZC	Silty Clay
SC	Sandy Clay	ZCL	Silty Clay Loam
CL	Clay Loam	L	Loam
SL	Sandy Loam	ZL	Silt Loam
SCL	Sandy Clay Loam	S	Sand
LS	Loamy Sand	Z	Silt

See report comments

Coding/interpretations/comments are valid only when viewed in accordance with the associated report

Sample(s) were analysed at the UKAS accredited laboratory of NRM

ESG. Glossop House, Hogwood Ln, Wokingham, Berks. RG40 4QW. Tel: 0118 932 4453 Fax: 0118 932 8383

Certificate of Analysis

Client	:	Agrivert Limited	Our Ref.	:	22056
Date Sampled	:	13-Nov-12	Date	:	23-Nov-12
Suite ID	:	LP7 - Subsoil	Sampled by	:	ESG
Site Details	:	Coursers Farm, Colney Heath, Hertfordshire			

Soil Sample Reference	**TP9**
Sample Depth (m bgl)	**0.4**

Particle Size Distribution **(USDA Classification)**

Clay (<0.002mm)	%	27	
Silt (0.002-0.05mm)	%	29	
Sand (0.05-2.0mm)	%	44	
Textural Class		CL	

Stone Content (Dry Weight Basis)

Stones 2-20mm	%w/w	14.1	
Stones 20-50mm	%w/w	14.2	
Stones >50mm	%w/w	4.3	

Soil Reaction & Soluble Salts

pH Value †	units	7.7	
Electrical Conductivity (Water)†	µS/cm	222	

Organic Matter Status

Organic Matter*	%	0.5	L

Notes:

† 1:2.5 water extract

* Walkley-Black

pH & EC Value

- Acid
- Alkaline
- Low salinity

Organic Matter

- L Low
- M Moderate
- H High

See report comments

USDA Soil Texture Classification

C	Clay	ZC	Silty Clay
SC	Sandy Clay	ZCL	Silty Clay Loam
CL	Clay Loam	L	Loam
SL	Sandy Loam	ZL	Silt Loam
SCL	Sandy Clay Loam	S	Sand
LS	Loamy Sand	Z	Silt

Coding/interpretations/comments are valid only when viewed in accordance with the associated report

Sample(s) were analysed by the UKAS accredited laboratory of NRM

ESG. Glossop House, Hogwood Ln, Wokingham, Berks. RG40 4QW. Tel: 0118 932 4453 Fax: 0118 932 8383

APPENDIX E
PLATES

PHOTOGRAPHS

Plate 1
Looking north over the site from the south east bund.

Plate 2
TP1 arisings.

Notes: Photographs of site and trial pit s	**Project** **Coursers Farm, Colney Heath, Hertfordshire** **Project No.** **22056/GI** **Carried out for** **Agrivert Limited**	Sheet 1 of 7

PHOTOGRAPHS

Plate 3
TP1 Topsoil overlying Made Ground.

Plate 4
TP2 arisings – topsoil left, subsoil front right and Made Ground rear right.

PHOTOGRAPHS

Plate 5
TP2 Topsoil overlying subsoil overlying Made Ground.

Plate 6
TP3, Made Ground extended to 1.5 m below the surrounding ground level.

PHOTOGRAPHS

Plate 7.
TP4 Made Ground with cobbles of brick, concrete and bitumen and inclusions of metal and plastic.

Plate 8.
TP5 Made Ground arisings with black organic staining.

PHOTOGRAPHS

Plate 9.
TP5 Glacial Deposits were encountered below the Made Ground at 1.5 m below the surrounding ground level.

Plate 10.
TP6 arisings.

PHOTOGRAPHS

Plate 11.
TP7, Made Ground including cobbles of brick, concrete, chalk, breeze block and wood.

Plate 12.
TP9 located just outside the base of the southern bund did not encounter Made Ground.

PHOTOGRAPHS

Plate 13.
TP10 Made Ground with cobbles of brick, concrete, wood, chalk and inclusions of hard and soft plastic.

Plate 14.
TP10 Made Ground arisings.

Proposed Anaerobic Digestion Facility - Land at Coursers Farm, Colney Heath, Hertfordshire

Extended Phase 1 Habitat Survey

Prepared by:
The Environmental Dimension Partnership (EDP)

On behalf of:
Agrivert Ltd

January 2012
Report Reference
EDP1421_02b

For EDP use
Report no. C_EDP1421_02b

Author	Ryan Stead
Approved	Jim Mullholland
QA	Claire Millington
Date	03 January 2012

THE ENVIRONMENTAL DIMENSION PARTNERSHIP

Contents

Appendices

Plan

Section 1
Introduction

1.1 The Environmental Dimension Partnership (EDP) have been instructed by Agrivert Ltd to undertake an extended Phase 1 Habitat Survey on land at Coursers Farm in Hertfordshire with regards to the proposals (as set out in sections 1.5-1.7 below). The site is located approximately 2km north of junction 22 of the M25 motorway and is centered at Ordnance Survey Grid Reference (OSGR) TL 203 044. The site covers an area of approximately 3.8 hectares (ha). The site is located within the administrative area of Hertsmere Borough Council (HBC).

1.2 The findings of this survey have been reviewed in light of relevant legislation, planning policy and biodiversity contextual information. The key findings and recommendations are set out in **Section 4**.

The Site

1.3 The site is in use as two grazed fields, one horse paddock and pond within a further horse paddock, adjacent to the main buildings of Coursers Farm, which comprises farm buildings and equestrian paddocks. It is currently used as livestock grazing and for the storage of inert material in the form of screening bunds. Within the proposed site there is a pond near the access with Coursers Road, and Tyttenhanger Stream is located along the southern boundary of the grazing field in which the site is located. The site is situated within a landscape dominated by pasture and arable fields, with a good network of hedgerows. Tyttenhanger Quarry is immediately adjacent to the west of the site, and is in use as a gravel extraction facility, operated by Lafarge Aggregates.

1.4 A Phase 1 Habitat survey in support of an application in January 2007 has been undertaken on the adjacent quarry site, which confirmed the presence of great crested newts (*Triturus cristatus*). There is currently permanent newt exclusion fencing surrounding the north eastern corner of the quarry which borders the Coursers Farm site.

The Proposals

1.5 The site is proposed for a development scheme which involves the construction of five storage tanks, three digestion tanks, a site office and reception building and ancillary development including an internal access road from Coursers Farm site (see Site Plan & Indicative Landscaping at **Appendix EDP 1**).

1.6 The proposed development will share the current vehicular access onto Coursers Road, however the traffic survey has identified that a length of hedgerow along the northern boundary of the site will require removal in order to improve visibility splays. This vegetation removal is also likely to include two trees.

1.7 The proposed development falls within the requirements of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 as a Schedule 2 project. However, a Screening Opinion adopted by Hertfordshire County Council (HCC) concluded that the scheme is not considered an EIA development. This report therefore does not constitute a full ecological 'environmental impact assessment' of the proposed development of the site.

Section 2
Methodology

Desk Study

2.1 A desk study was undertaken which involved searching the Multi-Agency Geographic Information for the Countryside (MAGIC) website[1] and contacting Hertfordshire Biological Records Centre (HBRC). Information on the following was requested from HBRC:

- Internationally designated sites within 5km;
- National and county-level designated sites within 2km;
- Notable/ protected species within 1km; and
- UK Biodiversity Action plan (BAP) habitats within 500m.

2.2 The London, Essex and Hertfordshire Amphibian and Reptile Trust were also contacted as records for great crested newt were known to exist for the adjacent quarry site.

2.3 Following the completion of the extended Phase 1 Habitat Survey, Dr Jenny Jones the County Recorder for Mammals was contacted regarding water vole (*Arvicola terrestris)* records.

Field Survey

2.4 The extended Phase 1 Habitat Survey was completed on the 8th March 2011. The weather conditions during the survey were sunny and dry, with a light breeze. The ambient temperature was approximately 14°C. The survey was undertaken with reference to published guidelines (JNCC, 2003) and included observations with respect to protected species and an assessment of the potential for the study area to support such species including breeding birds, badgers, bats and great crested newts. The vegetation was mapped and Target Notes were prepared on features of particular ecological interest.

2.5 Late March/early April is considered to be the start of the optimal season for undertaking this type of survey, and as such the list of species generated from the survey should not be taken as a comprehensive inventory for the study area. However, due to the management of the fields and nature of the habitats mapped, it is not considered that the survey date is a constraint on the information gathered for this report.

[1] www.magic.gov.uk

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Section 3
Summary of Findings

Desk Study

Statutory Designated Sites for Nature Conservation

3.1 The proposed development site is not covered by any statutory nature conservation designations. There are no internationally designated sites present within 5km, however there are two statutorily designated sites within a 2km radius. These are summarised below, and a map illustrating their distribution in relation to the site is located in **Appendix EDP 2** of this report:

- Redwell Wood Site of Special Scientific Interest (SSSI) is a broadleaved, mixed and yew woodland situated within 2km of the site; and

- Colney Heath Local Nature Reserve (LNR) contains a remnant of the heath vegetation community that used to be extensive in Hertfordshire, and is located within 0.5km of the site boundary.

3.2 No other statutory designated sites found within the 5km search radius.

Non-statutory Designated Sites for Nature Conservation

3.3 The desk study has identified 28 Local Wildlife Sites within a 2km radius of the site. The sites are summarised in **Table EDP 1**; and full descriptions with a distribution map are contained within the HBRC data within **Appendix EDP 2**.

Name	Grid Reference	Description
Smallford Pit	TL195068	An infilled former gravel pit with well developed secondary grassland, areas of standing water, a pond and fishing lake.
Knight's Wood	TL185055	Ancient semi-natural woodland, dominated by Pedunculate Oak (*Quercus robur)*.
Tyttenhanger Gravel Pits	TL190050	Sand and gravel pits, many of which have been flooded and are an important area for breeding waders.
St. Mark's Churchyard and Graveyard	TL197061	Churchyard and graveyard supporting unimproved neutral to acid grassland.
River Colne,	TL194055	A section of the River Colne which is important for

SW of Colney Heath		invertebrates.
St. Mark's Close, London	TL19-06-	Buildings and environs important for protected species.
Colney Heath Common	TL203058	A mosaic of neutral, acid and marshy grasslands, plus heathland, scrub, and riverine habitats.
Colney Heath Farm Meadows	TL207055	Unimproved neutral to acid grasslands along the River Colne.
Sleapshyde Gravel Pit	TL203064	A gravel pit which has been restored to an amenity/ wildlife park and now supports a mosaic of habitats, including open water, wet neutral grassland, tall herb, scattered scrub and plantation.
Bush Wood	TL224054	Ancient semi-natural woodland, dominated by Pedunculate Oak and Hornbeam (*Carpinus betulus)*.
Tollgate Wood	TL216055	Broadleaved woodland dominated by Pedunculate Oak and Ash (*Fraxinus excelsior)*.
Frederick's Wood	TL207051	Mosaic site of secondary woodland and remnant heath/ acid grassland.
Coppice Wood	TL184048	Ancient semi-natural Pedunculate Oak/ Hornbeam coppice-with-standards woodland.
The New Plantation	TL199047	Old woodland with Pedunculate Oak and Ash canopy.
River Colne by Bowmansgreen Farm	TL186040	Section of the River Colne with well vegetated banks and good communities of emergent aquatic vegetation.
Walsingham Wood	TL215039	Part ancient semi-natural Pedunculate Oak/ Hornbeam woodland.
Cobs Ash	TL213032	Ancient semi-natural Pedunculate Oak/ Hornbeam coppice woodland.
Cangsley Grove	TL218034	Ancient semi-natural Pedunculate Oak/ Hornbeam woodland.
Round Wood	TL211031	Ancient semi-natural Pedunculate Oak/ Hornbeam woodland.
Scrubby grassland by Frederick's Wood	TL207048	Unimproved acid grassland with scattered Hawthorn (*Crataegus monogyna)* patches.
Shenley Lodge Farm Wood	TL201024	Ancient semi-natural woodland of Pedunculate Oak/ Ash with Hazel (*Coryllus avellana)* coppice.
Potwells	TL216030	Wet acidic grassland and scrub
North Mymms Park	TL217047	Parkland of semi-improved neutral grassland with frequent planted trees.
North Mymms Churchyard	TL221044	Churchyard with old neutral grassland and scattered ornamental trees.

North Mymms	TL21-04-	Buildings and environs important for protected species.

Park Area		
North Mymms Icehouse	TL21-03-	Icehouse and environs important for protected species.
Coursers Farm Area	TL20-04-	Buildings and environs important for protected species.
Coursers Road Gravel Pit	TL20-03-	Hedgerow and ditch on Coursers farm important for breeding Tree Sparrow (*Passer montanus)*, a Local Biodiversity Action Plan Species

Table EDP 1: Non-statutory Designations within 2km of the site.

3.4 An Ancient Woodland Inventory site also lies within 300m of the Coursers Farm site boundary.

Protected/Notable Species

Bats

3.5 A number of bat records were returned by HBRC as within 1km of the site. Species recorded include brown long-eared (*Plecotus auritus)*, Natterer's (*Myotis nattereri)* and pipistrelle species (*Pipistrellus* sp.).

Other Mammals

3.6 There are records of badger (*Meles meles)* and water vole within 1km of the site. Dormice (*Muscardinus avellanarius)* have been recorded within 2km of the site.

Birds

3.7 There are several records of tree sparrow in the vicinity of Coursers Farm. This species has a Local Biodiversity Action Plan and in addition an important breeding area has been identified for tree sparrows located at Coursers Gravel Pit. The tree sparrow is listed as having the highest conservation concern, being categorised as a Red List Species within the UK.

Amphibians and Reptiles

3.8 There are records for common lizard (*Lacerta vivipara)* and grass snake (*Natrix natrix)* within 1km of the site, and whilst HBRC and the London, Essex and Hertfordshire Amphibian and Reptile Trust hold no records of great crested newts within 1km, several have been recorded within 5km of the proposed development. However, it is understood that this species has been recorded on the adjacent site managed by Lafarge Aggregates.

3.9 No existing records of protected or notable species were located within the site.

Field Survey

Habitats

3.10 The distribution of the key habitats is illustrated on the Habitat Features Plan (**EDP 1421/01**), which accompanies this report, and this should be read in conjunction with the following habitat descriptions.

Improved grassland

3.11 The majority of the site is dominated by improved grassland (Target Note 9 **Appendix EDP 3**). The larger field making up the site is sheep grazed and found to contain a close cropped sward with low species diversity. A horse paddock (Target Note 11 **Appendix EDP 3**) to the east of the site within Coursers Farm was also noted as supporting improved grassland.

Species-poor semi-improved grassland

3.12 The field (Target Note 4 **Appendix EDP 3**) located in the northern section of the site was found to be slightly less improved and more rank in it's nature.

Amenity grassland

3.13 Small areas of amenity grassland (Target Note 5 **Appendix EDP 3**) were noted within the site boundary at the entrance to the Coursers Farm complex. These were found to be well mown and contained a short sward with a limited number of forb species.

Hedgerow

3.14 A species-poor short hedgerow (Target Note 3 **Appendix EDP 3**) dominated by hawthorn and blackthorn was mapped along the northern boundary of the site adjacent to Coursers Road. This feature was noted to be gappy in places and in poor condition.

Open Water (Ponds)

3.15 The survey noted two ponds within the site boundary. One pond (Target Note 7 **Appendix EDP 3**) is located adjacent to the entrance of the farm access road. This is the larger of the two ponds. It supported a wide band of marginal planting (mostly variegated reed canary-grass (*Phalaris arundinaceavariagata*), and appeared to be a well established habitat.

3.16 The smaller pond (Target Note 8 **Appendix EDP 3**) was found to support little in the way of either aquatic or marginal vegetation and appeared to be a relatively recently created feature.

3.17 Three further ponds (Target Notes 15 **Appendix EDP 3**) were noted following the completion of the extended Phase 1 Habitat survey. The first was a small pond located in the corner of the field opposite the site, across Coursers Road. A further two ponds were found to the east of the site within the farm complex.

Running Water (wet ditch)

3.18 The ditches that run along the western and southern boundaries were found to be a mixture of dry and wet habitats. The northern end of the western boundary ditch was found to be dry and supported rank grasses along with limited forb species. At the southern end the ditch was wet containing approximately 5-10cm of water. Plant species within the inundated length were similar to those in the northern section.

3.19 Located to the south of the site, Tittenhanger Stream (Target Note 14 **Appendix EDP 3**) drains from west to east. At the time of the survey the water within this ditch reached a maximum depth of approximately 10cm. The ditch was confined by tall, steep grassy banks.

Scattered Scrub

3.20 A small area of scattered scrub (Target Note 2 **Appendix EDP 3**) dominated by bramble and hawthorn was mapped in the north west corner of the site.

Mature trees

3.21 No mature trees were mapped within the site boundary; however, two large oak trees (one at Target Note 6 and one close to Target Note 1 **Appendix EDP 3**) were noted adjacent to either side of the northern section of the site. No further trees were mapped.

Buildings

3.22 No buildings are present within the site boundary, however there are numerous large agricultural sheds (Target Note 12 **Appendix EDP 3**) located adjacent to the site within the Coursers Farm complex. In addition at least two residential properties are located within 150m of the eastern boundary of the site.

Hardstanding

3.23 Coursers Road to the north and the access road into Coursers Farm are located along the northern and eastern boundaries respectively. There are also numerous tarmac roads, hardstanding access tracks and yards which are located within the Coursers Farm complex (Target Note 13 **Appendix EDP 3**).

Arable

3.24 A large arable field was mapped to the south of Tittenhanger Stream.

Protected/Notable Species

Bats

3.25 As the site consists of open fields it does not support any opportunities for roosting bats. It offers limited opportunities for both foraging and commuting bats, as no significant boundary hedgerows or lines of vegetation are present.

Badgers

3.26 A single hole (close to Target Note 3) was identified within the base of the hedgerow adjacent to the main road along the northern boundary of the site. The hole showed no signs of occupation by badgers, and was surrounded by a number of active rabbit holes. No other evidence of badger field signs were noted within the survey. However the initial survey noted this as a potential single hole non-active badger sett.

Water voles

3.27 The ditches along the western boundary and to the south of the site were noted as having limited potential for water vole. At the time of the survey the majority of the western ditch was found to be dry, and therefore unsuitable for this species. However, water was noted to be flowing slowly within the ditch on to the south (Tyttenhanger Stream), at a depth of up to approximately 10cm.

3.28 A small number of mammal footprints were noted within the mud adjacent to this water course. These were not fresh, but at the time of survey were assessed as possible water vole field signs. Numerous holes were also noted within the ditch banks in this area. No other sign (such as feeding stations, droppings etc) of water vole were noted.

Dormice

3.29 Although the wider countryside contains suitable habitats (such as woodland and a good hedgerow network), the site itself has limited opportunities for this species. The species poor roadside hedgerow on the northern boundary of the site is the only habitat which offers anything close to suitable dormouse habitat.

Breeding Birds

3.30 Due to the lack of nesting opportunities, the site is unlikely to support a significant number or diversity of breeding birds. The roadside hedgerow is likely to provide the only opportunity for breeding birds within the site.

Amphibians and Reptiles

3.31 The pond located within the site (Target Note 8 **Appendix EDP 3**) supported little aquatic or marginal vegetation, and appeared to offer only limited opportunities for breeding great crested newts. However, the larger pond within the site located adjacent to the site (Target Note 7 **Appendix EDP 3**) close to the current farm access road, showed significant amounts of both aquatic and marginal vegetation, and as such appeared to offer a close to optimal conditions for breeding great crested newts.

3.32 Ongoing surveys have identified that all five ponds support great crested newts. These surveys are scheduled to be completed by mid-June 2011.

3.33 Due to the current grazing management of the fields, the site does not currently offer any suitable habitat for reptiles. However, the adjacent ditches along the western boundary and to the south of the site may offer useful foraging habitat and connection corridors for grass snakes.

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Section 4
Discussion and Recommendations

4.1 This section discusses the findings as set out in **Section 3** in relation to relevant planning policy and legislative considerations and sets out our recommendations in relation to these findings and the scheme.

The Proposals

4.2 It is understood that the proposals for the site include the following:

- The recontouring of the site and removal of the small field pond within the improved grassland; and
- The construction of five storage tanks, three digestion tanks a site office and reception building and ancillary development.

Legislation and Policy

4.3 Hertsmere Borough Council has set out in its revised 2010 Core Strategy 'Hertsmere Local Development Plan Document' a number of policies that are aimed to guide development within the Borough. Policy CS12 Protection and enhancement of the natural environment is the most relevant policy for ecology. This policy states that..."*All development proposals must conserve and enhance the natural environment of the Borough, including biodiversity, protected trees, landscape character and sites of ecological and geological value, in order to maintain and improve environmental quality. Proposals should provide opportunities for habitat creation and enhancement throughout the life of a development*."

Assessment

Designated Sites

4.4 The Local Wildlife Sites in closest proximity of the proposed development site include Frederick's Wood, which is an area of secondary woodland; the scrubby grassland site adjacent to it; and also The New Plantation, an area of old oak and ash woodland.

4.5 Due to the reasons for their designation and the fact that the proposed development will not result in the increased recreational use of these sites, it is not expected that they will suffer any significant adverse impact through the development proposals.

Protected and Notable Species

Bats

4.6 The site holds limited opportunities for foraging or commuting bats. There are no features that offer roosting opportunities for bats within the site. It is therefore considered that the proposed development of the site will not have an adverse effect on the local bat population.

Badgers

4.7 As a potential badger sett has been noted on the northern boundary of the site, it is recommended that this is investigated further. A survey should be conducted to establish the use of this single hole and therefore what effect the proposed development may have on the local badger population.

Water voles

4.8 Limited habitat for water vole was noted on the boundaries of the site. Several small mammal footprints were recorded in the ditch to the south of the site. As such it is recommended that a water vole survey of these areas is conducted by a suitability experienced ecologist, to establish whether this species will experience any adverse effects through the development proposals.

Dormice

4.9 Due to the general unsuitability of the habitat on site no further survey is recommended for dormice.

Birds

4.10 Breeding birds, their nests, eggs and young are protected under the Wildlife and Countryside Act 1981 (as amended).

4.11 The site was assessed as containing limited habitat that was suitable for nesting birds. As a general recommendation, features with potential for supporting breeding birds should not be removed between February to August, inclusive, unless breeding birds are confirmed absent by a suitably qualified ecologist within five working days of the works commencing.

4.12 Should breeding birds, their nests, eggs and/or young be found during this period, no works will commence until the breeding has ceased. This is normally defined as when the young have fledged and are no longer dependent on the nest.

4.13 With respect to enhancement opportunities, it is recommended that any new landscape planting should include medium to long-term opportunities for nesting sites (e.g. the inclusion of hedge and shrub planting) and should include a high diversity of native fruit and nut bearing trees and shrubs within the planting schedule (see Landscape Assessment report).

Amphibians and Reptiles

4.14 Great crested newts and their places of refuge are subject to protection under the Wildlife and Countryside Act 1981, as amended, the Conservation (Natural Habitats &c.) Regulations 2010, and the Countryside and Rights of Way Act 2000. They are considered to be European Protected Species, which is the highest level of protection afforded to species in the United Kingdom.

4.15 A detailed schedule of surveys have been undertaken which have identified great crested newts within the pond on site. The information from these surveys will give an estimated population class for the great crested newts present on site. The current proposals indicate that the pond is to be lost and a replacement pond constructed. Due to the low quality habitat the current pond offers great crested newts, it is likely that the proposed pond can be created to include a much more beneficial habitat for the newt population within and around the site. Detailed recommendations are given in the separate great crested newt report **EDP1421_03b**.

4.16 All species of reptile are protected from intentional or reckless harm under the Wildlife and Countryside Act (1981, as amended). In addition, certain species of reptile receive a higher level of protection and/or are subject to specific action through the UK BAP.

4.17 No potential reptile habitat was identified on site. The potential for the ditches to support grass snakes has been highlighted, however the development proposals will not have a direct effect on these areas and therefore if reptiles are indeed present, it is unlikely that they will be subject to any adverse impacts through the implementation of the development proposals.

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Section 5
Summary and Conclusions

5.1 EDP has been commissioned by Agrivert Ltd to undertake an extended Phase 1 Habitat Survey of a site at Coursers Farm, Hertfordshire. A detailed field survey was undertaken by an appropriately experienced Ecologist on 8th March 2011.

5.2 The development proposals are not likely to have an adverse impact on any of the designated sites identified within the desk study. The survey found no notable habitats within the site. The presence of great crested newts has been confirmed in the two ponds within the site. The site has limited potential to support breeding birds within the scrub and hedgerow. No other protected or notable species are likely to be affected by the development proposals.

5.3 Once the great crested newt surveys have been completed a suitable mitigation strategy will be drawn up in order to ensure that the proposals have minimal affect on this species.

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Appendix EDP 1
Site Plan & Indicative Landscaping

Notes.

1. Reproduced from the Ordnance Survey Map with the permission of the Controller of Her Majesty's Stationary Office, Crown Copyright, Licence Number 100020449.
2. All bunds shown on this plan are for indicative purposes only.
3. Material finishes are indicative only.

Legend

- Indicative Grass Planting
- Indicative Shrub Planting
- Indicative Bund Contours
- Indicative Tree Planting
- Existing Trees
- Proposed Hardstanding
- Proposed Hedgerow

Rev	Description	Date	By

AGRIVERT
Agrivert Limited
The Stables,
Radford,
Chipping Norton,
OX7 4EB
Tel 01608 677 700,
Fax 01608 677 711,
email mail@agrivert.co.uk

Client

Project
Anaerobic Digestion Facility
Coursers Farm
Colney Heath

Title
Site Plan & Indicative Landscaping

Scale @ A3	Drawn by/Checked by	Date
1:1250	JM/JI	16.12.11

Job no.	Dwg No.	Revision
COU001	P300	1

NORTH

Coursers Farm Stables
Pond
OH
Existing Pond
Proposed Pond
Storage 2
Storage 3
Pump Room
Storage 4
Storage 5
Site Office
Visitor & overflow parking
Reception Building
Entrance
Exit
Control Room
Biofilter
Wet Scrubber
Weighbridges with control kiosk
Oil Tank
Gas Engine Associated Equipment
Flare
3n° Gas Engine Units
Storage 1
Secondary Digester 1
Pumping Containers
Primary Digester 1
Primary Digester 2
Transformer
Electricity Board Service Distribution Panel
Crop Feeder
Farm access to Silage Clamp
Drain
Attenuation Pond
Silage Clamp
COURSERS ROAD
El Sub Sta
Pond

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Appendix EDP 2
Desk Study Data

KEY INTERNATIONAL, NATIONAL & LOCAL SITE DESIGNATIONS

Statutory designations

RAMSAR
Ramsar sites are designated under the Convention on Wetlands of International Importance especially as Waterfowl Habitat. Wetlands are designated, protected and promoted in order to stem the progressive encroachment on and loss of wetlands, which are broadly defined to include marsh, fen, peatland and water.
There is 1 Ramsar site in Hertfordshire. All designated Ramsar sites are SSSIs.

Special Area of Conservation (SAC)
Special Areas of Conservation are sites designated by Member States under the EC Habitats Directive. The aim is to establish a European network of important high quality conservation sites that will make a significant contribution to conserving habitats and species considered to be most in need of conservation at a European level.
There are 2 SAC sites in Hertfordshire.

Special Protection Area (SPA)
Special Protection Areas are designated under the EC Birds Directive, to conserve the habitat of certain rare or vulnerable birds and regularly occurring migratory birds. Any significant pollution or disturbance to or deterioration of these sites has to be avoided.
There is 1 SPA site in Hertfordshire, All designated SPAs are SSSIs.

National Nature Reserve (NNR)
National Nature Reserves are statutory reserves established for the nation under the Wildlife and Countryside Act, 1981. NNRs may be owned by relevant national body (e.g. Natural England in England) or established by agreement; a few are owned and managed by non-statutory bodies. NNRs cover a selection of the most important sites for nature conservation in the UK. There is 1 NNR in Hertfordshire.

Site of Special Scientific Interest (SSSI)
Sites of Special Scientific Interest are areas notified under the Wildlife and Countryside Act, 1981, as being of 'special interest for nature conservation'. They represent the finest sites for wildlife and natural features in Great Britain supporting many characteristic, rare and endangered species, habitats and natural features. Notification as a SSSI is primarily a legal mechanism organised by Natural England and selected according to specific criteria. The *Guidelines for the Selection of Biological SSSIs*, published in 1989 by the Joint Nature Conservancy Council, set down the selection criteria for both biological and geological SSSIs.
There are 43 SSSIs in Hertfordshire.

Area of Outstanding Natural Beauty (AONB)
AONBs are nationally important landscapes that are not National Parks, designated by the Countryside Agency to aid their protection and management. An AONB cannot be included in a simplified planning zone and it is not promoted for active recreation such as a National Parks. The AONB in Hertfordshire has an associated body concerned with the area's conservation.
There is 1 AONB in Hertfordshire.

Local Nature Reserve (LNR)
Land owned, leased or managed by Local Authorities and designated under the National Parks and Access to the Countryside Act. A site of some nature conservation value managed for educational objectives - no need for SSSI status. Some reserves are managed by a non-statutory body. Local authorities have the power to pass bylaws controlling (e.g.) access, special protection measures. There are 36 LNRs in Hertfordshire.

Non-statutory Site designations

Local Wildlife Site / Wildlife Sites
Local Wildlife Sites are non-statutory sites designated at a county level as being of conservation importance and often recognised in Local authority development plans. The aim of this identification is to protect such sites from land management changes, which may lessen their nature conservation interest, and to encourage sensitive management to maintain and enhance their importance. Although WS have no statutory protection they need to be considered in the planning process through Planning Policy Guidance like PPG9 which refers to the Town & Country Planning Act 1990 Section 30. This states that nature conservation issues should be included in the surveys of local authority areas to ensure that the plans are based on fully adequate information about local species, habitats, geology and landform. Plans should be concerned not only with designated areas but also with other land of conservation value and the possible provision of new habitats.
There are 1954 Local Wildlife Sites in Hertfordshire (December 2009)

Regionally Important Geological / Geomorphological Site (RIGS)
Regionally Important Geological/Geomorphological Sites are non-statutory earth science sites. The RIGS networks are locally based voluntary groups drawing on both professional and interest groups identifying sites using a methodical and rational approach. RIGS are analogous to non-statutory biological sites - they are not a second tier but sites of regionally or local importance in their own right. There are 21 RIGS in Hertfordshire.

Ancient woodland
Ancient Woodland is land that has had a continuous woodland cover since at least 1600 AD and has only been cleared for underwood or timber production. It can be placed in two categories:
Ancient Semi-natural Woodland (ASNW) – woodland that retains a native tree and shrub cover that has not been planted, although it may have been managed by coppicing or felling and allowed to regenerate naturally. This covers all stands of ancient woodland which do not obviously originate from planting.
Ancient replanted Woodland (AWS - ancient woodland site or PAWS - plantation on ancient woodland site) – woodland where the original tree cover has been felled and replaced by planting, often with conifers and usually this century.
There are 657 ASNW, AWS and PAWS in Hertfordshire.

Ecology Database Site (EDS) / Ecosites
These sites are considered to be of significance for their wildlife and/or geological features in at least a local context. They are sites with some semi-natural habitat features and/or species interest and are supported by data held in the Hertfordshire Biological Records Centre database. There are about 3000 Ecosites in Hertfordshire (Dec 2009).

HBRC, January 2011

Statutory sites

STATUS	NAME	GRID	AREA (ha)	SITE REFERENCE
LNR	Colney Heath	TL202058	22.603	69/001
SSSI	Redwell Wood	TL212025	52.601	78/011

HERTFORDSHIRE SPECIES RECORDS

5km_search

International designation

- Dormouse
- Otter
- Great Crested Newt
- Water Vole
- Bat

Produced by

HERTFORDSHIRE BIOLOGICAL RECORDS CENTRE

It should be noted that the species dots do not represent the exact location but general area of the species recorded. Many of these records have been exported from a 1km, 2km or even 10km data source. These plans have been supplied for information purposes only. No copying, in whole or part, is permitted. Please observe copyright restrictions.

Wildlife Sites Report					
SITE REFERENCE	**NAME**	**GRID REFERENCE**	**AREA(ha)**	**RATIFIED**	**DESCRIPTION**
68/003	Smallford Pit	TL195068	61.35	1997	A largely infilled former gravel pit supporting well developed secondary grassland along with some former old acid/neutral grassland remnants. Additional habitats include numerous hollows supporting seasonal and more permanent areas of standing water, a pond and a fishing lake. A small brook also runs through the site. The majority of the grassland has developed naturally on the site and is rough and relatively species-poor. Perennial Rye-grass (Lolium perenne) occurs in the sward in places where attempts were made to restore the site. However, overall, a reasonably diverse grassland flora has been recorded, though many of these are ruderal species. Species recorded include Bird's-foot Trefoil (Lotus corniculatus), Lesser Stitchwort (Stellaria graminea), Meadow Buttercup (Ranunculus acris), Common Sorrel (Rumex acetosa), Germander Speedwell (Veronica chamaedrys) and Oxeye Daisy (Leucanthemum vulgare). Pyramidal Orchid (Anacamptis pyramidalis) and Bee Orchid (Ophrys apifera) have been recorded in the north of the site. Remnants of old undisturbed acid/neutral grassland survive to the perimeter of the site and support species such as Red Fescue (Festuca rubra), Common Bent (Agrostis capillaris), Common Sorrel, Agrimony (Agrimonia eupatoria), Meadow Buttercup, Common Knapweed (Centaurea nigra), Sheep's Sorrel (Rumex acetosella) and Lady's Bedstraw (Galium verum). Within the ephemeral/open water habitats a wide range of aquatic/wetland flora has been recorded, including several uncommon species, such as Fan-leaved Water Crowfoot (Ranunculus circinatus), Spiked Water-milfoil (Myriophyllum spicatum), Horned Pondweed (Zannichellia palustris), Lesser Bulrush (Typha angustifolia), Lesser Spearwort (Ranunculus flammula), Common Spike-rush (Eleocharis palustris) and Water-plantain (Alisma plantago-aquatica). There is a good variety of self sown and planted trees and shrubs, particularly around the periphery of the site. The site is important for invertebrates, such as butterflies and dragonflies, birds, reptiles and also amphibians, with records for Great Crested Newts (Triturus cristatus). Wildlife Site criteria: Grassland indicators.
68/021	Knight's Wood	TL185055	2.11	1997	Ancient semi-natural woodland with Pedunculate Oak (Quercus robur) dominant in the canopy plus occasional Ash (Fraxinus excelsior) and Wild Cherry (Prunus avium). The canopy also contains small amounts of other species including Holly

Wildlife Sites Report					
SITE REFERENCE	**NAME**	**GRID REFERENCE**	**AREA(ha)**	**RATIFIED**	**DESCRIPTION**
					(Ilex aquifolium), Field Maple (Acer campestre), Hornbeam (Carpinus betulus), Silver Birch (Betula pendula) and Crab Apple (Malus sylvestris). Old Hazel (Corylus avellana) coppice is dominant in the shrub layer. The ground flora is dominated by Bluebell (Hyacinthoides non-scripta) and Bramble (Rubus fruticosus agg.). Other species recorded include Broad Buckler-fern (Dryopteris dilatata), Wood Millet (Milium effusum) and Wood Meadow-grass (Poa nemoralis). Remnant ditches and hedge banks are present around the wood margin and there is a small pond in the north-east corner. Wildlife Site criteria: Ancient Woodland Inventory site; woodland indicators.
68/022	Tyttenhanger Gravel Pits	TL190050	61.93	1997	Former agricultural and park land adjacent to the River Colne supporting an area of sand and gravel pits, many of which are flooded. It is a complex site which has been partly restored. The range of habitats include large lakes, exposed sand banks, semi-natural neutral grassland, areas of unimproved acid grassland which may be remnants of the original heathland, scrub and broadleaf woodland. The sand pits form the largest and most important site for sandy ground bees and wasps in Hertfordshire with several nationally notable/rare species recorded. The site is also important for other invertebrates including species of spider unknown elsewhere in Hertfordshire. The flooded pits are regarded as a prime regional site for breeding waders and the site generally is very important for birds. The site also supports protected mammal and reptile species. Wildlife Site criteria: Species.
68/050	St. Mark's Churchyard & Graveyard	TL197061	0.41	1997	Churchyard and graveyard supporting old unimproved neutral to somewhat acid grassland with species recorded including Red Fescue (Festuca rubra), Meadow Foxtail (Alopecurus pratensis), Field Wood-rush (Luzula campestris), Common Knapweed (Centaurea nigra), Pignut (Conopodium majus), Sheep's Sorrel (Rumex acetosella), Common Sorrel (Rumex acetosa), Oxeye Daisy (Leucanthemum vulgare), Lady's Smock (Cardamine pratensis), Meadow Buttercup (Ranunculus acris) and Betony (Betonica officinalis). Hedgerows and trees surrounds the two areas, with Bluebell (Hyacinthoides non-scripta) recorded beneath the trees along the eastern boundary of the churchyard. Wildlife Site criteria: Grassland indicators.
68/070	River Colne, SW of Colney Heath	TL194055	0.98	2000	Section of the River Colne important for invertebrates, supporting a range of dragonflies. Wildlife Site criteria: Species.

Wildlife Sites Report					
SITE REFERENCE	**NAME**	**GRID REFERENCE**	**AREA(ha)**	**RATIFIED**	**DESCRIPTION**
68/097	St. Mark's Close, London Colney	TL19-06-	0	2003	Building and environs important for protected species. Wildlife Site criteria: Species.
69/001	Colney Heath Common	TL203058	23.32	1997	Colney Heath common and a stretch of the River Colne. The common is of special interest supporting a remnant of Hertfordshire's once extensive heathland. Its mosaic of neutral, acid and marshy grasslands, heathland, scrub and riverine habitats collectively support a diverse flora, including several species scarce or locally distributed in the county. Plant species recorded, which are of particular note, include Heath Spotted-orchid (Dactylorhiza maculate), Southern Marsh Orchid, (Dactylorhiza praetermissa), Bird's-foot (Cornithopus perpusillus), Blinks (Montia Fontana), Petty Whin (Genista anglica), Dwarf Gorse (Ulex minor) and, in the River Colne, Opposite-leaved Pondweed (Groenlandia densa). The site is important for invertebrates with a good diversity of butterflies and dragonflies recorded. The open heath is also important for vertebrates, providing an important feeding ground for a variety of birds. Common Lizard (Lacerta vivipara), Grass Snake (Natrix natrix) and Water Vole (Arvicola amphibius) have been recorded from the site. Wildlife Site criteria: Grassland criteria; Species.
69/002	Colney Heath Farm Meadows	TL207055	4.95	1997	A mosaic of old unimproved neutral to acid grasslands along the River Colne, which forms part of a larger complex of heathland/wetland sites in the area. Plant species recorded include Sweet Vernal-grass (Anthoxanthum odoratum), Common Knapweed (Centaurea nigra), Pignut (Conopodium majus), Lady's Bedstraw (Galium verum), Meadow Vetchling (Lathyrus pratensis), Oxeye Daisy (Leucanthemum vulgare), Field Wood-rush (Luzula campestris), Meadow Buttercup (Ranunculus acris), Common Sorrel (Rumex acetosa), Sheep's Sorrel (Rumex acetosella), Bird's-foot Trefoil (Lotus corniculatus), Salad Burnet (Sanguisorba minor) and Common Lady's-mantle (Alchemilla filicaulis spp. vestita) - a scarce species in Hertfordshire. The lower lying areas are dominated by tall grasses typical of damp ground and the habitat supports a range of wetland species. A pond is also present in one of the fields surrounded by Alder (Alnus glutinosa) and willow (Salix sp.). Other habitats include a scrub-lined ditch, an Alder plantation along the River Colne and a hedge dominated by Hawthorn (Crataegus monogyna) and elm (Ulmus sp.). Wildlife Site criteria: Grassland

Wildlife Sites Report					
SITE REFERENCE	**NAME**	**GRID REFERENCE**	**AREA(ha)**	**RATIFIED**	**DESCRIPTION**
					indicators.
69/003	Sleapshyde Gravel Pit	TL203064	24.16	1997	Former gravel pit restored to an amenity/wildlife park. The area supports a mosaic of habitats with open water, wet neutral grassland, tall herbs, scattered scrub and plantation. Species recorded in the grassland include Common Knapweed (Centaurea nigra), Red Fescue (Festuca rubra), Meadow Buttercup (Ranunculus acris), Bulbous Buttercup (Ranunculus bulbosus), Common Sorrel (Rumex acetosa), Common Spotted-orchid (Dactylorhiza fuchsii) and Oxeye Daisy (Leucanthemum vulgare). A flooded pit and connecting stream support bank side trees and scrub, including Hawthorn (Crataegus monogyna), Goat Willow (Salix caprea) and White Willow (Salix alba). Species such as Remote Sedge (Carex remota), Lesser Pond-sedge (Carex acutiformis), Meadowsweet (Filipendula ulmaria), Gypsywort (Lycopus europaeus), Water Mint (Mentha aquatica) and Yellow Water-lily (Nuphar lutea) have been recorded along the margins and in the open water. The site has ornithological interest and a good diversity of dragonflies has been noted. Wildlife Site criteria: Grassland indicators; fen and swamp indicators.
69/009	Bush Wood	TL224054	14.02	2000	Ancient semi-natural Pedunculate Oak (Quercus robur)/Hornbeam (Carpinus betulus) woodland composed of Hornbeam coppice throughout with some Pedunculate Oak, Ash (Fraxinus excelsior) and Hornbeam standards. Areas with Hazel (Corylus avellana), Field Maple (Acer campestre) and Ash coppice are also present. The south-west corner is mainly Pedunculate Oak and Silver Birch (Betula pendula) scrub. The ground flora is mostly Bramble (Rubus fruticosus agg.) mixed with grasses. Indicator species recorded include Bluebell (Hyacinthoides non-scripta), Dog's Mercury (Mercurialis perennis), Remote Sedge (Carex remota), Wood Sorrel (Oxalis acetosella), Wood Millet (Milium effusum) and Broad Buckler-fern (Dryopteris dilatata). Remnant boundary hedge banks and ditches, ponds and wide rides add to the habitat diversity. Wildlife Site criteria: Ancient Woodland Inventory site; woodland indicators.
69/019	Tollgate Wood	TL216055	4.47	2000	Old, probably secondary, broadleaved woodland supporting a high canopy of principally Pedunculate Oak (Quercus robur) and Ash (Fraxinus excelsior) with the occasional coppiced Hazel (Corylus avellana), Hornbeam (Carpinus betulus) and

Wildlife Sites Report					
SITE REFERENCE	**NAME**	**GRID REFERENCE**	**AREA(ha)**	**RATIFIED**	**DESCRIPTION**
					Field Maple (Acer campestre) plus Birch (Betula spp.), Hawthorn (Crataegus monogyna) and Blackthorn (Prunus spinosa). Grasses, mainly Yorkshire Fog (Holcus lanatus) and Creeping Soft-grass (Holcus mollis), are dominant below but several woodland indicators have been recorded such as Bluebell (Hyacinthoides non-scripta), Broad Buckler-fern (Dryopteris dilatata), Remote Sedge (Carex remota), Dog's Mercury (Mercurialis perennis) and Three-nerved Sandwort (Moehringia trinervia). A pond remnant is present in the east and rough clearings below power lines. Wildlife Site criteria: Old secondary woodland with a semi-natural canopy and varied structure; wood present on Bryant (1822); >2 ha; woodland indicators.
69/043	Frederick's Wood	TL207051	10.22	1997	Mature plantation on old heathland/acid grassland with Scots Pine (Pinus sylvestris) in the north and Ash (Fraxinus excelsior) with Sweet Chestnut (Castanea sativa) in the south plus locally dominant Silver Birch (Betula pendula) and Sycamore (Acer pseudoplatanus). The conifer plantation is generally very open below with scattered acid indicators on the ground. The broadleaved part is very scrubby below with Elder (Sambucus nigra) and Hawthorn (Crataegus monogyna) and Sycamore saplings. The ground flora supports woodland indicators such as Bluebell (Hyacinthoides non-scripta), Broad Buckler-fern (Dryopteris dilatata), Dog's Mercury (Mercurialis perennis), Dog's Mercury and Wood Sage (Teucrium scorodonia). A bank and ditch feature along the west boundary supports Pedunculate Oak (Quercus robur) standards with Hornbeam (Carpinus betulus), Hazel (Corylus avellana) and Hawthorn. Indicators of acid conditions include Bracken (Pteridium aquilinum), Heath Bedstraw (Galium saxatile) and Sheep's Sorrel (Rumex acetosella). Rides and clearings in the wood add further habitat diversity. Wildlife Site criteria: Mosaic site of secondary woodland with woodland indicators and remnant heathland/acid grassland.
77/005	Coppice Wood	TL184048	7.98	1997	Ancient semi-natural Pedunculate Oak (Quercus robur)/Hornbeam (Carpinus betulus) coppice-with-standards woodland with frequent Hornbeam and Hazel (Corylus avellana) coppice plus Wild Cherry (Prunus avium) and some Ash (Fraxinus excelsior). The shrub layer is very scattered. Bluebell (Hyacinthoides non-scripta) is abundant in the ground layer which is moderately species diverse.

Wildlife Sites Report					
SITE REFERENCE	**NAME**	**GRID REFERENCE**	**AREA(ha)**	**RATIFIED**	**DESCRIPTION**
					Other woodland indicators recorded include Wood Anemone (Anemone nemorosa), Broad Buckler-fern (Dryopteris dilatata), Wood Melick (Melica uniflora), Wood Sorrel (Oxalis acetosella) and Wood Meadow-grass (Poa nemoralis). Banks with remnant of old laid hedges, including Hornbeam, are present to the boundary and several dells and small ponds add to the habitat diversity. Wildlife Site criteria: Ancient Woodland Inventory site; woodland indicators.
77/043	The New Plantation	TL199047	4.95	1997	Old woodland with a canopy typically of tall Pedunculate Oak (Quercus robur) standards with Ash (Fraxinus excelsior) and the occasional Hornbeam (Carpinus betulus) (mainly standards), most frequent around the perimeter, and planted Sweet Chestnut (Castanea sativa). A small section in the south has been replanted with Wild Cherry (Prunus avium) and a few Ash. The ground flora supports frequent Bluebell (Hyacinthoides non-scripta) and Wood Meadow-grass (Poa nemoralis) plus Pill Sedge (Carex pilulifera), a plant of heathy soils, has also been recorded. The wood is surrounded by hedges with some old laid Hornbeam. Wildlife Site criteria: Old secondary woodland with a semi-natural canopy and varied structure; part (south) shown on Bryant (1822); >2 ha.
77/053	River Colne by Bowmansgreen Farm	TL186040	0.99	1997	Section of the River Colne supporting well vegetated banks and good communities of emergent aquatic vegetation. Water Voles (Arvicola amphibius) have been recorded on this stretch of river. Wildlife Site criteria: Species.
78/008	Walsingham Wood	TL215039	36.71	1997	Part ancient semi-natural Pedunculate Oak (Quercus robur)/Hornbeam (Carpinus betulus) woodland with areas cleared and replanted with conifer and broadleaf species. Hornbeam is present throughout the semi-natural canopy as coppice or as standards. Other trees present include Pedunculate Oak (Quercus robur), Ash (Fraxinus excelsior), Silver Birch (Betula pendula), Beech (Fagus sylvatica) and Wild Cherry (Prunus avium). Some Hazel (Corylus avellana) coppice is also present. The ground flora supports woodland indicators including abundant Bluebell (Hyacinthoides non-scripta). Other species recorded include Wood Sorrel (Oxalis acetosella), Broad Buckler-fern (Dryopteris dilatata) and Yellow Pimpernel (Lysimachia nemorum). The northern part of the site is part felled secondary woodland with much Sycamore (Acer pseudoplatanus) or mixed plantation and Nettle-leaved Bellflower (Campanula trachelium) and Common Twayblade (Neottia

Wildlife Sites Report					
SITE REFERENCE	**NAME**	**GRID REFERENCE**	**AREA(ha)**	**RATIFIED**	**DESCRIPTION**
					ovata) have been recorded here. Wildlife Site criteria: Part Ancient Woodland Inventory site with restorable elements of its previous semi-natural character including some semi-natural canopy and ancient features; woodland indicators.
78/009	Cobs Ash	TL213032	18.69	1997	Ancient semi-natural Pedunculate Oak (Quercus robur)/Hornbeam (Carpinus betulus) coppice woodland with some mixed plantation in the south, of Red Oak (Quercus rubra) and Norway Spruce (Picea abies). There is also some Hazel (Corylus avellana) coppice. The ground is recorded as wet with abundant mosses, Bramble (Rubus fruticosus agg.) and Bracken (Pteridium aquilinum) and several woodland indicators including Bluebell (Hyacinthoides non-scripta), Broad Buckler-fern (Dryopteris dilatata), Wood Sage (Teucrium scorodonia) (Circaea lutetiana) and Enchanter's Nightshade. Wildlife Site criteria: Ancient Woodland Inventory site.
78/010	Cangsley Grove	TL218034	16.44	1997	Ancient semi-natural Pedunculate Oak (Quercus robur)/Hornbeam (Carpinus betulus) woodland with Hornbeam coppice dominant within the main part of the wood. Pedunculate Oak standards, included some planting, are frequent. Silver Birch (Betula pendula), Ash (Fraxinus excelsior) and coppiced Hazel (Corylus avellana) are also present. A largely clear felled area to the north-west supports regenerating/replanted trees. The ground flora supports mainly Bramble (Rubus fruticosus agg.), Bracken (Pteridium aquilinum) and Bluebell (Hyacinthoides non-scripta). Other species recorded include Dog's Mercury (Mercurialis perennis), Enchanter's Nightshade (Circaea lutetiana) and Wood Sage (Teucrium scorodonia). Wildlife Site criteria: Ancient Woodland Inventory site.
78/017	Round Wood	TL211031	2.53	1997	Ancient semi-natural Pedunculate Oak (Quercus robur)/Hornbeam (Carpinus betulus) woodland of mainly Hornbeam coppice with Oak standards. A little Hazel (Corylus avellana) coppice is also present. Midland Hawthorn (Crataegus laevigata) occurs along the wood margin. The ground flora is dominated by Bluebell (Hyacinthoides non-scripta). A bank and ditch is present to the south-west and east facing boundaries and supports Hawthorn (Crataegus monogyna) and Blackthorn (Prunus spinosa) hedges with some mature Pedunculate Oak. Wildlife Site criteria: Ancient Woodland Inventory site.
78/031	Scrubby Grassland	TL207048	2.04	1997	Area of unimproved acid grassland with some scattered to dense patches of

Wildlife Sites Report					
SITE REFERENCE	**NAME**	**GRID REFERENCE**	**AREA(ha)**	**RATIFIED**	**DESCRIPTION**
	by Frederick's Wood				Hawthorn (Crataegus monogyna). The acid grassland supports a good mix of grasses and herbs including Sweet Vernal-grass (Anthoxanthum odoratum), Common Bent (Agrostis capillaris), Red Fescue (Festuca rubra), Sheep's Sorrel (Rumex acetosella), Lady's Bedstraw (Galium verum), Lesser Stitchwort (Stellaria graminea) and Bird's-foot Trefoil (Lotus corniculatus). Wildlife Site criteria: Grassland indicators.
78/033	Shenley Lodge Farm Wood	TL201024	4.24	1997	Ancient semi-natural woodland of Pedunculate Oak (Quercus robur)/Ash (Fraxinus excelsior) with Hazel (Corylus avellana) coppice. There is abundant Wych Elm (Ulmus glabra) in the understorey and significant Sycamore (Acer pseudoplatanus) invasion, particularly in the northern extension of the wood. The ground flora supports woodland indicators, predominantly Bluebell (Hyacinthoides non-scripta) and Dog's Mercury (Mercurialis perennis). Other species recorded include Wood Anemone (Anemone nemorosa), Giant Fescue (Festuca gigantea) and Yellow Archangel (Lamiastrum galeobdolon). The north part of the wood is a linear hollow. Wildlife Site criteria: Ancient woodland with a semi-natural canopy and field evidence suggesting an ancient origin; shown on Bryant (1822); woodland indicators.
78/043	Potwells	TL216030	20.61	1997	Secondary wet acidic grassland (set-aside) and scrub on former acid grassland. There are also patches of plant species associated with calcareous soils. The site is crossed by Bramble (Rubus fruticosus agg.) lined ditches and there is a swallow hole in the east. Wild Service-tree (Sorbus torminalis) and Hares (Lepus europaeus) has been recorded from the site along with a good diversity of butterflies and birds. Wildlife Site criteria: Grassland indicators, Species.
78/079	North Mymms Park	TL217047	24.67	1997	Parkland of semi-improved neutral grassland with frequent planted trees, either as singles or in clumps. The sward varies somewhat in species mix and diversity and is of most interest in the north-central area. Species recorded include Sweet Vernal-grass (Anthoxanthum odoratum), Lady's Bedstraw (Galium verum), Pignut (Conopodium majus), Field Wood-rush (Luzula campestris), Bulbous Buttercup (Ranunculus bulbosus) and Bird's-foot Trefoil (Lotus corniculatus). There are small ponds along the north-eastern edge. Wildlife Site criteria: Grassland indicators.
78/082	North Mymms	TL221044	0.62	2000	Churchyard with old neutral grassland supporting a good diversity of grasses and

Wildlife Sites Report					
SITE REFERENCE	**NAME**	**GRID REFERENCE**	**AREA(ha)**	**RATIFIED**	**DESCRIPTION**
	Churchyard				herbs with some scattered ornamental trees. Species recorded in the sward include Sweet Vernal-grass (Anthoxanthum odoratum), Meadow Foxtail (Alopecurus pratensis), Red Fescue (Festuca rubra), Common Knapweed (Centaurea nigra), Bird's-foot Trefoil (Lotus corniculatus), Field Wood-rush (Luzula campestris), Common Sorrel (Rumex acetosa), Burnet-saxifrage (Pimpinella saxifraga) and Lady's Bedstraw (Galium verum). Other species of note recorded on the site include Spring Beauty (Claytonia perfoliata) and Wall Rue (Asplenium ruta-muraria). Wildlife Site criteria: Grassland indicators.
78/084	North Mymms Park Area	TL21-04-	0	1997	Buildings and environs important for protected species. Wildlife Site criteria: Species.
78/086	North Mymms Icehouse	TL21-03-	0	1997	Icehouse and environs important for protected species. Wildlife Site criteria: Species.
78/104	Coursers Farm Area	TL20-04-	0	2002	Building and environs important for protected species. Wildlife Site criteria: Species.
78/108	Coursers Road Gravel Pit	TL20-03-	0	2006	Hedgerow and ditch on Coursers Farm important for breeding Tree Sparrow (Passer montanus), a Local Biodiversity Action Plan species. Wildlife Site criteria: Species.

Ancient Woodland Inventory sites

NAME	WOOD TYPE	AREA (ha)
Bush Wood, North Mymms	Ancient Semi-natural Woodland	13.80
Cangsley Grove	Ancient Semi-natural Woodland	14.63
Cangsley Grove (replanted)	Ancient Replanted Woodland	1.54
Cobs Ash	Ancient Semi-natural Woodland	17.41
Cobs Ash (replanted)	Ancient Replanted Woodland	3.59
Coppice Wood	Ancient Semi-natural Woodland	7.82
Hawkshead Wood (replanted)	Ancient Replanted Woodland	98.60
Knight's Wood	Ancient Semi-natural Woodland	1.88
Walsingham Wood	Ancient Semi-natural Woodland	12.36
Walsingham Wood (replanted)	Ancient Replanted Woodland	8.49

HERTFORDSHIRE NON-STATUTORY SITE RECORDS

68/003
69/003
68/097
68/050
68/070
69/001
68/021
68/022
69/002
69/019
69/009
69/043
77/005
77/053
77/043
78/031
78/104
78/079
78/082
78/084
78/008
78/086
78/108
78/010
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78/017
78/043
78/033

Colney Heath
Roestock
London Colney
RIDGE CP

2km_search
Wildlife Site

Produced by

HERTFORDSHIRE BIOLOGICAL RECORDS CENTRE

Species records with international designations

SPECIES	YEAR	GRID	1 Km	SITE	PROTECTED	BAP	LBAP
Brown Long-Eared Bat	1997		TL1505	Sopwell Mill Hotel Area	1	1	0
Brown Long-Eared Bat	1997		TL1505	Sopwell Mill Hotel Area	1	1	0
Brown Long-Eared Bat	1998		TL1607	Verulam School	1	1	0
Brown Long-Eared Bat	1998		TL1607	Verulam School	1	1	0
Brown Long-Eared Bat	2002		TL1808	Coopers Green Lane	1	1	0
Brown Long-Eared Bat	2002		TL1808	St Albans, Cooper Lane	1	1	0
Brown Long-Eared Bat	2003		TL1801	Shenleybury	1	1	0
Brown Long-Eared Bat	2003		TL1906	St Marks Close, Colney Heath	1	1	0
Brown Long-Eared Bat	1988		TL2104	North Mymms Park	1	1	0
Brown Long-Eared Bat	1997		TL2007	Smallford, Pope Field Farm Area	1	1	0
Brown Long-Eared Bat	1997		TL2007	Smallford, Pope Field Farm Area	1	1	0
Brown Long-Eared Bat	1992		TL2002	Shenley Lodge Area	1	1	0
Brown Long-Eared Bat	1995		TL2001	Shenley Quarry and Ponds	1	1	0
Brown Long-Eared Bat	1996		TL2001	Shenley Quarry and Ponds	1	1	0
Brown Long-Eared Bat	1997		TL2001	Shenley Quarry and Ponds	1	1	0
Brown Long-Eared Bat	1998		TL2001	Shenley Quarry and Ponds	1	1	0
Brown Long-Eared Bat	1993		TL2001	Shenley Quarry and Ponds	1	1	0
Brown Long-Eared Bat	1993		TL2001	Shenley Quarry and Ponds	1	1	0
Brown Long-Eared Bat	1994		TL2001	Shenley Quarry and Ponds	1	1	0
Brown Long-Eared Bat	1992		TL2001	Shenley Quarry and Ponds	1	1	0
Brown Long-Eared Bat	1991		TL2001	Shenley Quarry and Ponds	1	1	0
Brown Long-Eared Bat	2001		TL2001	Shenley Quarry and Ponds	1	1	0
Brown Long-Eared Bat	2002		TL2001	Shenley Quarry and Ponds	1	1	0
Brown Long-Eared Bat	1999		TL2006	Sleapshyde Farm Area	1	1	0
Brown Long-Eared Bat	2002		TL2004	Coursers Farm Area	1	1	0
Brown Long-Eared Bat	2002		TL2004	Coursers Farm Area	1	1	0
Brown Long-Eared Bat	1995		TL2000	Ravenscroft Farm Area	1	1	0
Brown Long-Eared Bat	1996		TL2104	North Mymms Park Area	1	1	0
Brown Long-Eared Bat	1996		TL2104	North Mymms Park Area	1	1	0
Brown Long-Eared Bat	1996		TL2104	North Mymms Park Area	1	1	0
Brown Long-Eared Bat	1996		TL2104	North Mymms Park Area	1	1	0
Brown Long-Eared Bat	1989		TL2207	Chantry Lane Wood and Dene Hole	1	1	0
Brown Long-Eared Bat	1989		TL2207	Chantry Lane Wood and Dene Hole	1	1	0

Brown Long-Eared Bat	1996	TL2207	Hatfield, Foxglove Close	1	1	0
Brown Long-Eared Bat	2002	TL2208	Howe Dell School	1	1	0
Brown Long-Eared Bat	2002	TL2208	Howe Dell School	1	1	0
Brown Long-Eared Bat	2003	TL2208	Howe Dell School	1	1	0
Brown Long-Eared Bat	1994	TL2308	Hatfield House Area	1	1	0
Brown Long-Eared Bat	1994	TL2308	Hatfield House Area	1	1	0
Brown Long-Eared Bat	1994	TL2308	Hatfield House Area	1	1	0
Brown Long-Eared Bat	1994	TL2308	Hatfield House Area	1	1	0
Brown Long-Eared Bat	1994	TL2308	Hatfield House Area	1	1	0
Brown Long-Eared Bat	1993	TL2308	Hatfield House Area	1	1	0
Brown Long-Eared Bat	1993	TL2308	Hatfield House Area	1	1	0
Brown Long-Eared Bat	1992	TL2403	Bluebridge Avenue, Brookmans Park	1	1	0
Brown Long-Eared Bat	1996	TL2403	Gobions Wood	1	1	0
Brown Long-Eared Bat	2000	TL2205	Dellsome Lane	1	1	0
Brown Long-Eared Bat	2000	TL2205	Dellsome Lane	1	1	0
Chiroptera (Bat)	2001	TL1606	St Albans, Guildford Road	1	0	0
Chiroptera (Bat)	1998	TL1705	Tyttenhanger, Highfield Lane	1	0	0
Chiroptera (Bat)	2000	TL1907	Oaklands College, East Drive	1	0	0
Chiroptera (Bat)	2001	TL1900	Mimms Lane, Shenley	1	0	0
Chiroptera (Bat)	1992	TL1906	Colney Heath Church Area	1	0	0
Chiroptera (Bat)	1994	TL2000	TL20A	1	0	0
Chiroptera (Bat)	2000	TL2002	Shenley Lodge Area	1	0	0
Chiroptera (Bat)	2000	TL2002	Shenley Manor Lodge School	1	0	0
Chiroptera (Bat)	1998	TL2001	Shenley Quarry and Ponds	1	0	0
Chiroptera (Bat)	1995	TL2001	Shenley Quarry and Ponds	1	0	0
Chiroptera (Bat)	1995	TL2001	Shenley Quarry and Ponds	1	0	0
Chiroptera (Bat)	1996	TL2001	Shenley Quarry and Ponds	1	0	0
Chiroptera (Bat)	2002	TL2001	Shenley Quarry and Ponds	1	0	0
Chiroptera (Bat)	1989	TL2103	North Mymms Area	1	0	0
Chiroptera (Bat)	1996	TL2100	Clair Hall Manor Area	1	0	0
Chiroptera (Bat)	2000	TL2207	Hatfield, Bulrush Close	1	0	0
Chiroptera (Bat)	1997	TL2207	Hatfield, Bullrush Close	1	0	0
Chiroptera (Bat)	2002	TL2208	Hatfield, Link Walk	1	0	0
Chiroptera (Bat)	2001	TL2205	Welham Green, Welham Manor	1	0	0
Chiroptera (Bat)	2002	TL2305	Welham Green, Huggins Lane	1	0	0
Daubenton Bat	1998	TL2001	Shenley Quarry and Ponds	1	0	0

Daubenton Bat	1991	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	1993	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	1994	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	1990	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	1992	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	1990	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	1995	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	1996	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	1996	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	1997	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	1993	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	1993	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	2004	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	2004	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	2002	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	2001	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	2003	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	2002	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	2003	TL2001	Shenley Quarry and Ponds	1	0	0
Daubenton Bat	2002	TL2403	Gobions Wood	1	0	0
Daubenton Bat	2004	TL2403	Gobions Wood	1	0	0
Daubenton Bat	2001	TL2403	Gobions Wood	1	0	0
Daubenton Bat	2002	TL2403	Gobions Wood	1	0	0
Daubenton Bat	2004	TL2403	Gobions Wood	1	0	0
Daubenton Bat	2001	TL2403	Gobions Wood	1	0	0
Daubenton Bat	2003	TL2403	Gobions Wood	1	0	0
Daubenton Bat	1998	TL2403	Gobions Wood	1	0	0
Daubenton Bat	1995	TL2403	Gobions Wood	1	0	0
Daubenton Bat	2000	TL2403	Gobions Wood	1	0	0
Daubenton Bat	1996	TL2403	Gobions Wood	1	0	0
Daubenton Bat	2003	TL2403	Gobions Wood	1	0	0
Daubenton Bat	1992	TL2403	Gobions Wood	1	0	0
Natterer's Bat	2001	TL1907	Smallford Station Road	1	0	1
Natterer's Bat	1994	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1991	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1992	TL2001	Shenley Quarry and Ponds	1	0	1

Natterer's Bat	1996	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1993	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1995	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1996	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1993	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1990	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1998	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1991	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1992	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1997	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	2004	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	2002	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	2003	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	2003	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	2001	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	2002	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	2004	TL2001	Shenley Quarry and Ponds	1	0	1
Natterer's Bat	1999	TL2006	Sleapshyde Farm Area	1	0	1
Natterer's Bat	2004	TL2403	Gobions Wood	1	0	1
Natterer's Bat	2001	TL2403	Gobions Wood	1	0	1
Natterer's Bat	2001	TL2403	Gobions Wood	1	0	1
Natterer's Bat	1996	TL2403	Gobions Wood	1	0	1
Natterer's Bat	2003	TL2403	Gobions Wood	1	0	1
Natterer's Bat	2003	TL2403	Gobions Wood	1	0	1
Noctule Bat	2002	TL2204	Home Farm Area, North Mymms	1	1	0
Pipistrelle 45 Khz Bat	2002	TL2008	Hatfield, Bramble Road	1	1	0
Pipistrelle 45 Khz Bat	2002	TL2204	Home Farm, North Mymms	1	1	0
Pipistrelle 45 Khz Bat	2002	TL2208	Howe Dell School	1	1	0
Pipistrelle 55 Khz Bat	1998	TL2303	Warrengate Road	1	0	0
Pipistrelle 55 Khz Bat	1998	TL2303	Warrengate Road	1	0	0
Pipistrelle Bat	1996	TL1506	St Albans, Cunningham Avenue	1	0	0
Pipistrelle Bat	1996	TL1506	St Albans, Cunningham Avenue	1	0	0
Pipistrelle Bat	1997	TL1505	Sopwell Mill Hotel Areas	1	0	0
Pipistrelle Bat	1997	TL1505	Sopwell Mill Hotel Areas	1	0	0
Pipistrelle Bat	1996	TL1506	St Albans, Cunningham Avenue	1	0	0
Pipistrelle Bat	1996	TL1506	St Albans, Cunningham Avenue	1	0	0

Pipistrelle Bat	1988	TL1506	St Albans, Cunningham Avenue	1	0	0
Pipistrelle Bat	1998	TL1706	Highfield Park, Hill End Hospital	1	0	0
Pipistrelle Bat	2002	TL1706	Hixberry Lane, Butterwick Centre	1	0	0
Pipistrelle Bat	2002	TL1706	Hixberry Lane, Butterwick Centre	1	0	0
Pipistrelle Bat	1988	TL1707	Gresford Close, St Albans	1	0	0
Pipistrelle Bat	1989	TL1707	St Albans	1	0	0
Pipistrelle Bat	1986	TL1806	Colney Heath Lane, St Albans	1	0	0
Pipistrelle Bat	2003	TL1906	St Marks Close, Colney Heath	1	0	0
Pipistrelle Bat	1999	TL2000	Catherine Bourne Farm Area	1	0	0
Pipistrelle Bat	1997	TL2001	Shenley Quarry and Ponds	1	0	0
Pipistrelle Bat	1999	TL2006	Sleapshyde Farm Area	1	0	0
Pipistrelle Bat	1997	TL2005	Colney Heath, Hall Gardens	1	0	0
Pipistrelle Bat	1990	TL2005	Hall Gardens, Colney Heath	1	0	0
Pipistrelle Bat	1990	TL2005	Hall Gardens, Colney Heath	1	0	0
Pipistrelle Bat	1989	TL2005	Colney Heath, Hall Gardens	1	0	0
Pipistrelle Bat	1998	TL2102	Blackhorse Lane	1	0	0
Pipistrelle Bat	1998	TL2102	Blackhorse Lane	1	0	0
Pipistrelle Bat	1993	TL2106	Robins Way, Hatfield	1	0	0
Pipistrelle Bat	1993	TL2106	Robins Way, Hatfield	1	0	0
Pipistrelle Bat	1996	TL2208	Hatfield, Brior Wood	1	0	0
Pipistrelle Bat	1994	TL2207	Hatfield, 10 Cheviots	1	0	0
Pipistrelle Bat	1994	TL2207	Chantry Lane Wood and Dene Hole	1	0	0
Pipistrelle Bat	1989	TL2207	Chantry Lane Wood and Dene Hole	1	0	0
Pipistrelle Bat	1989	TL2207	Chantry Lane Wood and Dene Hole	1	0	0
Pipistrelle Bat	2001	TL2207	Hatfield, Thrush Avenue	1	0	0
Pipistrelle Bat	2002	TL2208	Howe Dell School	1	0	0
Pipistrelle Bat	1995	TL2204	North Mimms	1	0	0
Pipistrelle Bat	1995	TL2205	North Mimms, Dixons Hill Close	1	0	0
Pipistrelle Bat	1998	TL2303	Mimmshall Brook, Water End	1	0	0
Pipistrelle Bat	1998	TL2303	Mimmshall Brook, Water End	1	0	0
Pipistrelle Bat	2002	TL2306	North Mymms Marshmoor Works	1	0	0
Pipistrelle Bat	1994	TL2308	Hatfield House Area	1	0	0
Pipistrelle Bat	1994	TL2308	Hatfield House Area	1	0	0
Pipistrelle Bat	1994	TL2308	Hatfield House Area	1	0	0
Pipistrelle Bat	1993	TL2308	Hatfield House Area	1	0	0
Pipistrelle Bat	1991	TL2303	Hawkshead Lane, North Mymms	1	0	0

Pipistrelle Bat	1995		TL2404	Brookmans Park, Moffats Lane	1	0	0
Pipistrelle Bat	1991		TL2404	Peplins Way, Brookmans Park	1	0	0
Pipistrelle Bat	1994		TL2404	Brookmans Park, Bradmore Way	1	0	0
Pipistrelle Bat	1997		TL2404	Brookmans Park, Bradmore Way	1	0	0
Pipistrelle Bat	1998		TL2404	Brookmans Park, Brookmans Avenue	1	0	0
Pipistrelle Bat	1998		TL1607	Verulam School	1	0	0
Serotine Bat	1993		TL2308	Hatfield House Area	1	0	0
Unidentified Bat	2001		TL2001	Shenley Quarry and Ponds	1	0	0
Unidentified Bat	2004		TL2001	Shenley Quarry and Ponds	1	0	0
Unidentified Bat	2001		TL2403	Gobions Wood	1	0	0
Whiskered Bat	1998		TL2303	Mimmshall Brook, Water End	1	0	0
Water Vole	1977	TL203058	TL2005	Colney Heath	1	1	1
Water Vole	1987	TL240080	TL2408	TL20P	1	1	1
Water Vole	1989	TL231021	TL2302	Mimmshall Brook by Mimms Hall	1	1	1
Water Vole	1992	TL186042	TL1804	River Colne by Bowmansgreen Farm	1	1	1
Water Vole	1993	TL186042	TL1804	River Colne by Bowmansgreen Farm	1	1	1
Water Vole	1996	TL186040	TL1804	River Colne by Bowmansgreen Farm	1	1	1
Water Vole	1996	TL231021	TL2302	Mimmshall Brook by Mimms Hall	1	1	1
Water Vole	1997	TL182037	TL1803	River Colne NE of Nature Reserve	1	1	1
Water Vole	1997	TL186040	TL1804	River Colne by Bowmansgreen Farm	1	1	1
Water Vole	1997	TL197058	TL1905	TL10X	1	1	1
Water Vole	1998	TL200058	TL2005	Colney Heath	1	1	1
Great Crested Newt	1986	TL194072	TL1907	Land near Smallford Nurseries	1	1	1
Great Crested Newt	1986	TL181050	TL1805	Tyttenhanger Lane Copse and Pond	1	1	1
Great Crested Newt	1983	TL195068	TL1906	Smallford Gravel Pits	1	1	1
Great Crested Newt	1986	TL195068	TL1906	Smallford Gravel Pits	1	1	1
Great Crested Newt	1986	TL190003	TL1900	Twin Pines, Shenley	1	1	1
Great Crested Newt	1986	TL179053	TL1705	Highfield Hall Ponds	1	1	1
Great Crested Newt	1986	TL183060	TL1806	Tyttenhanger Lane Pond	1	1	1
Great Crested Newt	1986	TL227064	TL2206	Travellers Lane Grassland and Ponds	1	1	1
Great Crested Newt	1988	TL168058	TL1605	Francis Bacon School	1	1	1
Great Crested Newt	1997	TL187083	TL1808	small pond, Oaklands Gravel Pit	1	1	1
Great Crested Newt	1998		TL2206	Travellers Lane Grassland and Ponds	1	1	1
Great Crested Newt	1998		TL1705	Highfield Hall Area	1	1	1
Great Crested Newt	1998		TL1805	Hill End Farm Area	1	1	1
Great Crested Newt	1998		TL1805	Barley Mo Lane	1	1	1

Great Crested Newt	1998		TL1602	Harper Lane Gravel Pit	1	1	1
Great Crested Newt	1973	TL203013	TL2001	Dovers Green, Shenley Quarry	1	1	1
Great Crested Newt	1977	TL229083	TL2208	Howe Dell School	1	1	1
Great Crested Newt	2001	TL242045	TL2404	Piplins Way, Brookmans Park	1	1	1
Great Crested Newt	2002		TL2208	Howe Dell School	1	1	1
Great Crested Newt	2001		TL2206	New Barnfield Meadow	1	1	1
Great Crested Newt	1993	TL164026	TL1602	Old Parkbury Fishing Lakes	1	1	1
Otter	1967	TL20P	TL2000		1	1	1
Otter	2004	TL177034	TL1703		1	1	1
Otter	2004	TL181035	TL1803	Colne Broad Colney	1	1	1
Dormouse	1994	TL218034	TL2103	Cangsley Grove	1	1	1
Dormouse	1975	TL213077	TL2107	Hatfield, Watery Lane	1	1	1

Species records with National and Local designations

SPECIES	YEAR	GRID	1 Km	SITE	PROTECTED	BAP	LBAP
Badger	1995		TL1804	Tyttenhanger Gravel Pit	1	0	0
Badger	1986		TL2003	Small Wood N.W. of Redwell	1	0	0
Grass Snake	1997	TL190050	TL1905	Tyttenhanger Gravel Pit - central causeway	1	1	0
Grass Snake	1985	TL200060	TL2006	TL20D	1	1	0
Grass Snake	1998	TL203057	TL2005	Colney Heath - River Colne section	1	1	0
Grass Snake	1998	TL203057	TL2005	Colney Heath - River Colne section	1	1	0
Grass Snake	1999	TL203058	TL2005	Colney Heath	1	1	0
Grass Snake	1985	TL203058	TL2005	Colney Heath	1	1	0
Grass Snake	2004	TL203058	TL2005	Colney Heath - The Warren	1	1	0
Lizard	1988	TL203058	TL2005	Colney Heath	1	1	0
Lizard	1988	TL203058	TL2005	Colney Heath	1	1	0
Palmate Newt	1999	TL186055	TL1805	pond, Knights Wood	0	0	0
Cornflower	1887	TL200060	TL2006	Between Roe Green & Roe Stock., TL20D	0	1	1
Cornflower	1999	TL203058	TL2005	disturbed pipeline, Colney Heath	0	1	1
Cornflower	1989	TL200060	TL2006	Johnsons Spring Field, TL20D	0	1	1
Tree Sparrow	2004	TL2003	TL2003	Coursers Farm Area	0	1	1
Tree Sparrow	2006	TL2003	TL2003	Coursers Farm Area	0	1	1
Tree Sparrow	2007	TL2003	TL2003	Coursers Farm Area	0	1	1
Tree Sparrow	2008	TL2003	TL2003	Coursers Farm Area	0	1	1
Tree Sparrow	2008	TL1904	TL1904	Tyttenhanger Farm Area	0	1	1
Tree Sparrow	2007	TL1904	TL1904	Tyttenhanger Farm Area	0	1	1
Tree Sparrow	2006	TL1904	TL1904	Tyttenhanger Farm Area	0	1	1
Tree Sparrow	2005	TL1904	TL1904	Tyttenhanger Farm Area	0	1	1
Tree Sparrow	2004	TL1904	TL1904	Tyttenhanger Farm Area	0	1	1
Tree Sparrow	2003	TL1904	TL1904	Tyttenhanger Farm Area	0	1	1
Tree Sparrow	2002	TL2003	TL2003	Coursers Farm Area	0	1	1
Tree Sparrow	2005	TL2003	TL2003	Coursers Farm Area	0	1	1
Tree Sparrow	2003	TL2003	TL2003	Coursers Farm Area	0	1	1
Tree Sparrow	2001	TL2003	TL2003	Coursers Farm Area	0	1	1
Tree Sparrow	2000	TL2003	TL2003	Coursers Farm Area	0	1	1
Tree Sparrow	1999	TL2003	TL2003	Coursers Farm Area	0	1	1

Veteran & Mature Tree records

SPECIES	SURVEY DATE	GIRTH (cm)	SITE	ADDRESS	CONTEXT	EASTING	NORTHING	RECORD NUMBER
Oak	30/08/2000	405	North Mimms Park	North Mimms	PL, Parkland	522080	204250	720
Hornbeam	30/08/2000	330	North Mimms Park	Walsingham Wood, North Mimms	WL, Woodland	521500	203770	721
Sweet chestnut	30/08/2000	480	North Mimms Park	North Mimms	WL, Woodland	521400	204400	722
Beech	30/08/2000	480	North Mimms Park	North Mimms	PL, Parkland	521500	204400	723
Oak	30/08/2000	440	North Mimms Park	North Mimms	PL, Parkland	521580	204440	724
Oak	05/09/2000	480	North Mimms Park	North Mimms	WE, Wood Edge	521750	203750	725
Oak	05/09/2000	580	North Mimms Park	North Mimms	X, Other	521650	203600	726
Oak	05/09/2000	440	North Mimms Park	North Mimms	PL, Parkland	522100	204300	727
Oak	05/09/2000	476	North Mimms Park	North Mimms	PL, Parkland	522050	204200	728
Oak	05/09/2000	490	North Mimms Park	North Mimms	PL, Parkland	521990	204190	729
Oak	05/09/2000	580	North Mimms Park	North Mimms	PL, Parkland	521950	204300	730
Holly	30/08/2000	150	North Mimms Park	Walsingham Wood, North Mimms	WL, Woodland	521200	204200	732
Lime species	05/09/2000	480	North Mimms Park	North Mimms	PL, Parkland	522020	204400	731

HERTFORDSHIRE SPECIES RECORDS

2km_search

Veteran & mature tree

National & Local designations

Tree Sparrow

Cornflower

Palmate Newt

Lizard

Grass Snake

Badger

Produced by

HERTFORDSHIRE BIOLOGICAL RECORDS CENTRE

It should be noted that the species dots do not represent the exact location but general area of the species recorded. Many of these records have been exported from a 1km, 2km or even 10km data source. These plans have been supplied for information purposes only. No copying, in whole or part, is permitted. Please observe copyright restrictions.

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Appendix EDP 3
Extended Phase 1 Habitat Survey Target Notes

1. Large soil bunds in adjacent land managed by Lafarge Aggregates.
2. Small area of scrub surrounding electricity sub-station dominated by bramble and hawthorn.
3. A species-poor short hedgerow dominated by hawthorn and blackthorn is located along the northern boundary of the site adjacent to Coursers Road. This feature was noted to be gappy in places and in poor condition.
4. A field supporting species-poor semi-improved grassland, used as a paddock for horses.
5. Small areas of amenity grassland located at the entrance to the Coursers Farm complex. These were found to be well mown and contained a short sward with a limited number of forb species.
6. Mature oak tree located outside of the site boundary.
7. An off-site pond was noted adjacent to the entrance of the farm access road. This pond supported a wide band of marginal planting which is dominated by variegated reed canary-grass, and appeared to be a well-established habitat.
8. Small pond located within the site boundary supporting little in the way of either aquatic or marginal vegetation. This pond appeared to be a relatively recently created feature.
9. The majority of the site is dominated by improved grassland. The larger field making up the site was found to be sheep grazed and supported a close cropped sward with low species diversity.
10. An open area of sparsely vegetated land located adjacent to the site boundary on the land managed by Lafarge Aggregates.
11. A horse paddock to the east of the site located within Coursers Farm (but outside of the site boundary) was also noted as containing improved grassland.
12. Large agricultural sheds within the Coursers Farm complex located adjacent to the site.
13. Hardstanding yard located adjacent to the site, used for equipment storage.
14. The ditches located along the western and southern boundaries were found to be a mixture of dry and wet habitats. The northern end of the western boundary ditch was found to be dry and supported rank grasses along with limited forb species. At its southern end the ditch was wet but contained approximately 5-10cm of water. Plant species within the inundated length were similar to those in the northern section. Along the southern boundary of the site, Tittenhanger Stream flows from west to east. At the time of the survey the stream contained a maximum of approximately 10cm of water. The stream was confined by tall, steep grassy banks and a number of holes were noted that had the potential to have been excavated by water voles.
15. Three further ponds were noted following the completion of the extended Phase 1 Habitat survey. The first was a small pond located in the corner of the field opposite the site, across Coursers Road. A further two ponds were found to the east of the site within the farm complex. These ponds will be described fully in the separate great crested newt report.

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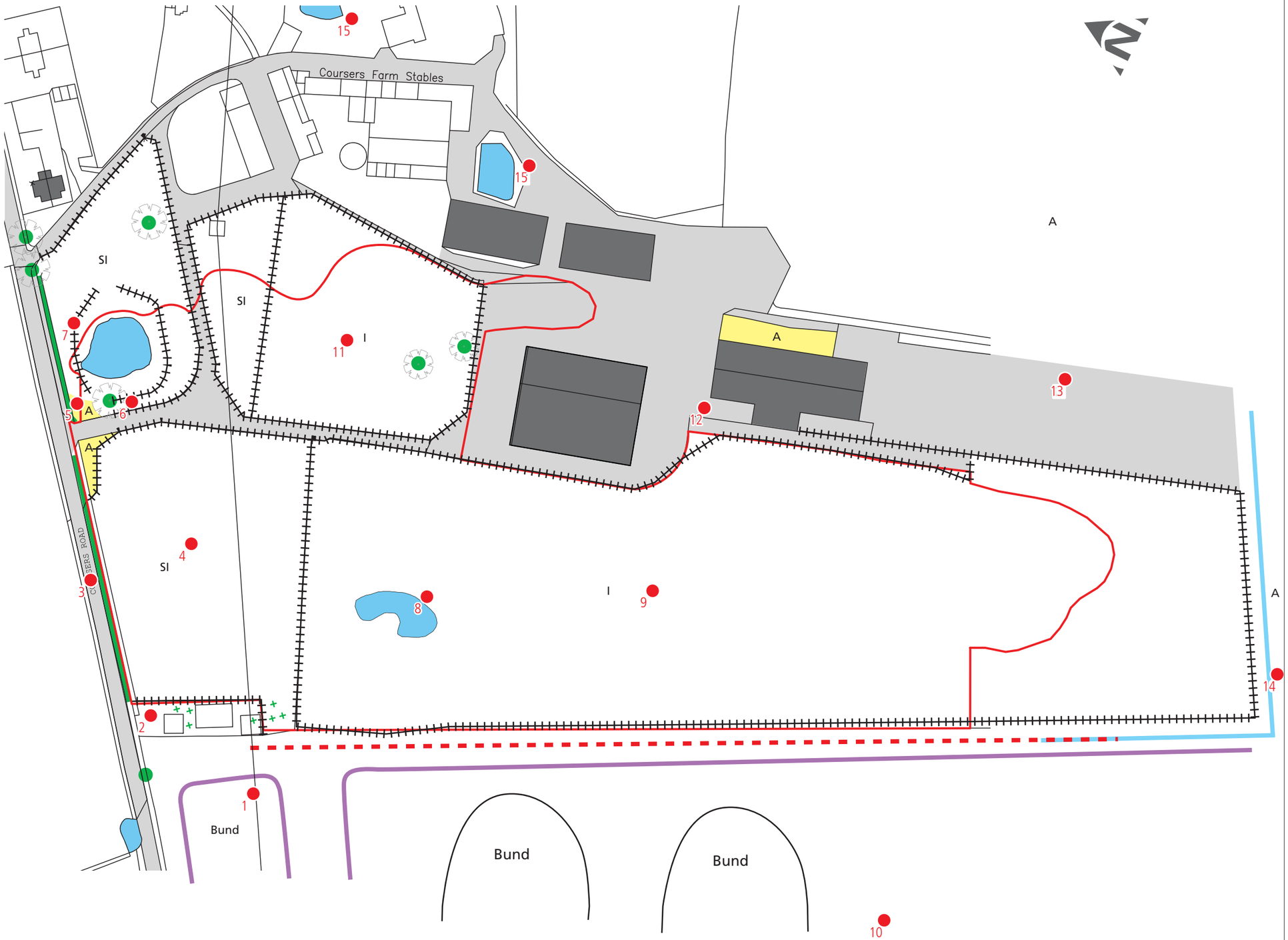
Plan

Plan EDP 1 Extended Phase 1 Habitat Plan
(EDP1421/01a 3 August 2011 TB/RS)



Site Boundary

Amphibian/reptile fencing

Dry ditch

Wet ditch

A — Amenity grassland

Open water

SI — Species poor semi-improved grassland

I — Improved grassland

A — Arable

Hedgerow

Scattered scrub

Mature tree

Fence

Building

Hard standing

1 — Target note

edp

THE ENVIRONMENTAL DIMENSION PARTNERSHIP

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client

Agrivert Ltd

project title

Coursers Farm, Hertfordshire

drawing title

Extended Phase 1 Habitat Plan

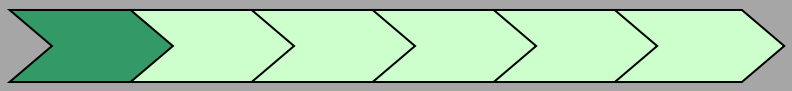
date	3 AUGUST 2011	drawn by	TB
drawing number	EDP 1421/01a	checked	RS
scale	nts		

North London Anaerobic Digestion Facility

Site Environmental Permit: Non-Technical Summary

February 2016

1. Reception



Solid Waste

Solid waste is delivered to the site in a wide range of RCV's and bulkers. The delivery vehicle enters the site and registers its waste and the source as it is weighed over the weighbridge. It then proceeds to the enclosed Reception Building where access is gained through high speed doors. The doors close automatically after the vehicle has entered the building, ensuring any odour is captured within the building and treated through the scrubber and biofilter.

Solid waste is handled in a different manner to liquid wastes because of its drier consistency and potential contamination, e.g. plastics. Solid waste is tipped into a reception bunker with a moving floor. Once the solid waste has been tipped, the moving floor conveys the solid waste to a screw conveyor. This transports the material into the macerator, which removes contaminants and reduces particle size. Once the load has been tipped, the vehicle then passes through a decontamination area and exits through another high speed door. The high speed door closes and the reception building regains negative air pressure.

Liquid Waste

Liquid waste is delivered in a tanker, entering the site over the weighbridge in the same manner as the solid waste. The tanker then enters the Reception Building which is bunded and connects to a discharge pipeline within the reception building and commences discharge to one of two storage tanks depending on viscosity. High viscosity liquids are discharged to a 450m³ tank and low viscosity liquids to a 250 m³ tank. Odours from delivering tankers are extracted from the building and treated through the scrubber and biofilter. Once the load has been discharged, the tanker passes through a decontamination area and exits through the next high speed door. The high speed door closes and the reception building regains negative air pressure.

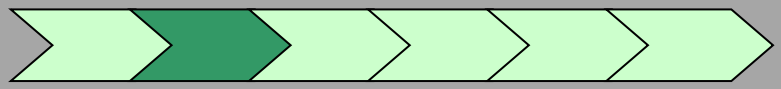
Biofilter and Wet Scrubber

The main body of the reception building is kept slightly below atmospheric air pressure. The air is treated through a wet scrubber and biofilter before venting to the atmosphere. The liquid waste storage tanks and mixing tank, used to contain the wastes at the front end, are located underground and are connected directly to the extraction system to prevent odour release into the building or to the outside.

Energy Crop

Stabilising energy crop silage is stored on site in a silage clamp and is delivered to the energy crop feed bunker by loading shovel. The crop bunker is located next to the primary digesters and comprises a moving floor and screw conveyor system. This feeds the silage into the primary digesters, providing a controlled feed only as required. Occasional silage feed can help to balance the digester biology, as well as providing a good source of energy.

2. Pre-Treatment



Pre-treatment and Blending

Pre-treatment is the most important phase to ensure problem-free and stable digestion in order to produce high gas yields, particularly when dealing with contaminated materials and animal by-products.

1. Screening

The solid waste may contain contaminants such as plastics and soft food waste packaging (inevitable in commercial and kerbside collected waste). It is undesirable for this material to enter the digester; therefore all material from the solid waste bunker is fed into the macerator. This specialist machine serves three purposes:

- Opening of soft and hard packaging, including plastics, paper, tins and glass;
- Removing plastics and other soft packaging via a separate contras discharge chute; and
- Reducing the particle size of all the material to below 12mm in one plane, to ensure maximum efficiency in gas release and ABPR compliance.

The resultant thick, organic soup is pumped into a settling and mixing tank, where the small pieces of heavy contaminants (e.g. glass, grit, metals) settle out by gravity.

2. Mixing

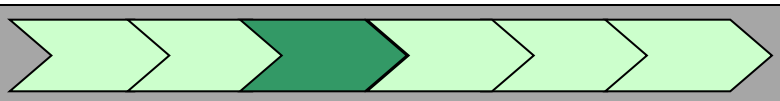
Liquid wastes are added directly to the mixing tank, where the organic soup is stored. The rate at which liquid waste is added will vary with the composition and dry matter of the solid waste. The higher moisture content and reduced viscosity enable the heavy contaminants to settle in the mixing tank to provide a de-gritting stage. This tank is periodically emptied by specialist contractors.

3. Control by Blending

Anaerobic conditions can be maintained and controlled by carefully blending the input material. Regular sampling and analysis from the primary and secondary digesters allows criteria such as pH levels and organic loading rates to be maintained at optimum levels. Feed-stocks are balanced to prevent inhibition of the biology and control gas production rates.

The facility is designed to accept a wide variety of wastes. To complement this, silage is used as a moderating feedstock. As well as providing stabilisation properties, silage also produces good gas yields and therefore a source of energy if waste inputs are not available (such as on public holidays).

3. Digestion



Digestion

The first phase of digestion is completed in the primary digesters. This is where 70% of the biogas is extracted. Each digester has a capacity of circa 5,700m^3 and is stirred by propeller stirrers.

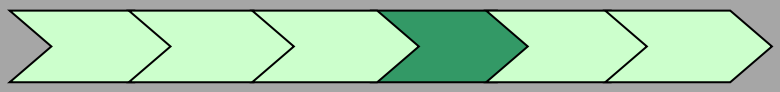
The digester is heated by a hot water system comprising stainless steel coils attached to the inside of the concrete tank walls. The hot water is heated by the CHP heat exchanger. As the biogas is released it is stored in the void above the digestion mass and is sealed by a twin membrane roof. The gas is kept at a low pressure by a moving roof membrane that fills and empties as the biogas levels rise and fall. The outer membrane of the digester is constantly air inflated and does not move, protecting the inner membrane elements from the weather.

The stirrers operate on a periodic basis in order to keep the digester contents moving sufficiently to ensure that the mix optimises biogas yield, but without excessive energy usage. The stirrer motors and gearboxes are outside the tank and can easily be maintained. Should the internal parts of one stirrer fail, the process is maintained by the other stirrers when, ultimately during a planned shutdown, they are able to be replaced with minimal disruption to the process. The digester would be isolated during this process.

The substrate is displaced from the primary digesters by the pumping regime and fed into the secondary digesters where approximately 20% of the biogas is extracted.

The substrate in the secondary digesters is stirred, but with less intensity than the primary digesters. All digestion and storage tanks serve as gas holders. There is sufficient storage within the top of each tank for several hours of un-replenished production of biogas. In reality, the ongoing biogas production means that the gas available to the engines, if all feeding were to stop, would be sufficient to last for several days, but at reduced levels.

4. Pasteurisation



Pasteurisation of the substrate is carried out in order to kill bacteria and achieve compliance with Animal By-Product Regulations (ABPR). To be compliant, all animal by-product material must be reduced to a particle size of below 12mm in one plane (which is achieved in the macerator system) and held at a temperature of 70°C for one hour. It is acceptable to carry out pasteurisation either pre- or post-digestion, providing all animal by-products are pasteurised in the process. However, Agrivert chooses to employ post-digestion pasteurisation with the following advantages:

- All feedstock within the plant, including energy crop silage (which is added directly to the digester, separately from the food waste), is pasteurised, which is best practice for achieving PAS110 and QP approval.
- The digestion process will eliminate many pathogens that may be present in the organic waste feedstock, reducing the burden on the pasteurisation stage.
- The waste material will be heated in the digester to >40ºC, so less time and energy will be required to raise the temperature to >70ºC for pasteurisation.
- If a problem were to arise with the pasteurisation system, the digesters would continue to operate normally (receiving waste) until the problem was resolved.

The material from the secondary digester tanks is introduced into one of the pasteurisation tanks in batches of approximately 30m³. The substrate material pumped into the primary digesters passes through a heat exchanger to receive heat from the outgoing material from the pasteuriser. Batching ensures that nothing is despatched to final storage without being fully pasteurised.

The pasteurisation tanks are heated using the hot water from the CHP engines' heat exchanger system. This water enters the pasteuriser water jacket at between 85-92ºC. Once the contents are at + 70ºC, the tank is held at this temperature for a minimum of 1 hour. An auxiliary boiler will be available to ensure ABPR is always achieved during commissioning and in the unlikely event of two CHP engine units failing.

The automated system ensures that waste does not leave the pasteurisation tanks until temperature has been achieved for the required time. This is recorded automatically and can be audited by the Animal Health Department at any time.

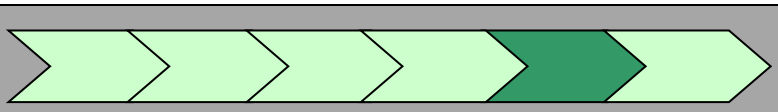
There are three temperature probes inside each of the pasteurisers to monitor the temperature and ensure temperature is achieved throughout the mass for the entire period. Each pasteuriser is equipped with a stirrer which ensures the batch is homogeneous, ensuring no cool zones are able to develop.

Once temperature has been achieved, the batch then passes onto the storage tank via a heat exchanger to cool it down, while at the same time heating up the substrate material on its way to the digesters.

Sampling points for ABPR purposes are provided at the inlets and outlets of the pasteurisation stage.

ABPR represents such a critical element of the process that the pasteurisation tanks consist of duty and assist / standby pasteurisation tanks.

5. Energy Production



Energy Production

The biogas produced by the digesters is naturally high in sulphides. Sulphides are a problem for gas engines and must be reduced where possible. The first stage of reduction is carried out within the digesters where there are three forms of sulphide control:

- Small and controlled amounts of oxygen are pumped into the biogas store, in order to oxidise some of the sulphides;
- Ferrous Chloride is added periodically to the digester to enable the sulphides to become iron sulphates and be removed in solid form.
- A net is suspended across the top of the digesting liquid on which sulphur crystals grow. As they gain sufficient weight, they fall from the net into the liquid and remain in their solid form rather than exiting the digester as a gas. This elemental sulphur which drops into the digestate improves its fertiliser value.

Once these three stages have been completed, the biogas has had a significant reduction in overall sulphur content and is normally ready for use in the gas engine. However, to ensure optimised levels of sulphur, all biogas is also 'scrubbed' through an activated carbon filter.

In order to avoid wetting the carbon which shortens its life, the biogas is dehumidified to remove condensate before entering the filter. Prior to combustion in the CHP engine the biogas is compressed to a constant pressure so that the control system operates consistently.

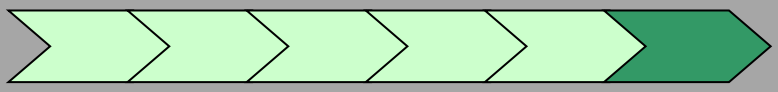
The Gas Engine

The gas engines are sized to operate at maximum efficiency and to create the necessary power. Such gas engines are very reliable but have comprehensive maintenance agreements in place to minimise downtime. The gas engine receives the biogas and uses it as a fuel in powering a conventional generator unit to produce electricity at 415 volts. The output of the generator is dependent on the draw of biogas (and the resulting rpm of the gas engine). Should there be too much biogas for the gas storage and the gas engine, then it is flared at a remote flare stack. If this is a persistent issue, then additional gas engines can be added to increase electricity production.

The hot water from the gas engine cooling system and exhaust gas heat exchanger is used to heat the pasteurisation tanks, to keep the digesters at the required temperature for mesophilic digestion, and to keep the digester gas pressure relief valves from freezing on cold days

Excess heat can be utilised in a variety of manners dependent upon location. Surplus heat can be cooled through standard cooling radiators. The gas engine exhaust is piped through a flue that rises on the outside of the insulated container. The noise of the gas engine is suppressed within the sound insulated engine container. The power generated by the gas engine is transmitted directly to the National Grid via transformers and a high voltage connection.

6. Digestate Storage And Recycling



Digestate Storage and Recycling

Storage

The storage tank plus the two secondary digesters have sufficient capacity to give 10 weeks' storage within the process. The digesters and storage tanks are fitted with gas roofs to provide gas storage, thereby maximising and stabilising energy production.

Recycling

Sealed tankers are used to transport the digestate end product from the site to be spread to land or to farm lagoons for storage.

When the season and weather are suitable for recycling to land (respecting the Nitrate Directive), the digestate is applied using specialised spreaders.

Application rates are strictly monitored in accordance with the requirements of the crop, and to comply with the Nitrate Vulnerable Zone (NVZ) regulations. The digestate is a valuable bio-fertiliser, with a higher rate of first year nitrogen availability than many ordinary chemical fertilisers. It also contains valuable sources of potash and phosphate. The main spreading seasons are in the spring, the late summer and autumn. This is to coincide with the cropping windows where nutrients are most required and soil conditions are most appropriate.