



Homes and Communities Agency
Colt International, Havant
Ground Investigation and Assessment
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0.0 Executive Summary

Introduction	WYG Environment Planning Transport Ltd (WYG) was commissioned by the Homes and Communities Agency (HCA) to carry out a ground investigation at the Colt International site in Havant, Hampshire, to assess the ground conditions and provide an updated qualitative assessment for the proposed redevelopment of the site.
Site Location and Description	The site is located on New Lane, Hampshire PO9 2LY and centred on National Grid Reference 472610, 108009. At the time of the investigation (during February 2017) the site was occupied by the Colt International factory, warehouse and office buildings with associated hard standing carpark and access roads. The local topography (which slopes to the southeast) is accommodated by a retaining wall on the north west boundary and an embankment running across the site.
Geology	The site is underlain by Made Ground over Head Deposits (predominantly sands and gravels) over the London Clay Formation (clay), which in turn is underlain by the Lambeth Group and White Chalk Group at depth.
Hydrogeology	The superficial deposits (Head Deposits) are classified as a Secondary Aquifer. The London Clay Formation and Lambeth Group are unproductive strata, whilst the underlying Thanet Sand and White Chalk Group combined are classified as a Principal Aquifer.
Hydrology	The Monsoon Drain (open drainage ditch), runs along the west side of the main building and the River Lavant flows to the south, south east of the site.
Site History	Historic OS maps dating back to 1867 indicate limited residential development on the site prior to the sites redevelopment for Colt International in the mid-1960s. The site layout has remained largely unchanged since this period.
Ground Investigations	Ground investigation works comprised 14No. Window sample locations to depths ranging between 0.30 and 5.00m bgl with Standard Penetration Testing (SPTs) and installation of 7No. dual purpose landgas and groundwater monitoring apparatus. Samples were obtained for laboratory assessment and 2No. Return monitoring visits were undertaken.
Ground Conditions Encountered	Ground conditions encountered during the investigation were consistent with those identified in the published literature and comprised a 0.40 to 2.00m thick layer of Made Ground over Head Deposits overlying the London Clay Formation at depths ranging between 0.80 and 2.80m bgl. The London Clay Formation persisted to the full depth of the investigation. Groundwater was encountered at depths ranging between 0.50 and 1.50m bgl during the investigation and between ground level and 2.79m bgl during return visits.



Geotechnical Recommendations	Conventional shallow foundations should pass through the Made Ground and bear upon the Head Deposits and London Clay Formation were net allowable bearing capacities ranging between 90 and 200kPa would limit settlement to less than 25mm depending on the composition and consistency of the soils present. For heavier loads piles embedded into the London Clay Formation could be considered and based on the depths investigated, piles capacities ranging between 20 to 390kN have been assessed for various diameters and lengths of pile. Floor slabs will need or be suspended or constructed upon engineered fill. Foundations will need to be constructed in line with guidance provided within NHBC Chapter 4.2 due to the volume change potential of the London Clay Formation. Excavations will require support and dewatering. Subsurface concrete should conform to DS-1 AC1.
Contamination Findings	Minor elevations of methane and carbon dioxide (0.9 and 2.5% respectively) were recorded during gas monitoring. Target Screen Values (TSVs) were exceeded samples of soil for residential end use with homegrown produce, mainly in samples of Made Ground. Minor quantities of asbestos fibres were detected in three samples of Made Ground. Minor exceedances of Environmental Quality Standards (EQS) and Drinking Water Standards (DWS) of groundwater and leachate samples were also recorded.
Conceptual Site Model	Based on the review of desk study information and the phase 2 ground investigation the following risk levels have been identified: • Future site users – HIGH • Construction workers (during redevelopment of site) – HIGH • Groundwater– LOW to MODERATE • Surface Water – LOW • Onsite property/buildings and services – LOW TO MODERATE • Offsite workers and residents – LOW
Conclusions and Recommendations	Further investigation of the site will be required to target areas currently occupied by operational buildings, and further establish the presence and extent of contamination. And to confirm that the thickness of the London Clay Formation provides adequate protection of the underlying Principal Aquifer (Thanet Sand Formation and White Chalk Group). Deeper boreholes will also provide information for the assessment of the bearing capacities of deeper piles for more heavily loaded structures if required.



1.0 Introduction

1.1 Instruction

WYG Environment Planning Transport Ltd (WYG) was commissioned by the Homes and Communities Agency (HCA) to carry out a ground investigation and assessment at Colt International, New Lane, Havant. The investigation was designed to provide preliminary information relating to the ground conditions, potential ground contamination and geotechnical constraints at the site. This report should be read in conjunction with the corresponding phase 1 report prepared by WYG (referenced as Colt International, Havant, Phase I dated November 2016). This report details the ground investigation undertaken, findings and provides an updated qualitative assessment of the findings.

1.2 Proposed Development

At the time of compiling this report development proposals for the site were at an early stage. During the investigation WYG had been provided with conceptual drawings by WYG Planning and a subsequent revision to the development in June 2017. The updated plans show multi-storey residential developments in the north central areas, residential dwellings in the western and central areas and commercial development in the east.

1.3 Objectives and Scope

The desk based assessment undertaken by WYG in November 2016 collated publically available information to review the risks associated with ground conditions with potential to impact upon the redevelopment of the site for combined high density residential / commercial use.

The desk study report confirmed the requirement for intrusive ground investigations to allow a further assessment of risks. An intrusive investigation scoped within our proposal dated 8th September 2016 (and detailed herein) formed part of the agreed brief which comprised the following:

- A geotechnical and ground contamination assessment discussing the results incognisance of the desk based assessment, not only concerning potential on-site geotechnical engineering and contamination conditions/constraints, but also an overview of the potential for migration of contamination onto the site, or off-site to local receptors.
- A geotechnical and ground contamination intrusive investigation consisting of 14No. window samples, with standard penetration testing (SPTs) and the submission of shallow soils samples for laboratory analysis and initial geotechnical characterisation.



- Interpretation of the data collected in order to define a Conceptual Site Model (CSM) and to undertake qualitative risk assessment and semi-quantitative risk assessment grading the pollutant linkages in accordance with a risk matrix.
- Development of an outline geotechnical model of shallow ground conditions with discussion of characteristic geotechnical parameters.
- Provision of recommendations pertaining to potential development constraints and management options.
- Assessment of potential land contamination liabilities associated with identified contamination on the site.

The recommendations and opinions expressed in this report are based on the information provided and other sources of readily available information. Where use has been made to other reports or information provided by the client, or from other third party sources, such data has been reviewed in good faith and it has been assumed that their contents are correct, as it is impractical to fully validate this data.

WYG is unable to guarantee any Third Party information.

1.4 Limitations

This report presents a full factual record of all site works carried out between the 1st and 3rd February 2017.

The observations summarised in this report are based on the strata observed in the exploratory holes. WYG takes no responsibility for conditions which have not been revealed by the exploratory hole locations or which occur between them.

No warranty is given as to the possibility of future changes in the condition of the site as characteristics, especially liquid and gaseous materials within the ground, are likely to vary with time.

The information contained in this report is intended for the use of the HCA and their consultant partners. WYG can take no responsibility for the use of this information by any third party for uses other than that described in this report. This report is also subject to the report conditions contained within Appendix A.



2.0 Site Description

2.1 Site Location

The site is located in an area of mixed residential and commercial land use approximately 1.5km north east of central Havant. The Site location is illustrated as Drawing A099913 LND N SK01 - Site Location Plan in Appendix C.

Table 1 Site Location Details

Site Address	New Lane, Havant, Hampshire PO9 2LY
Site Area	2.6ha
National Grid Reference	472610, 108009

2.2 Site Description

A site walkover was undertaken by WYG on 22nd September 2016 as part of the desk based assessment and no significant changes to the site were observed during the site investigation works undertaken in February 2017. Key features of the site are summarised as follows.

The site was operational and occupied by Colt International and comprised a factory and warehouse facility with peripheral office / out buildings. The front of the site, facing west onto New Lane provided vehicle access, car parking and landscaping. A five storey rectangular building located in the south east contained offices (and former ground floor restaurant –redundant during walkover).

A two storey research and development (R&D) block was located north of the office/restaurant building adjoining the front car park building; this Block was not accessed during the walkover due to health and safety concerns associated with the presence of asbestos within the building structure. Behind the office block a second, three storey office block (vacant and unused at the time of the walkover) was situated and behind this was the factory / warehouse buildings.

Locally the land level reduced from approximately 26m Above Ordnance Datum (m AOD) in the north west to approximately 16m AOD in the south east. This level change was accommodated by a grass embankment (on a broadly north-south bearing) which separated a higher car parking area in the west



from the warehouse and factory floor level in the east. The main warehouse and factory building was constructed on a relatively flat area in the centre of the site (residing at approximately 19m AOD). A 4.5m high concrete and brick retaining wall is situated at the northern boundary of the site with Bartons Road lying beyond and elevated above the factory level. Basements were absent across the site, with the exception of a single plant room (location unknown).

The factory building was being used by Colt to manufacture bespoke ventilators / louvre systems. Manufacturing operations occurred within the open plan factory building situated behind the R&D and office building. A range of modern plant / machinery was being used to press, cut and punch metal sheets. A welding area was located in the south of the main factory building. Modular offices were located within the factory / warehouse areas.

Areas of the internal space were unused or used only for storage of raw materials and products; this included the warehouse area and also the western and central portion of the factory space.

The factory buildings (and some parts of the warehouse) were heated with mains powered electric heaters. The internal heaters were previously oil powered; reportedly the heaters were supplied by above ground pipelines.

The manufacturing processes were generally dry with limited use of chemicals required. Based on a review of COSHH records held on site, liquids used at the site were understood to include cutting fluids, various adhesives, sealants, silicone mastic, hydraulic oil, white spirit and cleaning agents. Drawings of the site layout reviewed on site also identified a paint store in the north west, however, it is unclear if this layout was fully implemented and no evidence of paint use or storage was identified. Chemicals and liquids were understood to be stored in low volume containers (according to COSHH specifications). A current bulk chemical storage area was not identified during the site walkover.

The concrete slab that extended across the factory and warehouse floor was observed to be in good condition. An area of lichen was observed in a small area in the north west of the warehouse building suggesting possibly damp conditions; potentially an area of liquid/chemical/fuel spillages.

Raw materials delivered to site by lorry included aluminium, steel, wood and plastic. Waste materials produced as part of the manufacturing process included aluminium and steel scraps, wood, low volumes of waste oil and general waste. The steel, aluminium and wood waste was recycled. Mastic tubes and other packaging / low volumes materials that were classified as hazardous were collected and disposed of by a specialist waste contractor (further details of waste management were not provided). Skips / bins



containing metal fines were observed in the factory area. A waste processing area (compactor) was observed outside (south) of the main factory building.

Ancillary buildings north west of the current warehouse included a redundant single storey wooden recreational outbuilding and a small single storey brick structure (former gas storage) with two aluminium (louvre) doors. Access to the latter building was not available during the walkover; however the requirement for ventilation and the presence of ramps was suggestive of possible chemical storage or use within. A single storey building adjoining and north of the main warehouse, identified as the air pollution test area was inaccessible at the time of the walkover; the purpose / and operations associated with the facility remain unknown.

An area adjacent to the southern site boundary was set aside as a weathering area. This was used to allow long term evaluation of products that were exposed to external weather conditions. A number of frames and structures were present supporting products that were subject to testing.

Adjacent to the weathering area was a single storey prefabricated metal structure with louvre doors identified as being for the storage of empty and full gas bottles; access was not available.

Also adjacent to the weathering area was a building of brick and metal cladding construction used for fire testing of finished products. Adjacent to the building was an external cylindrical plastic (but likely double skinned) Above Ground Storage Tank (AST) for 'fuel oil', of approximately 1000 litres capacity positioned on a breeze block plinth. A single pipe exited the tank and entered the building; it is understood that this previously provided the fuel for burners located inside the fire testing building. It was also suggested (anecdotally by site staff) that at one time the AST was located inside the factory building.

South of the main factory building was a small brick outhouse with louvre ventilated doors. Access was not available to the building, however, it is understood that this housed an old diesel generator that previously provided a 'back up' power supply. Adjacent west of the outhouse was a former brick bund containing several brick plinths that supported and housed a large cylindrical diesel AST. The tank was no longer present.

An electricity sub-station was located on the eastern edge of the former diesel tank bund.

Surface water drainage included an open concrete lined channel to the west of the access road surrounding the main building (known as the Monsoon Drain).

The monsoon drain, which received surface water from the north and western parts of the site, connected in the south with a series underground drains. It is understood that the culverted main course of the



drainage traversed the southern perimeter of the site connecting with a ditch which discharged (presumably into the River Lavant) immediately south east of the site.

2.3 Site Boundaries and Surrounding Land Uses

Bartons Road forms the north boundary and a housing estate is situated on the north side of Bartons Road.

New Lane forms the east boundary and the premises of Eaton, a manufacturer of electrical and hydraulic products and systems is situated on the east side of New Lane.

Marsh Plant Hire and several smaller commercial units are situated within the Nest Business Park to the south of the site.

Martin Road forms the west boundary, with Saint Alban's Church, a single residential development and a green area of public open space situated further to the west.

2.4 Geology

2.4.1 Made Ground

A layer of Made Ground associated with the sites development history is anticipated to be present across the site and this may include disturbed locally derived soils and imported materials.

2.4.2 Superficial deposits

The BGS Geology Viewer (BGS Website, 2017) indicates that the superficial deposits are characterised by three distinct areas as follows:

- The central portion of the site is underlain by Head Deposits described as horizons of clay, silt, sand and gravel
- The eastern portion of the site is also underlain by Head Deposits described as clayey gravel.
- Superficial deposits are absent from the west of the site

A borehole record, obtained from online BGS records, from NGR 472680 107800 approximately 100m south of the south eastern corner of the site identified the following geological sequence:

- Topsoil - to 0.15m below ground level (bgl)
- Cobbly Gravel and Clay: Compact medium flint gravels and cobbles in firm brown clay matrix to 1.35m bgl
- Sand: Compact fine brown sand to 3m bgl



2.4.3 Bedrock

The BGS Geology Viewer (BGS Website, 2017) identifies the underlying solid geology as London Clay Formation, which is underlain by the Lambeth Group, Thanet Sand Formation and Chalk Group in deepening succession. Thicknesses of the London Clay Formation and Lambeth Group are unknown below the site. However, a deeper borehole record obtained from online BGS records approximately 1.6km south west of the site identified the following geological sequence and thicknesses:

- River Drift – ballast and stones over sand - to 5.20m bgl;
- London Clay Formation: from 5.20 to 41.10m bgl;
- Lambeth Group: from 41.10 to 80.50mbgl;
- Upper Chalk: from 80.50 to 113.70m bgl (end of borehole).

2.5 Hydrogeology

2.5.1 Aquifer Classification

The Envirocheck Report (contained within the Phase I report) and the Environment Agency 'What's in Your Backyard' (WIYBY) interactive map identifies the bedrock geology (London Clay Formation) as being unproductive strata.

The superficial deposits (Head Deposits) are classified as both Secondary A and Secondary B Aquifers – relating to the predominantly coarse and predominantly fine soils of the superficial deposits respectively.

The Environment Agency WIYBY Mapping indicates that the site is located within a Zone 1c (Inner – subsurface activity only) Protection Zone for a groundwater abstraction located approximately 3km south west of the site; a current abstraction license for public water supply is currently held here by Portsmouth Water Limited. This abstraction will be from the Chalk Group which lies beneath the London Clay Formation and the Lambeth Group below the site.

2.5.2 Licensed Groundwater Abstractions

There are no active groundwater abstraction licenses on site or within 1km of the site.

2.6 Hydrology

2.6.1 Surface Water Features

Two surface water features located on (or in close proximity to) the site are detailed as follows:

- The Monsoon Drain – (described in detail in Section 2.2)



- The River Lavant - at its closest point the river Lavant is located within a 5 metres east of south eastern corner of the site. The river follows a broadly southerly course discharging into the Langstone Channel in Langstone Harbour to the east of Portsmouth. The section passing nearest to the site is designated by the Environment Agency as being of River Quality A. Whilst the flow rate is low (less than 0.31 cumecs) the river is classified by the Environment Agency as a 'Main River'.

2.7 Site History

A detailed review of historical OS plans is provided within the WYG Desk Based Assessment.

In summary, historic Ordnance survey maps dating back to 1867 indicate limited residential development on the site prior to the site redevelopment as a manufacturing facility for Colt International in the mid-1960s. The site layout has remained largely unchanged since this period.

It is reported that during the Second World War that a cottage building in the north west of the site was requisitioned by the mining department of HMS Vernon Mining Department and used for military storage purposes.

2.8 Potential Contaminant Sources

The WYG Desk Based Assessment identified potential on-site sources of contamination which are summarised as follows:

- Former cylindrical diesel AST (circa 10,000 gallons) situated south of the main factory building.
- Double skinned plastic AST (circa 1000 litres capacity) for storage of 'fuel oil' adjacent to the Fire Testing facility.
- Ancillary facilities associated with unknown activities external north west of the factory building.
- Fuel supply (including above ground pipelines) providing fuel to heaters within the building.
- Made Ground

Although not listed as a potential source of ground contamination, the presence of asbestos materials in building materials was also recognised.

A number of current and commercial premises are located in the site vicinity, and of particular note is the Marsh Plant immediately south, Eaton on the opposite side of New Lane, and a gas holder approximately 300m south of the site. Based on the local topography (sloping south east) and the known hydrogeological setting (that includes a public water abstraction to the south west) a southerly groundwater flow direction is inferred. Therefore, commercial premises in the site vicinity are considered to be down gradient in terms



of inferred groundwater flow and it is considered relatively unlikely that the site has been impacted by off-site sources of contamination.



3.0 Ground Investigation

3.1 Design and scope

The ground investigation was designed and scoped by WYG as detailed within the fee proposal letter (dated 8th September 2016 client ref HP16070). Intrusive works were undertaken between the 1st and 3rd of February, 2017 and comprised the following:

- Non-intrusive survey comprising Ground Penetrating Radar (GPR) and Electromagnetic Scanning to help locate buried service routes prior to commencing exploratory holes.
- Inspection pits were hand excavated to a depth of 1.20m bgl and probed with a downhole magnetometer by an EOD specialist to check for ferrous materials potentially associated with UXO.
- Where present surface concrete was cored using 300mm diameter diamond coring.
- 14No. window sample boreholes were drilled across the external areas of the site and three window sample boreholes were drilled within the factory buildings.
- Standard penetration testing (SPTs) were undertaken at 1m centres during the progression of the window sample boreholes.
- Soil samples were obtained for laboratory environmental and geotechnical assessment.
- Recovered soils were logged to BS 5930:1999 +A2:2010.
- On completion 7No. window sample boreholes were installed with 50mm diameter dual purpose HDPE gas and groundwater monitoring standpipes to allow for subsequent monitoring and sampling of groundwater.
- 2No. return visits were undertaken to monitor landgas within the installations, record water levels and retrieve water samples for laboratory assessment.
- 3no. surface water samples were collected from the Monsoon Drain and River Lavant.

Exploratory holes locations are indicated on Drawing ref: A090070-182_N_LDN_SK02 Site Investigation Layout Plan (Appendix C) and factual data relating to the investigation is included in Appendix D to H.

3.2 Site Investigation Standards

Standards employed during the investigation were broadly in accordance with BS5930 Amendment 2 (BS5930 Amendment 2: 'Code of Practice for Site Investigation', 2010) which incorporates EN14688-1&2,



Eurocode 7, Geotechnical Design (ref. BS-EN 1997-2:2007). The investigation was also undertaken in accordance with environment Agency Guidance CLR 11 'Model Procedures for the Management of Land Contamination' and BS10175:2011_A1:2013 Investigation of potentially contaminated land.

3.3 Soil Sampling

Soil logging and sampling for laboratory analysis was undertaken by a WYG Engineer. Representative soil samples were taken from the exposed strata beneath the site during the fieldwork. Samples were sealed in appropriate laboratory supplied containers with airtight lids. Soil samples were dispatched under a chain of custody to Jones Environmental Laboratory for analytical testing. The environmental chemistry of soil samples selected by WYG were analysed by Jones Environmental Laboratory. Jones Environmental Laboratory is an approved supplier in accordance with the requirements of the WYG quality system and is accredited by the UK Accreditation Service (UKAS) and the EA's Monitoring Certification Scheme (MCERTS) for a range of chemical analyses.

3.4 Groundwater Sampling

An initial visit was made to the site (10th February 2017) to complete well development (see Section 3.4.1 below). Subsequently, two monitoring trips were completed dated 20th and 27th February 2017. During these visits ground water sampling and groundwater level monitoring was undertaken. During the purging visit on 10th February and the visit on 27th February 2017, ground gas monitoring was also undertaken.

3.4.1 Well Development

It is accepted that water located within the well casing after drilling works have been undertaken is unlikely to be truly representative of the formation water; water is often added as part of the drilling process and/or the ground disturbance can result in the addition of particulate material. Well development, by removing water (and particulates) from the well is required therefore to rectify the effects of drilling. It also serves to stabilise the filter pack adjacent to the well screen and improves the hydraulic connection between the well screen and the surrounding formation (CL:AIRE 2008).

Well development was undertaken on the 10th February, ten days before the first monitoring visit. *Note that the process of well development that includes aggressive purging of the internal well can in itself cause sediments in the base of the well to be mobilised and therefore it is appropriate to allow a minimum period of several days to allow sediments to settle prior to sampling.*

Groundwater was removed from the well as part of well development, using low flow method. All wells were purged dry due to slow flow rate.



3.4.2 Groundwater Level Monitoring and Sampling

Groundwater levels were monitored on site using a dual phase dipmeter, results are discussed in Section 4.5. Groundwater samples were collected using the low-flow technique, whereby the sample is extracted at the same rate that water flows into the well, i.e. the water level within the well remains constant throughout. As a precaution, due to the slow flow rate and low recharge, the wells were only purged until the water ran clear, which approximately removed 0.5 litres of groundwater.

Samples were sealed in appropriate laboratory supplied bottles with airtight lids. Water samples were dispatched under a chain of custody to Jones Environmental Laboratory for analytical testing. The environmental chemistry of groundwater samples selected by WYG were analysed by Jones Environmental Laboratory. Jones Environmental Laboratory is an approved supplier in accordance with the requirements of the WYG quality system and is accredited by the UK Accreditation Service (UKAS) and the EA's Monitoring Certification Scheme (MCERTS) for a range of chemical analyses.

3.4.3 Ground Gas Monitoring

Ground gases including methane, carbon dioxide, oxygen, carbon monoxide and hydrogen sulphide were measured during two monitoring rounds using a GA2000 infra red gas analyser. Results are discussed in Section 4.6. The full results of ground gas monitoring recorded during each monitoring visit are provided in Appendix K.

4.0 Ground Conditions Encountered

4.1 Soil Conditions

Ground conditions encountered during the investigation were consistent with those identified in the published literature and comprised Made Ground and localised Head Deposits overlying the London Clay Formation, which persisted to the full depth of the investigation.

Exploratory hole locations are indicated on Figure SK02, detailed descriptions of the soils and ground conditions encountered are provided on the Engineering Logs included in Appendix E. Strata depths and thicknesses are summarised in Table 2.

Table 2 Summary of Encountered Strata

Hole ID	Concrete		Made Ground		Head Deposits – Coarse		Head Deposits – Fine		London Clay Formation	
	From (m bgl)	Thickness (m)	From (m bgl)	Thickness (m)	From (m bgl)	Thickness (m)	From (m bgl)	Thickness (m)	From (m bgl)	Thickness (m)
BH1	GL	0.2	0.2	0.80	NE	NE	NE	NE	0.80	>3.20
BH2	NE	NE	GL	0.80	0.80	>2.70	NE	NE	NE	NE
BH3	GL	0.2	0.2	1.60	NE	NE	1.60	1.20	2.80	>1.20
BH4	NE	NE	GL	1.60	1.60	0.70	NE	NE	2.30	>2.70
BH5	GL	0.2	0.2	1.50	1.50	>1.20	NE	NE	NE	NE
BH6	GL	0.2	0.2	0.80	0.80	>1.00	NE	NE	NE	NE
BH7	GL	0.2	0.2	2.00	2.00	>2.00	NE	NE	NE	NE
BH8	GL	0.3	0.3	>0.80	NE	NE	NE	NE	NE	NE
BH9	GL	0.2	0.2	0.40	0.40	>2.60	NE	NE	NE	NE
BH10	GL	0.3	0.3	>0.30	NE	NE	NE	NE	NE	NE
BH11	GL	0.2	0.2	1.40	NE	NE	NE	NE	1.40	>1.60
BH12	NE	NE	GL	0.40	0.40	>2.60	NE	NE	NE	NE
BH13	NE	NE	GL	>1.50	NE	NE	NE	NE	NE	NE
BH14	NE	NE	GL	1.40	1.40	1.30	NE	NE	2.70	>1.30
BHI1*	GL	0.2	0.2	0.40	0.40	>2.60	NE	NE	NE	NE
BHI2*	GL	0.2	0.2	0.60	0.60	1.90	NE	NE	2.50	>1.50
BHI3*	GL	0.2	0.2	0.40	0.40	>2.60	NE	NE	NE	NE

*BHI1,2 and 3 were undertaken within the buildings and are indicated as BH1, 2 and 3 Internal on the exploratory hole location plan.



4.1.1 Surfacing

Ground surfacing in the external areas generally comprised hardstanding with some local grass verge and planter areas. Hard standing comprised 0.20 to 0.30m thick layer of concrete. The factory floor comprised a 0.20m thick layer of concrete over a 0.40 to 0.60m thick layer of fill comprising clayey, sandy gravel.

BH10 located at the top of the slope west of the factory building was terminated on concrete which persisted to depth of greater than 0.30m bgl

4.1.2 Made Ground

Made Ground was encountered below the surface concrete (where present) within all exploratory hole locations and persisted to a maximum depth of 1.60m bgl. The Made Ground was variable in composition and consisted of horizons of both predominantly fine and predominantly coarse soils.

Predominantly coarse soil horizons typically comprised sands and flint gravels with varying clay content. Gravel size fragments of brick, mixed aggregates, chalk and wood were encountered in varying quantities. Ash was noted within BH6.

Predominantly fine soils typically comprised clays with varying quantities of sand and flint gravel with fragments of brick and wood, and with chalk and mixed aggregates in varying quantities.

In general the Made Ground deepens towards the east across the lower level (on the east side of the site) and towards the south across the upper level (in the west of the site).

4.1.3 Head Deposits

Head Deposits were encountered underlying the Made Ground in most areas of the site with the exception of BH1 and BH11 located in the north west extremity of the site. The deposit typically comprised coarse soils with localised fine soils (as encountered in BH3).

Predominantly fine soils encountered in BH3 comprised soft greyish brown sandy slightly gravelly clay from a depth of 0.60 to 1.60m bgl. The gravels comprised flint with fragments of wood.

Predominantly coarse soils were encountered in most areas of the site immediately below the Made Ground and persisted to a maximum proven depth of 4m bgl, with thicknesses varying between 0.70m and >2.70m bgl. These deposits were relatively uniform in composition consisting of sands and flint gravels with subordinate clay and silt.



4.1.4 London Clay Formation

The London Clay Formation was encountered below the Head Deposits in four of the exploratory hole locations (BH3, BH4, BH14 and BHI2), and immediately below the Made Ground in two of the exploratory hole locations located in the north west extremity of the site (BH1 and BH11) at depths ranging between 0.80 and 2.80m bgl. The deposit persisted to the full depth of the investigation with a maximum thickness of >3.20m determined in BH1.

The deposit was relatively uniform in composition and comprised soft to firm grey brown clay. The consistency of the soil generally increased with depth.

4.1.5 Obstructions and Services

Two of the window sample locations were terminated at shallow depths on encountering subsurface obstructions detailed as follows.

- BH10 was abandoned at 0.3m due to a hard obstruction encountered whilst hand excavating the inspection pit. Due to the close proximity of services to the proposed location, the decision was taken to abandon this location.
- BH8 was abandoned at 0.8m due to a large amount of water in the trial pit resulting in instability and constant collapse during excavation.
- BH6 was terminated at 1.8m due to refusal within very dense gravels.
- BH13 was terminated on a wooden obstruction at a depth of 1.5m bgl. This borehole was moved along the embankment both the north and south of the original position, but encountered the same obstruction at a depth of 1.5m bgl. Due to a lack of service clearance outside of this proposed area, the decision was taken to abandon this location.

4.2 Visual and Olfactory Evidence of Contamination

Ash was observed within BH6 between 0.20 and 0.80mbgl.

4.3 Dual Purpose Groundwater and Ground Gas Installations

50mm HDPE standpipes were installed in 7no of the exploratory boreholes. Response zones comprised slotted sections with 125µm filter wrap and 10mm diameter pea-shingle surround sealed above and below with bentonite. Details of the response zones and monitored strata are provided on the engineering logs included in Appendix E and summarised in Table 3.

Table 3: Standpipe Response Zones

Location	Sealed Response Zone (m bgl)	Strata
BH1	0-0.8m	Made Ground
BH2	1.0-3.0m	Head Deposits
BH4	1.0-4.0m	Head Deposits & London Clay Formation.
BH5	2.0-2.7m	Head Deposits
BH7	0-2.0m	Made Ground
BH11	0-1.0m	Made Ground
BH14	1.4-2.4m	Head Deposits

4.4 Groundwater

Groundwater was encountered during the investigation at the depths summarised in Table 4.

Table 4: Summary of Groundwater Strikes

Location	Water Depth (m bgl)	Strata
BH1	1.40	London Clay Formation
BH2	1.00	Head Deposits
BH3	1.00	Made Ground
BH4	1.80	Head Deposits
BH6	1.20	Head Deposits
BH7	1.00	Made Ground
BH8	0.50	Made Ground
BH9	1.20	Head Deposits
BH11	1.20	Made Ground
BH12	1.50	Head Deposits
BHI1	1.30	Head Deposits
BHI2	1.50	Head Deposits
BHI3	1.40	Head Deposits

4.5 Groundwater Monitoring

Two return groundwater monitoring visits were undertaken as summarised in Table 5.

Table 5: Summary of Groundwater Monitoring

Location	Water Depth (m bgl)	
	20/02/2017	27/02/2017
BH1	0.20	0.00
BH2	ND	0.32
BH4	1.95	1.63
BH5	1.78	2.79
BH7	ND	ND
BH11	0.42	ND
BH14	1.55	1.40

ND – Not Detected

4.6 Ground Gas Monitoring

Ground gases including methane, carbon dioxide, oxygen, carbon monoxide and hydrogen sulphide were measured during the two monitoring rounds using a GA2000 infra red gas analyser. A summary of ground gas results is presented in Table 6. The full results of ground gas monitoring recorded during each monitoring visit are provided in Appendix F.

Table 6 Summary of Ground Gas Monitoring Results

Location	Peak Flow (l/hr)		Methane (% CH ₄)		Carbon Dioxide (% CO ₂)		Oxygen (% O ₂)		CO (ppm)		H ₂ S (ppm)	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
BH1	0.1	0.3	0.0	0.2	0.1	0.1	20.3	22.1	<1	<1	<1	<1
BH2	0.1	0.4	0.0	0.1	0.1	0.2	20.7	21.4	<1	<1	<1	<1
BH4	0.0	0.3	0.0	0.2	0.1	2.5	18.2	20.8	<1	<1	<1	<1
BH5	0.2	0.2	0.0	0.9	0.1	0.3	14.2	20.6	<1	<1	<1	<1
BH7	0.1	0.2	0.0	0.2	0.1	0.2	20.8	20.9	<1	<1	<1	<1
BH11	0.0	0.2	0.0	0.1	0.1	0.5	20.5	21.8	<1	<1	<1	<1
BH14	0.0	0.2	0.0	0.1	0.1	0.4	20.4	21.1	<1	<1	<1	<1



Atmospheric pressure recorded at the closest weather station (Rowlands Castle approximately 2km to the north of the site (ID: I90580690) through the monitoring period is summarised in Table 7.

Table 7: Summary of Atmospheric Pressure During Monitoring Rounds (hPa)

Date	Time: 06:00	Time: 12:00	Time: 18:00	Rising / Falling
10/02/2017	1013	1015	1013	Rising then falling
27/02/2017	987	980	976	Falling



5.0 Laboratory Testing

5.1 Environmental Laboratory Testing

Environmental laboratory testing was scheduled by WYG, and undertaken by Exova Jones Environmental Laboratory who are UKAS and MCERTS accredited for a wide range of chemical tests.

Laboratory testing was carried out in accordance with ISO17025:2005 General Competence of Testing and Calibration Laboratories.

5.1.1 Soil

WYG submitted twenty-seven soil samples for chemical testing for a range of determinants as outlined in Table 8. Laboratory analytical certificates are presented in Appendix G.

Table 8: Summary of Environmental Testing (Soils)

Test	No. scheduled
Metals Suite – Arsenic, Beryllium, Boron, Cadmium, Chromium (III), Hexavalent Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium, Zinc	27
Polycyclic Aromatic Hydrocarbons (USEPA Standard 16) suite	27
Total Petroleum Hydrocarbons (TPH) Criteria Working group testing	27
Polychlorinated biphenyl (PCB) suite	2
Asbestos (Screen)	27
Asbestos (Identification)	3
Total Phenols	27
BTEX Benzene, Toluene, Ethylbenzene and Xylenes (Mixed Isomers)	23
VOC target list (inc BTEX/MTBE) by GC-MS	4
Standard inorganics including pH, soluble sulphate, free cyanide, natural moisture content.	27
Fraction of Organic Carbon	27

5.1.2 Water

Groundwater samples were collected from the monitoring installations containing water on the 20/02/2017 and 27/02/2017.

Table 9 details the range of parameters analysed for within the water samples. Laboratory analytical certificates are presented in Appendix G.

Table 9: Summary of Environmental Testing (Waters)

Test	No. scheduled
Metals Suite – Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium (III), Copper, Lead, Molybdenum, Mercury, Nickel, Selenium, Zinc.	13
Calcium	13
Chloride	13
Polycyclic Aromatic Hydrocarbons (USEPA Standard 16) suite	13
Total Petroleum Hydrocarbons (TPH) Criteria Working group testing	13
Total Hardness	13
Phenols by HPLC	13
Standard inorganics including pH, sulphate, total cyanide	13
Nitrate and Nitrite	13
Dissolved Organic Carbon	13
Ammonical Nitrogen as NH ₃ and NH ₄	13
BTEX by GC-MS	13
Total Alkalinity as CaCO ₃	13
Volatile Organic Compounds	13

5.1.3 Leachate

Table 10 details the range of parameters analysed for leachate analysis. Laboratory analytical certificates are presented in Appendix F.

Table 10: Summary of Environmental Testing (Leachate)

Test	No. scheduled
Metals Suite – Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium (III), Copper, Lead, Molybdenum, Mercury, Nickel, Selenium, Zinc.	3
Polycyclic Aromatic Hydrocarbons (USEPA Standard 16) suite	3



5.2 Geotechnical Laboratory Testing

A programme of geotechnical laboratory testing, scheduled by WYG, was carried out on representative samples taken from the various strata from the ground investigation. The results of the geotechnical laboratory tests are presented in Appendix H.

All testing was carried out in accordance with BS1377:1990+A1 Methods of Testing Soils for Civil Engineering Purposes. Table 13 details tests and standards undertaken on samples recovered during the site investigation.

Table 11: Summary of Laboratory Geotechnical Testing

Type of Test	Standard	No.
Classification		
Natural Moisture Content	BS1377: Part 2:1990, Clause 3.2	6
Atterberg Limits	BS1377: Part 2:1990, Clauses 4.4, 5.3 & 5.4	6
Particle Size Distribution (PSD) – Wet Sieving	BS1377: Part 2:1990, Clause 9.2	11
Particle Size Distribution (PSD) – Sedimentation	BS1377: Part 2:1990, Clause 9.4	3
Chemical		
BRE SD1 Concrete Aggressivity Suite	Concrete in aggressive ground (Special Digest 1). BRE Construction Division 2005	6



6.0 Geotechnical Discussion

6.1 Geology & Geotechnical Parameters

Ground conditions encountered during the recent site investigation were broadly consistent with those identified in the published literature.

In summary ground conditions comprised Made Ground over predominantly coarse-grained Head Deposits overlying London Clay Formation. Head Deposits were absent on the raised western portion of the site. Details of the various soils encountered during this investigation are discussed in Section 5.0.

This section discusses the key geotechnical characteristics of each encountered strata as determined from field observations and laboratory geotechnical testing. Laboratory results are presented in Appendix G.

6.1.1 Made Ground

Made Ground soils were highly variable in terms of composition and characteristics. SPT 'N' values ranged from 10 to 22 in the coarse soils and between 2 and 17 in the fine soils. No lateral or vertical trends were noted and these soils have not been characterised due to inherent variability.

6.1.2 Head Deposits

Coarse

SPT 'N' values which ranged between 13 and >50 corresponding to medium dense to very dense coarse soils, were predominantly within the medium dense / dense range, and displayed a general increase with depth.

Nine particle size distribution tests (PSDs) were carried out on representative samples and indicated percentages of gravel, sand and silt/clay varying between 0 and 76%, 13 and 85% and 11 and 32%, respectively, indicating a sandy silty/clayey gravel, (slightly) gravelly very clayey/silty sand and a (very) silty /clayey sand which corresponded to the engineers description of predominantly coarse soil.

Fine

An SPT 'N' value of 7 was determined in the predominately fine Head Deposits, correlating with the WYG engineer's field assessment of soft consistency soils.

6.1.3 London Clay Formation

N values within the London Clay Formation ranged between 8 and 25 and showed a general increase with depth. Using the relationship $C_u = N \times 4.5$, the undrained shear strength (C_u) of the London Clay Formation has been determined to range between 36kN/m^2 to 112.5kN/m^2 . This correlates with the WYG engineers field assessment of soft to firm consistency soils.

Particle size distribution tests (PSDs) carried out on 3 representative samples indicated percentages of gravel, sand, silt and clay varying between 0 and 11%, 8 and 10%, 42 and 48% and 38 and 43%, respectively, indicating a slightly sandy silty clay and a slightly sandy slightly gravelly silty clay.

Index properties (Atterberg Limits) were determined on five representative samples of the London Clay Formation from depths varying between 1.00 to 3.00mbgl. Liquid limits were shown to range between 42 and 65%, plastic limits between 21 and 28% and plasticity indices of between 21 and 37%, with corresponding modified plasticity indices ranging between 20 and 31% corresponding to intermediate to high plasticity clays of medium volume change potential. Moisture content determined on the same samples ranged between 22 to 40%.

The range and variations of the various test results obtained for the London Clay Formation are summarised in Table 12.

Table 12 Summary of Test Results

Test		No. of results	Minimum Value	Maximum Value	Mean Average Value
Natural moisture content (m- %)		5	22	40	28.8
Plasticity index (PI)		5	21	37	26.4
SPT N values		14	8	25	Not applicable (general increase with depth recorded)
Undrained shear strength:					
From SPT N values ^(b)	C_u (kPa)	14	36	112.5	Not applicable (general increase with depth recorded)

^(b)Estimated from a correlation by Stroud and Butler (1975) using the relationship $C_u = \text{SPT N} \times 4.5$



7.0 Engineering Considerations

7.1 Introduction

At this stage specific details of the development have not been confirmed, however the general layout of the proposed development has been provided to WYG on Drawing Colt International Residential Option 13 (A090070-182[ST1]27 revision B) dated June 2017 included in Appendix B.

This drawing shows residential development in the west of the site and commercial developments in the east. Residential developments are indicated to comprise 2 to 5 storeys buildings with associated landscaping in the west and central areas of the site and access roads off Martin Road to the west of the site. Commercial units are indicated to comprise commercial units with associated hard standing carparking and access road from New Lane to the east of the site.

7.2 Shallow Foundations

Due to variability of the Made Ground there is potential that these soils will give rise to unacceptable and unpredictable amounts of total and differential settlements under load. It is therefore recommended that conventional spread foundations should pass through the Made Ground and bear onto the underlying undisturbed natural soils.

To the east of the embankment, at the lower level, conventional shallow foundations (pad or strip) founding upon the medium dense to very dense coarse grained Head Deposits are likely to be suitable for low-rise developments. In consideration of bearing pressures alone a net allowable bearing capacity of the order of 200kPa should be obtainable for a conventional 1m wide strip foundation bearing into the Head Deposits at a depth of 1.0m bgl limiting settlements to less than 25mm. It is noted that due to the variable thickness of the Made Ground foundations will need to be constructed at deeper levels in some areas. In addition bearing capacities would need to be reduced (or foundations deepened to bear upon coarse soils) where predominantly fine soils are present. A net allowable bearing capacity of the order of 90kPa would be attained for conventional shallow foundations bearing upon the fine Head Deposits soils at a depth of 1.60m bgl (limiting settlements to less than 25mm).

At the higher level to the east of the embankment, the London Clay Formation is located directly below the Made Ground. A net allowable bearing pressure of the order of 100kN/m² should be obtainable for a conventional 1m wide strip foundation bearing onto the London Clay Formation at a depth of 1.30m bgl



limiting settlements to less than 25mm. Slightly higher capacities of the order of 150kPa will be supported at deeper levels of 1.50mbgl where firm clay is present.

It should be noted that parts of the site are vegetated and proposed building footprints may fall within the zone of influence of trees. Consequently it would be necessary to consider the zone of influence of these trees following the guidance set out in NHBC Chapter 4.2 "Building Near Trees" (2017), particularly where foundations are to be constructed within shrinkable clay soils. Foundations may need to be constructed at deeper levels below the depth of influence of the tree, depending on the water demand of the tree and the column change potential of the soils. This would also apply to areas where trees are to be planted as part of the proposed development.

The London Clay Formation was assessed to be an intermediate to high plasticity clays of medium volume change potential which would allow a *minimum* foundation depth of 0.90m bgl *outside* of the zone of influence of trees.

7.3 Piles

Piled foundations could be considered where structural loads are too high to be supported by conventional shallow foundations. In consideration of prevailing conditions alone and depending on foundation load requirements, a choice of pile type of various lengths and diameters can be designed to bear within the strata encountered beneath the site.

However general site conditions, environs and proximity to adjacent extant infrastructure, foundations and services are all influential in choice of piling system.

Factors likely to influence pile design would include the presence of sub surface concrete layers which may require pre-boring, proximity to existing structures and heave from load removal during temporary works. For these reasons it is recommended that a competent and experienced specialist piling contractor undertakes all piling works, adopting appropriate controls and that their advice should be sought at the earliest opportunity.

Illustrative calculations for indicative axially loaded pile capacities have been undertaken, based on a single pile. The calculation of pile capacity (Q) in predominantly fine grained soils is in accordance with the general form:

$$Q = N_c \cdot C_{u \text{ base}} \cdot A_{\text{base}} + \alpha \cdot C_u \text{ (average)} \cdot A_{\text{shaft}}$$

where Q is the bearing capacity, N_q is a bearing capacity factor, α is the adhesion factor, C_u is the shear strength and A_{base} and A_{shaft} are respectively the area of the base and shaft of the pile. Parameters adopted for illustrative calculations are summarized in Table 13.

Table 13: Parameters adopted for illustrative calculations

Parameter	Value
Adhesion (α)	0.45
Shear Strength (C_u)	Average over shaft length (based on 4.8 x SPT N)
N_c	9
β	0.68

For the purposes of this illustrative exercise a simplified ground model has been adopted for the two areas of the site.

Elevated Western Area

Variations in strata thickness have been approximately averaged to provide a simplified ground model of conditions underlying the site. This ground model comprises the following: -

- Made Ground – 1.10m thick (no contribution to pile capacity)
- London Clay Formation – >4.0m deep (fine grained)

Central and Eastern Area

Variations in strata thickness have been approximately averaged to provide a simplified ground model of conditions underlying the site. This ground model comprises the following: -

- Made Ground – 1.0m thick (no contribution to pile capacity)
- Coarse Grained Head Deposits – 1.9m thick
- London Clay Formation – >3.20m thick (fine grained)

For detailed design, it will be necessary, as a consequence of variation in strata thicknesses, column loads and group effects (if any), to assess final required pile lengths on a structure-by-structure basis.

The competency of the soil profile used for these calculations is based on in situ testing, principally SPT N values, where estimation of undrained shear strengths (kN/m^2) of the encountered fine grained soils have been calculated using the empirical correlation $C_u = 4.8 \times \text{SPT N value}$ (after Stroud, 1975).

Owing to the variable composition and consistency of the Made Ground, for the purposes of foundation assessment, no strength values have been assigned to these soils.

Based on these preliminary characteristic parameters, estimates of required length for different safe working loads for CFA piles have been assessed and are provided in Table 15 and 16.

Table 15 Safe working loads for CFA piles in Elevated Western Area (kN)

Penetration into London Clay Formation (m)	Pile Diameter (m)		
	0.3	0.6	0.9
2	20	70	160
3	30	100	200
4	60	180	360

Table 16 Safe working loads for CFA piles in Central and Eastern Area (kN)

Penetration into Head Deposits / London Clay Formation (m)	Pile Diameter (m)		
	0.3	0.6	0.9
2	60	240	540
3	30	80	160
4	50	130	250
5	70	200	390

It should be noted that some factors are sensitive to the exact method of installation, which can have a significant effect on pile capacity. It should also be noted that for Continuous Flight Auger (CFA) piles there are certain practical constraints when considering the incorporation of large amounts of pile reinforcement for lateral loading.

On the basis of the illustrative calculations, settlements are likely to be within permissible tolerances. Working capacities for pile groups should be assessed when final design details are known, although for preliminary design purposes it is likely that piles spaced at least 3 x pile diameter from other piles in any group will behave as single piles.



The above calculated values are presented for indicative purposes only. Where preliminary and working pile load tests are undertaken it may be appropriate to reduce Safety Factors. It should be noted that no allowance has been made for a net decrease in overall pile capacity owing to a reduction in effective stress and consequently skin friction through the excavation/removal of surface soils.

Should greater loads be required, it is recommended that further investigation is required to establish more focused characteristic parameters for geotechnical design to deeper levels.

7.4 Floor Slabs

The Made Ground is not considered as a suitable bearing stratum for ground bearing floor slabs due to variability in composition and consistency.

In areas where the Made Ground is relatively thin, it may prove practical to utilise ground bearing floor slabs following localised stripping of these incompetent soils and replacement with a compacted granular material. However, in some areas Made Ground thickness has been found to be relatively deep (up to 2.0m bgl in BH7) and such replacement is likely to be impractical. As an alternative, in such areas consideration should be given to the use of suspended floors. Furthermore, ground bearing floor slabs will need to be constructed outside the zone of influence of established and introduced trees. Where this cannot be achieved floor slabs will need to be suspended in accordance with NHBC Chapter 4.2 "Building Near Trees" (2017).

7.5 Pavements

Characteristic CBR values have not been established for the site and it is recommended that detailed assessment of the sub-grade is undertaken via in-situ CBR testing and inspection during construction. This will identify unsuitable materials that may require removal and replacement once areas of proposed road and pavement have been finalised. This will help to reduce the risk of inappropriate or overly conservative parameters arising from the inherent variability of the near surface soils.

7.6 Temporary Work

It is considered at this stage that temporary works will comprise trench excavations for service construction into the Made Ground and possibly the underlying Head Deposits or London Clay Formation. It is considered that most excavations will require support or the battering back to a safe angle during excavation. It is recommended that the slopes are battered back at a ratio of 2:1.

It is recommended that where man entry into excavations deeper than 1.20m is required that either excavations are shored or that the sides of excavations are battered to a safe angle of repose.

Based on current groundwater level readings, it is likely that excavations for services and other infrastructure will encounter significant groundwater and therefore dewatering will be required. It is recommended that the dewatering is undertaken in accordance with the guidelines of CIRIA C750 Groundwater Control – Design and Practice, (2016).

7.7 Chemical attack on Buried Concrete

Chemical testing in accordance with BRE SD1: 2005 Concrete in Aggressive Ground has been used to derive the Design Sulfate Class and ACEC Concrete class of the soils encountered as detailed in Table 17. Table 13 assumes mobile groundwater conditions (BRE Special Digest 1).

Table 17 Summary of Concrete Classification Testing

Location	Depth - mbgl	Strata	pH	Water Soluble Sulphate – 2:1 water soil extract mg/l	Design Sulfate Class	ACEC Class
BH1	1.00 – 2.00	London Clay Formation	8.8	31	DS-1	AC-1
BH3	2.80 – 4.00	London Clay Formation	8.4	120	DS-1	AC-1
BH4	2.30 – 3.00	London Clay Formation	8.3	41	DS-1	AC-1
BH11	2.00 – 3.00	London Clay Formation	8.1	16	DS-1	AC-1
BH12	2.80 – 4.00	Head Deposits – Coarse	8.1	120	DS-1	AC-1
BH14	3.00 – 4.00	London Clay Formation	8.0	81	DS-1	AC-1

The results for all samples are indicative a design sulphate class of DS-1 AC1 based on the recent ground investigation data. We would advise that all cements used for sub-surface concrete should confirm to the advice given within this publication unless otherwise specified or required.



8.0 Ground Contamination Tier 1 Assessment

8.1 Methodology for Contamination Assessment

The objective of the Tier 1 Screening Assessment presented herein is to identify the chemical constituents which might potentially pose unacceptable levels of risk to sensitive on-site and off-site receptors.

Measured concentrations in soil, soil leachate and groundwater have been compared with various sets of Tier 1 Screening Values (TSVs). Where measured concentrations in environmental media exceed these levels this does not necessarily indicate a requirement for remediation; it can however, be the trigger for the undertaking of a more detailed quantitative assessment in accordance with the current UK tiered risk assessment framework.

8.1.1 Human Health

Soil

In March 2014, DEFRA published the 'C4SLs' within the 'Policy Companion Document: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination' (SP1010). The purpose of the C4SLs is to identify a concentration in soil indicative of Category 4 status as defined by Part 2a Statutory Guidance¹ on the definition of contaminated land. In September 2014, further clarification was published in a letter from Lord DeMauley to Local Authorities instructing them to use C4SLs in planning. Where available, C4SLs have been used as the preferred choice of screening criteria.

For those constituents where no C4SL has been published by the EA / DEFRA, WYG have screened soil against Suitable for Use Levels (S4ULs)².

At the time of compiling the report a proposed development plan showed multi-storey residential properties located on the western and central portions of the site and commercial developments on the eastern portion. For the purposes of this risk assessment human health criteria for soils applicable to a residential end use without plant uptake have been used in order to screen the site data to provide a more conservative screening criteria as the full proposed development plan had yet to be finalised at the time of screening the data.

¹ Published by DEFRA in 2012 the guidance defines four categories of Category 4 is considered the least contaminated; "there is no risk or that the level of risk posed is low"

² Nathaniel C.P., McCaffrey, C., Gillet, A.G., Ogden R.C., and Nathaniel, J.F. 2015. *The LQM/CIEH S4ULs for Human Health Risk Assessment*



A number of TSVs are dependent on the Soil Organic Matter (SOM) content, and as such TSVs are typically calculated for a SOM of 1%, 2.5% and 6%. The average recorded Fractional Organic Carbon (FOC) recorded within the soils was 0.00775. Using the equation of $SOM(\%) = FOC / 0.0058$ this equates to a site specific SOM of 1.3%. A site specific SOM of 1% has been assumed for the purposes of screening all of the soil data.

Groundwater

Whilst it is considered unlikely that following redevelopment that site users will have the potential to come into direct contact with groundwater on a routine basis, it is noted that particularly shallow groundwater (<0.5m) was noted in some areas of the site (BH1, BH11 and BH2 located in the north and west). As part of the risk assessment process, concentrations of chemical constituents in groundwater (and leachate) have been compared with drinking water standards; this assessment is also considered relevant to the assessment of controlled waters noting that deeper groundwater (within the White Chalk) is regarded as drinking water resource and that the site is located within a Source Protection Zone (Zone 3a - Outer) for an abstraction situated approximately 3km west of the site.

Ground Gas

A preliminary ground gas risk assessment has been completed by calculating gas screening values (GSVs) of hazardous gas (carbon dioxide and methane) from the product of gas flow and concentration (i.e. the discharge). The derived GSVs have been compared with criteria presented within CIRIA C665 'Assessment of Risks posed by Gas to Buildings' in order ascertain a conservative 'Characteristic Situation' which can subsequently be used as the basis for identifying risk mitigation measures / or for undertaking more comprehensive assessment.

8.1.2 Controlled Waters

The eastern and central portions of the site are underlain by superficial deposits that are defined by the Environment Agency as Secondary A aquifers. There are no groundwater abstractions within 1km of the site and therefore these aquifers in themselves are not regarded as being highly sensitive as potential environmental receptors.

Underlying the London Clay Formation and Lambeth Group Deposits is the deeper Thanet Sand formation and White Chalk which are classified as a Principal Aquifer. The site is located within an Outer Zone 1c (Inner – subsurface activity only) Protection Zone for a drinking water abstraction from the White Chalk by Portsmouth Water. It is expected that the London Clay Formation and Lambeth Group are likely to provide a relatively impermeable barrier preventing potential contaminant transport between the overlying



Secondary A Aquifers and the deeper Chalk. Investigations undertaken to date have penetrated a maximum of 3.2m into the London Clay in the north west of the site (BH1), 2.7m in the north east (BH4), 1.6m in the west (BH11) and 1.4m in the south east (BH14). Whilst this appears to indicate that the London Clay Formation is likely to provide a substantial barrier site wide preventing potential impacts to the chalk from shallow contaminant sources, as a precautionary approach (in lieu of more extensive data) it is considered appropriate to assume that some connectivity between shallow and deeper groundwater units could occur (for example during deep piling). In order to assess a worst case assumption that shallow groundwater is in continuity with groundwater in the chalk, the contaminant concentrations in groundwater have been compared directly with Drinking Water Standards (DWS).

Excluding the on-site drainage (monsoon drain) the nearest surface water to the site is considered to be the River Lavant adjacent to the south eastern corner of the site. Classified as a Good Quality Grade A River this represents a potentially sensitive receptor for any contaminative impact arising from the site. It is thought that existing surface water drainage may discharge into the River, providing a mechanism for potential contaminant transport and impact. It is unclear whether the groundwater beneath the site is in continuity with the River; this could potentially provide another mechanism by which contamination arising from the site could impact the River.

For the purposes of evaluating Controlled Waters at the site, the River Lavant is considered to be a potential receptor and Freshwater Environmental Quality Standards have been used to inform an initial assessment of risks to the River; concentrations recorded in groundwater, surface water and leachate have been screened against EQS.

As discussed above, in order to evaluate the significance of potential impacts to deeper groundwater in the White Chalk, a separate screen has been undertaken using DWS. Both groundwater and soil leachate data have been screened against DWS.

8.2 Generic Assessment of Laboratory Data

8.2.1 Soil

A total of twenty-seven soil samples collected from the site were submitted for laboratory analysis. Table 18 presents a summary of the exceedances above the adopted screening criteria. Visual representations of the encountered exceedances are displayed in figures SK03 and SK04 in Appendix C.

Table 18 Exceedences of Soil TSVs – Residential without Consumption of Homegrown Produce

Chemical Constituent	TSV (mg/kg)	No. of analyses	No. of Exceedences	Conc. (mg/kg)	Location of Exceedences
Beryllium	1.7	27	2	2.1 2.4	BH1 @ 1.5mbgl BH14 @ 0.3mbgl
Lead	310	27	2	370 1088	BH5 @ 0.6mbgl BH14 @ 0.3mbgl
Benzo(a)anthracene	11	27	1	14.64	BH11 @ 0.3mbgl
Benzo(a)pyrene	5.3	27	2	8.1 16.19	BH4 @ 0.5mbgl BH11 @ 0.3mbgl
Benzo(b)fluoranthene	2.6	27	3	11.1 4.46 18.65	BH4 @ 0.5mbgl BH5 @ 0.6mbgl BH11 @ 0.3mbgl
Dibenzo(ah)anthracene	0.24	27	3	1.88 2.25 0.61	BH4 @ 0.5mbgl BH5 @ 0.6mbgl BH11 @ 0.3mbgl
Napthalene	2.3	27	1	2.31	BH11 @ 0.3mbgl

Notes: All exceedences occurring at shallow depth ie <1m below ground level (bgl) are shown in bold.

The results of the data screening indicate that the majority of soil tested at the site contains chemical concentrations below the criteria developed to indicate a potential risk of harm to health at a residential (without consumption of homegrown produce) setting, and that where exceptions do occur, chemical concentrations are only marginally elevated (e.g. less than one order of magnitude greater than relevant criteria).

However, in addition to the occasional and relatively marginal exceedences of chemical concentrations identified in Table 18 with respect to human health based criteria, asbestos was detected in three soil samples. Details of these detections and the results of subsequent quantification analysis is presented within Table 19. Visual representations of the encountered exceedences are displayed in figure SK05 in Appendix C.

Table 19 Asbestos Identification and Quantification in Soil

Sample	Type	Quantification (mass %)		
		Gravimetric	PCOM Fibres	Gravimetric + PCOM Total
BH2 at 0.6m	Amosite	<0.001	0.002	0.002
BH14 at 0.3m	Chrysotile	0.012	<0.001	0.012
CP3 at 0.35m	Chrysotile	<0.001	<0.001	<0.001

Asbestos fibres (Amosite and Chrysotile) were detected in the Made Ground in three of the twenty-seven samples collected from the Made Ground. Although not exclusive, Chrysotile (white asbestos), is typically associated with asbestos cement materials, and Amosite (brown asbestos), was mainly used in asbestos insulating boards which was used for fire protection and insulation.

It should be noted that no visible evidence of asbestos materials was apparent during site works, although laboratory inspection noted 'free fibres' in 1 sample and fibre bundles in the other two samples. Risk associated with asbestos is related to numerous factors, including the type of asbestos; whether the asbestos is in a bound form or present as loose fibres; concentration; the soil matrix; soil moisture; degree of disturbance, and others. In this case:

- The asbestos type detected is the lower risk Chrysotile. Although the moderate risk Amosite was encountered in a single location. However, fibre bundles and free fibres were identified which have a higher risk of becoming airborne.
- The laboratory results identified that three samples had 'quantifiable' levels (potentially >0.001%) of asbestos. A single sample (CP3 at 0.35m) was quantified and found to be less than <0.001%, another sample had 0.002% (BH2 at 0.6m) and the remaining sample had 0.012% (BH14 at 0.3m). As the asbestos level is below 0.1% the soils would not be treated as hazardous waste.
- The physical nature of the Made Ground was highly varied with both fine and coarse grained soils; the latter would suggest a higher risk of fibre release on disturbance.
- Natural moisture contents of the soil were analysed by the laboratory in two of the three samples where asbestos was identified. The moisture contents ranged from 12.3 to 24.3%. The greater the moisture content the less risk of fibre release (See CIRIA C733, 2014; Addison et al., 1988).

8.2.2 Groundwater

Groundwater data collected from the site has been subject to evaluation using two sets of generic standards namely (1) EQS and (2) DWS. Exceedences identified after screening the groundwater data against EQS are presented in Table 20. Visual representations of the encountered exceedences in the groundwater are displayed in figure SK06 in Appendix C.

Table 20 Exceedences of EQS in Groundwater

Determinant	TSV (ug/l)	No. of Analyses	No. of Exceedences	Conc. (ug/l)	Location of Exceedences
Dissolved Nickel	4	13	4	6.7 7 4.3 4.4	BH5 Round 1 BH5 Round 2 BH11 Round 1 BH 11 Round 2
Anthracene	0.1	13	3	0.47 0.14 0.15	BH1 Round 1 BH1 Round 2 BH5 Round 2
Fluoranthene	0.0063	13	8	0.83 0.27 0.01 2.45 0.04 0.11 0.03	BH1 Round 1 BH1 Round 2 BH4 Round 1 BH5 Round 2 BH11 Round 1 BH11 Round 2 BH14 Round 1
Benzo(a)pyrene	0.00017	13	2	0.02 0.35	BH1 Round 1 BH5 Round 2
Benzo(ghi)perylene	0.0082	13	2	0.01 0.23	BH1 Round 1 BH5 Round 2
Benzo(k)fluoranthene	0.017	13	1	0.23	BH5 Round 2
Benzo(b)fluoranthene	0.017	13	2	0.03 0.58	BH1 Round 1 BH5 Round 2
Total Cyanide	1	13	6	2 4 2 3 3 4	BH1 Round 1 BH1 Round 2 BH5 Round 1 BH5 Round 2 BH11 Round 1 BH11 Round 2
Ammonia as Nitrogen	300	13	9	3,150 870	BH1 Round 1 BH1 Round 2

Determinant	TSV (ug/l)	No. of Analyses	No. of Exceedances	Conc. (ug/l)	Location of Exceedances
				1,530	BH5 Round 1
				1,470	BH5 Round 2
				10,100	BH11 Round 1
				4,070	BH11 Round 2
				1,150	BH14 Round 1
				1,140	BH14 Round 2

The results presented in Table 20 indicate that a number of contaminants, in particular PAH compounds, metals, ammonia and cyanide exceed relevant EQS. Of note the majority of exceedances are considered relatively marginal (i.e. less than one order of magnitude greater than EQS), however, more marked exceedances are evident for ammonia (one to two orders of magnitude greater than EQS) within groundwater collected from BH1 and BH11 in the west of the site and also in BH5 and BH14 in the south east.

Relatively high concentrations of PAH compounds (in particular fluoranthene, benzo(a)pyrene, benzo(ghi)perylene and benzo(bk)fluoranthene) were also recorded in BH1 (particularly in Round 1) and in BH5 (particularly during Round 2). It is notable that in BH1, superficial strata was not recorded and therefore the shallow groundwater encountered is considered to be perched within the Made Ground that overlies the London Clay Formation. BH1 is also located in the north west of the site approximately 250m from the River Lavant (situated east of the site) and based on the (inconsistent) concentrations recorded, the absence of a confirmed continuous groundwater pathway and the travel distance it is considered relatively unlikely that the concentrations of contaminants recorded in groundwater in BH1 constitute a potential risk of impacts to the River Lavant.

The concentrations of PAH compounds (fluoranthene, benzo(a)pyrene, benzo(ghi)perylene and benzo(bk)fluoranthene) in BH5 exceed the EQS by between 1-3 orders of magnitude. It is notable that much lower concentrations of PAH were recorded in groundwater collected from BH5 during round 1 and also that on the second monitoring round the groundwater level was approximately 1m lower (it didn't recover following purging a week earlier) leaving a water column of only 0.1m in the base of the well. The groundwater collected from the base of BH5 contained a visibly high silt content and it is considered plausible that the high PAH content may be attributable to PAH compounds sorbed to the silt rather than being representative of true dissolved phase concentrations.

Exceedences identified after screening the groundwater data against DWS are presented in Table 21.

Table 21 Exceedances of DWS in Groundwater

Determinant	TSV (ug/l)	No. of Analyses	No. of Exceedances	Conc. (ug/l)	Location of Exceedances
Dissolved Selenium	10	13	2	18.2 23.8	BH5 Round 2 BH14 Round 2
Benzo(a)pyrene	0.01	13	2	0.2 0.35	BH1 Round 1 BH5 Round 2
Sum of Four PAH *	0.1	13	1	1.3	BH5 Round 2
Sulphate	250,000	13	1	410,000	BH5 Round 1
Chloride	250,000	13	3	262,900 423,800 267,000	BH1 Round 1 BH11 Round 1 BH11 Round 2
Ammonium as Nitrogen	500	13	9	3,340 920 1,620 1,560 10,700 4,310 1,220 1,210	BH1 Round 1 BH1 Round 2 BH5 Round 1 BH5 Round 2 BH11 Round 1 BH11 Round 2 BH14 Round 1 BH14 Round 2

* Includes benzo(b)fluoranthene, benzo(ghi)perylene, Benzo(k)fluoranthene and indeno(123cd)pyrene

The results presented in Table 21 indicate that, a number of contaminants, in particular PAH compounds, metals, ammonium, sulphate, chloride and cyanide exceed relevant DWS. The maximum concentrations of sulphate, chloride and selenium are considered only marginally elevated with respect to EQS (i.e. less than one order of magnitude greater), whilst the highest concentrations of benzo(a)pyrene, the sum of four PAH and ammonium are more notably elevated (1-2 orders of magnitude). As discussed previously the highest concentrations of PAH in groundwater have been recorded in BH5 (associated with high silt content) and in BH1 associated with perched water in shallow made ground. In BH1 the proven presence of at least 3m of London Clay Formation underlying the shallow groundwater is considered to be sufficient to 'protect' the deeper chalk in this part of the site from impacts from shallow groundwater and in BH5 the concentrations of PAH recorded during Round 2 may not be representative of true dissolved phase concentrations of PAH in groundwater in this part of the site.

8.2.3 Soil Leachate

Concentrations of contaminants recorded in soil leachate have been compared separately against EQS and DWS. Exceedences identified after screening the soil leachate data against EQS are presented in Table 22. Visual representations of the encountered exceedences are displayed in figure SK07 in Appendix C.

Table 22 Exceedences of EQS in Leachate

Determinant	TSV (ug/l)	No. of Analyses	No. of Exceedences	Conc. (ug/l)	Location of Exceedences
Dissolved Nickel	4	3	1	6.6	BH14 Round 1
Fluoranthene	0.0063	3	3	0.02 0.7 0.02	BH1 at 1.5m BH1 at 0.6m BH14 at 0.3m
Benzo(a)pyrene	0.00017	3	1	0.13	BH5 at 0.6m
Benzo(ghi)perylene	0.0082	3	1	0.08	BH5 at 0.6m
Benzo(k)fluoranthene	0.017	3	1	0.08	BH5 at 0.6m
Benzo(b)fluoranthene	0.017	13	1	0.2	BH5 at 0.6m

Exceedences identified after screening the soil leachate data against DWS are presented in Table 23.

Table 23 Exceedences of DWS in Leachate

Determinant	TSV (ug/l)	No. of Analyses	No. of Exceedences	Conc. (ug/l)	Location of Exceedences
Benzo(a)pyrene	0.01	3	1	0.13	BH5 at 0.6m
Sum of Four PAH	0.1	3	1	0.45	BH5 at 0.6m

As indicated in Table 23 and Table 24 the results of limited leachate testing and analysis performed on soil samples suggest that PAHs have the potential to leach from the soil at concentrations greater than relevant screening criteria (EQS and DWS). It is noted, however that the method of leachate derivation (which involves physical agitation of soil in deionised water for 24 hours) can result in concentrations occurring that exceed concentrations that might be expected to occur in natural conditions. It is considered generally that review and assessment of the occurrence of contamination in groundwater provides a more meaningful assessment of potential risks to controlled waters.

8.2.4 Surface Water

Samples were taken from the surface water from the Monsoon Drain on site and samples from the River Lavant both up and down stream of the possible culvert from the site. All results were below the stringent EQS thresholds.

8.2.5 Ground Gas

A ground gas risk assessment has been completed using the guidance presented in CIRIA C665 'Assessment of Risks posed by Gas to Buildings'.

Table 24 presents the results of assessing the methane and carbon dioxide GSVs (discharge rates) within boreholes across the site.

Table 24 Calculation of GSVs for Methane and Carbon Dioxide

Location	% CH ₄) l/hr	% CO ₂) l/hr
BH1	0.0006	0.003
BH2	0.0004	0.0008
BH4	0.0006	0.0075
BH5	0.0018	0.0006
BH7	0.0004	0.0004
BH11	0.0002	0.001
BH14	0.0002	0.0008
Site wide	0.0036	0.01

The average peak GSV for methane recorded in seven wells across the site is 0.0006l/hr, the highest individual GSV of 0.0018l/hr being recorded in BH5. For carbon dioxide a peak GSV of 0.0075l/hr was calculated in BH4 and the average GSV recorded in all seven wells was 0.002l/hr. If (as recommended in CIRIA C665) site wide worst case values are selected (maximum carbon dioxide levels of 2.5%, maximum



methane of 0.9% and peak flow of 0.4L/Hr) GSVs for methane of 0.0036l/hr and carbon dioxide of 0.01l/hr are calculated.

In each case, the well specific GSVs, and the site wide GSVs derived for methane and carbon dioxide are representative of a Characteristic Situation 1 which is considered to be indicate a **Very Low Risk** from ground gases.



9.0 Conceptual Site Model

Under the current UK environmental legislation (Environment Act 1995, Water Resources Act 1994, Environmental Protection Act 1990 (as amended), Health and Safety at Work Act 1994, Town and Country Planning Act 1990 and Building Regulations 1985), land is defined as contaminated if there is a significant 'pollutant linkage'. This requires evidence of the presence of a contaminant "source", a "pathway" through which contaminants could travel, and a "receptor" that could be harmed by the contaminant. In addition, the type of receptor and any harm must meet the descriptions of significant harm given in the statutory guidance. A site where a contaminant is causing, or is likely to cause, significant pollution of controlled waters also constitutes contaminated land.

This section of the report presents a Conceptual Site Model (CSM), which includes a qualitative assessment of environmental risks associated with each of the pollutant linkages identified.

The qualitative risk assessment is achieved by classifying the likely significance or severity of the risk and the probability of the risk actually occurring, to determine an overall risk for that particular pollutant linkage. The assessment has been undertaken with cognisance of:

- The nature, volume and extent of any identified contamination source as well as the presence of potential sources within unidentified areas;
- The potential pathways;
- Identified primary receptors; and

Proposed redevelopment activities (demolition and construction) and proposed future site use (understood for the purposes of this investigation to be a mixed use commercial and residential development).

9.1 Summary of Potential Ground Contamination Risk Sources

From the desk based and intrusive investigations undertaken at the site, a number of contamination sources and potential contamination sources have been identified;

- Large cylindrical former diesel AST (circa 10,000 gallons) situated south of the main factory building. It is understood that a diesel powered emergency generator was housed adjacent to the AST. Scarring on the concrete slab adjacent to the bund suggests that the tank may have connected via underground pipelines to an internal fill point or plant. It is unclear how recently the tank was decommissioned / removed. The closest investigation location achieved during the



subsequent intrusive works to the tank was BH7 approximately 15m to the south. Based on observations and results of soil sampling, evidence of PAH's was not recorded in BH7, however, this does not necessarily preclude that localised contamination might be present in the immediate vicinity of the former tank structure.

- Small double skinned plastic AST (circa 1000 litres capacity) for storage of 'fuel oil' situated on a plinth (but not bunded) adjacent to the Fire Testing facility in the south of the site. A single above ground pipe enters the Fire Testing building; it is reported that this tank was used to power the burners used as part of fire testing. The closest investigation location achieved during the subsequent intrusive works to the tank was BH8 approximately 5m to the south. This location was unable to progress deeper than 0.80mbgl due to high groundwater in the location. No olfactory or visual evidence was observed in the recovered soils, however, this does not necessarily preclude that localised contamination might be present in the immediate vicinity of the tank structure.
- Ancillary facilities north west of the factory building including an 'air pollution test' facility.
- The original heaters inside the main factory building were oil powered, reportedly supplied by above ground fuel pipelines.
- Soil data collected from the Made Ground (BH4, BH5, BH11 and BH14) and within the London Clay Formation in BH1 identified exceedances of human health based screening criteria for Beryllium (2 samples), Lead (2 samples), Benzo(a)anthracene (1 sample), Benzo(a)pyrene (2 samples), Benzo(b)fluoranthene (3 samples), Dibenzo(ah)anthracene (3 samples) and Napthalene (1 sample).
- Subsequent leachate analysis of three of the samples above from BH1, BH5 and BH14 indicated elevated Zinc (2 samples), Lead (1 sample), Mercury (1 sample), Fluoranthene (3 samples), Benzo(ghi)perylene (2 samples), Benzo(a)pyrene (1 sample), Benzo(b)fluoranthene (1 sample) and Benzo(k)fluoranthene (1 sample) with respect relevant water quality criteria.
- Quantifiable levels of asbestos fibres were recorded in in shallow samples collected from made ground in BH2 (amosite), BH12 (chrysotile) and BH14 (chrysotile) .
- Groundwater sampling identified concentrations of heavy metals, PAH compounds, cyanide, chloride, sulphate and ammoniacal nitrogen exceeding relevant water quality standards.



- Although detectable levels of ground gases (carbon dioxide and methane) were recorded during two monitoring rounds the levels recorded are not considered to indicate a potential risk to future site users and/or buildings.

A number of current and commercial premises are located in the site vicinity. Of particular note these include Marsh Plant immediately south, Eaton on the opposite side of New Lane, and a gas holder approximately 300m south of the site. Based, however, on the local topography (sloping down generally to the south or south east) and the known hydrogeological setting (that includes a public water abstraction to the south west) a southerly groundwater flow direction is inferred. Therefore, commercial premises in the site vicinity are considered to be down gradient in terms of inferred groundwater flow, and local topography, and it is relatively unlikely that the site has been impacted by off-site sources of contamination.

9.2 Risk Pathways

The key environmental pathways and exposure routes by which potentially contaminative substances can reach environmental and human health receptors are considered to be:

- Leaching of onsite sources of contamination.
- Lateral and vertical migration of gases/vapours.
- Overland surface water runoff.
- Contaminant migration through preferential pathways (e.g. piles, underground service ducts, and drains).
- Contaminant transport through off site migration of groundwater.
- Atmospheric transport and inhalation of airborne dusts, vapours and fibres (indoors and outdoors).
- Direct contact (dermal contact and ingestion) with soil, dust and water.
- Inhalation of vapours arising from soil contamination.

9.3 Receptors

The environmental and human health receptors on or surrounding the site include:

- Future site users (users / occupants of future commercial / residential premises).
- Construction workers during future development works.



- Groundwater (Head Deposits, Secondary Aquifers).
- Groundwater (Thanet Sand Formation and White Chalk are a Principal Aquifer and the site is located within a Source Protection Zone for groundwater abstraction)
- Surface waters (River Lavant adjacent south east of the site).
- On-site buildings and services.
- Offsite workers and residents.



10.0 Qualitative Risk Assessment

A qualitative risk assessment has been undertaken to evaluate potential pollutant linkages at the site. The likelihood of potential linkages being present and the consequences associated with these linkages has been evaluated using a matrix approach and a level of a risk has been assigned to each linkage. Further explanation of the risk matrix approach is provided in Appendix I.

10.1 Future Site Users

It is understood that current plans include redevelopment of the site for mixed commercial / residential use. The eastern portion of the site is currently proposed as potential commercial end use, and the western and central portion of the site are proposed for residential housing. The current plans identify multi-storey residential blocks with localised landscaped areas and parking.

Laboratory testing of the shallow soil has identified the presence of asbestos fibres and exceedences of heavy metals and PAH's with respect to human health based criteria applicable to residential end use; these concentrations and also the occurrence of low levels of asbestos fibres could present a potential health risk to future site users if exposure to the underlying soil is permissible. Shallow perched groundwater (almost at ground level in BH1 in the north west of the site) has been found to contain concentrations of several constituents at concentrations exceeding DWS. This could also pose a potential risk to the human health of future site users if the potential exists for exposure to occur (e.g. through shallow groundwater flooding or through contamination of drinking water supplies).

In addition to the known contaminant sources identified at the site the potential is seen to exist for undetected contamination within areas of the site that remain un-investigated, including in particular beneath the current building footprint.

Based on the findings of the investigation undertaken to date and also the potential for additional contaminant sources to be present it would be appropriate to assess the risk to future users of the site as **High** (Likely – Severe Consequence).

Based on the High risks identified it would be appropriate to undertake risk management measures that minimise potential exposure to contamination in the sub-soil. Consideration could be given to the placement of a clean layer of imported soil (typically 600mm - 1m of top soil and sub soil) for any landscaped / garden areas.



10.2 Construction Workers

Excavations and earthworks associated with any future demolition / construction work at the site has the potential to bring groundworkers into direct contact with the sub-soil. Although generally the levels of contamination recorded in soil to date are considered relatively mild, and are unlikely to present a significant risk through acute exposure scenarios, the potential does exist for higher concentrations to be present elsewhere. Furthermore detectable asbestos fibres have been identified in shallow made ground and, unless these risks are managed this could result in serious harm to health (even through a single exposure event).

Without any appropriate risk management / mitigation measures in place, it would be prudent to assume that the risk posed to future construction workers is **High** (Likely – Severe Consequence).

These risks, however, can be managed by further assessment (additional testing and/or watching brief during groundworks) and/or through appropriate working practices such as the use of appropriate personal protective equipment (PPE), provision of segregated welfare facilities and dust suppression measures (misting or hosing down) as and when required.

10.3 Groundwater

Underlying the Made Ground, in the central and eastern portions of the site are coarse-grained Head Deposits which are designated as a Secondary A aquifer. Noticeably the Head Deposits are relatively thin, between 0.70 and >2.70m thick and are underlain by relatively impermeable London Clay. At some locations no groundwater was encountered during subsequent monitoring (e.g. BH7 in the south of the site) and at other locations the well recovery was very slow after purging (e.g. BH5). Therefore the Secondary aquifer beneath the site is considered to be of generally low transmissivity and it is relatively unlikely that it could be used to support a productive abstraction. Although the groundwater flow direction (and gradient) is unclear it is plausible that locally there is some lateral flow towards the River Lavant.

Beneath the Secondary A Aquifer, and directly underlying the Made Ground in the west of the site, solid geology of London Clay has been encountered. These deposits extend site wide and it is expected that they are likely to provide a comprehensive barrier limiting potential downwards migration of contamination from shallow soil / groundwater and preventing impacts to the deeper Chalk. It should be noted, however, that in some areas of the site the degree of penetration into the London Clay is limited (e.g. 1.4m only) and it might be imprudent, without first proving a more significant thickness of London Clay, to discount the potential for the London Clay to allow some vertical migration of groundwater / liquids into the deeper Chalk.



It is also noted deep piling has potential to introduce new pathways into the White Chalk.

Although exceedences of water quality criteria have been identified in soil leachate, heavily / grossly contaminated soils have not been identified at the site and it is considered that the leachate generation methodology has the potential to over predict the analysis.

Although screening of ground water data has identified a number of exceedances of the water quality criteria, in the majority of cases the exceedences are considered to be only marginally elevated (e.g. less than one order of magnitude greater than the criteria). The most elevated concentrations recorded (relative to WQS) relate to (1) a sample of perched groundwater collected from made ground in BH1 in the north west of the site and (2) a sample collected from silty water at the base of the well in BH5 during monitoring round two; it is not considered that these two samples provide an accurate reflection of typical water quality within the Secondary Aquifer.

As a possible concern it is noted that concentrations of ammonia and ammonium are consistently elevated, however, the concentrations recorded in wells collected from the Head Deposits do not exceed the EQS (300µg/L) by more than one order of magnitude and, furthermore it is unclear that these concentrations are attributable to site sources of contamination.

It should be acknowledged that the potential exists for localised areas of more significant groundwater data than recorded to date, however, overall based on the findings of the investigation works undertaken it is considered that the risk to the underlying Groundwater can be downgraded (from the Moderate risks identified in the Phase 1) to **Low to Moderate**; this risk rating is considered applicable to both the Secondary A Aquifer and the deeper Principal Aquifer in the White Chalk.

10.4 Surface Water

The nearest surface waters to the site are considered to be the River Lavant adjacent to the south eastern corner of the site. Classified as a Good Quality Grade A River this represent a potential sensitive receptor for any contaminative impact arising from the site. It is thought that existing surface water drainage may discharge into the River, providing a mechanism for potential contaminant transport and impact. It is unclear whether the groundwater beneath the site is in continuity with the River; this could potentially provide another mechanism by which contamination arising from the site could impact the River. It is noted that the investigation works undertaken at the site have identified relatively mild levels of contamination in soil and groundwater. Samples taken from surface water from the Monsoon Drain on site and the River Lavant both up and down stream of the site did not record exceedences of stringent EQS thresholds.



Based on the findings of the site investigation it is considered that the risk to surface water can be down graded (from the Low to Moderate risk identified in the Phase 1) to **Low** (Unlikely chance of medium severity consequence).

10.5 On-site Buildings and Services

To date the results of soil testing have not identified the presence of gross contamination / or free product that might have the potential to attack and corrode building materials. It is considered plausible however, that higher levels of contamination could be present in the south-eastern corner of the site.

Elevated concentrations of potentially hazardous land gas have not been identified following land gas monitoring, nor has the desk study review identified any areas of suspected landfilling with the potential to generate land fill gas, in close proximity to the site.

Based on sulphate and pH levels all strata were found to have a design sulphate (DS) classification of DS-1 in accordance with BRE SD1.

Overall the risk posed by the site to buildings and services at any future development is considered to be **Low to Moderate** (conservative assumption that it is likely that mild consequence impacts will occur). These risks can be managed by further assessment of the distribution of hydrocarbon contamination in the south-eastern corner of the site. Consideration should also be given to appropriate design and building materials that minimise potential affects of chemical attack.

10.6 Off-Site Workers and Residents

The main pathways by which site sourced contamination might impact off-site receptors are assumed to be through potential vapour and gas migration, windblown dust, transport via preferential pathways (e.g. drainage) or contaminant migration via groundwater. Based on the low – moderate contaminative status of the site, risks associated with potential impacts to off-site workers are considered to be **Low** (unlikely - medium severity consequence). However, during any future redevelopment that includes demolition and slab removal, care will need to be taken to guard against dust generation and in particular potential release of asbestos fibres that could pose a risk to off-site users/ residents.



11.0 Conclusions & Recommendations

11.1 Conclusions

Based on the review of desk study information and the phase 2 ground investigation the following risk levels have been identified:

- Future site users – **HIGH** These risks could be managed by further assessment and investigation and development measures that minimise potential exposure to contaminants in the sub-soil.
- Construction workers (during redevelopment of site) – **HIGH** - though risks can be mitigated through appropriate working practices.
- Groundwater– **LOW to MODERATE**
- Surface Water – **LOW**
- Onsite property/buildings and services – **LOW TO MODERATE**
- Offsite workers and residents – **LOW** (noting that in order to keep risks as low during any redevelopment works measures may need to be employed to minimise wind-blown dust).

11.2 Recommendations

Further Assessment / Investigation of Contamination

Further intrusive investigation assessment works are recommended at the site targeting in particular areas of the site that remain currently uninvestigated (e.g. large area in the centre of the site occupied by current buildings). It might be appropriate during these works to consider undertaking further characterisation / delineation of the shallow soil sources identified to date including the vicinity of BH5 and BH14 in the south east (PAH, lead and asbestos), BH2 and BH12 in the north west (asbestos), BH11 in the west (PAH) and BH4 in the north east (PAH).

Generally further investigation works will require only shallow investigation only (proving the top of the London Clay) however, it would be appropriate also to consider the completion of an additional deeper exploratory hole to circa 10m to better understand the potential thickness the London Clay and therefore it's effectiveness as a barrier to potential downwards migration of contamination towards the deeper chalk.



Risk Mitigation during Future Groundworks

During any future construction works at the site it is recommended that measures are adopted to minimise potential exposure to contamination in soil / groundwater to site workers and also potential off-site residents / workers. In particular it is recommended that measures are undertaken to address risks associated with the presence of asbestos including the following:

- Minimise release of air borne dust / potential fibres; this might include dampening down any excavated spoil using hoses / spray / mists. Consideration might also be given to the use of additives that bond asbestos fibres to reduce / eliminate release into the air.
- Professional attendance by a trained and competent person whilst excavation occurs to provide a watching brief and to potentially identify asbestos containing materials if present.
- Air monitoring should be conducted during ground disturbance. Although non-asbestos fibres may be detected.
- Additional controls that could be employed if ground disturbance is to be extensive:
 - o Cleaning / wetting of access routes / roadways;
 - o Wheel / vehicle washes;
 - o Stockpile management;
 - o PPE / RPE for ground workers;
 - o Additional hygiene facilities (decontamination units / clean / dirty areas).

In the event that any more significant accumulation of suspected ACMs are identified during construction works, excavations should be halted and the material made safe by covering, pending testing of the material and development of a safe means of handling. As ACMs with loose fibres are present, excavation works may be subject to the licensing requirements of the Control of Asbestos Regulations.

Potential Remediation Requirements

Based on the investigation and assessment undertaken at the site to date that has identified relatively mild levels of contamination only, it is not expected that extensive or complex remediation works are likely to be required. However, it is noted that at present approximately two thirds of the site are proposed for a sensitive residential end use and therefore, even the relatively mild levels of contamination recorded in Made Ground could present a potential risk of harm to health if direct exposure to soil or soil derived dust is permissible.



It would be prudent to assume that the underlying Made Ground will either require remediation (potentially through excavation and off-site disposal), or that any areas of gardens / landscaping will require the import and placement of a clean cover material (sub-soil and topsoil). It is likely that any cover would need to achieve a minimum thickness of 600mm however, locally it may be appropriate to provide thicker cover (up to 1m) subject to the nature of the deeper materials and subsequent liaison and agreement with the planning authorities.

It is recommended that these works are carried out once the current occupiers have vacated the premises and prior to construction works. The additional works could be taken prior to or after demolition works. If done pre-demolition this would have the advantage of providing further information on contaminant sources site wide and thereby informing risk management precautions to be employed during the demolition works (in particular asbestos distribution and mitigation). If completed after demolition, however, this would have the advantage potentially of allowing more rapid / efficient investigation (surfaces structures having been removed) thereby potentially facilitating a more comprehensive investigation and assessment of risks at the post development site.

Geotechnical Recommendations

It is understood that development proposals for the site are at an early stage, however information from the recent investigation has confirmed that shallow foundations bearing upon the superficial deposits will be viable for smaller scale developments, and piled foundations will be required for more heavily loaded structures. Floor slabs will need to be suspended in areas and exactions could be unstable and will require dewatering.

Further ground investigation is recommended to further define design parameters for the proposed structures once designs are finalised, particularly for deeper piled foundations. Deeper exploratory boreholes (>5m bgl) are also recommended in order to prove the solid geology (London Clay Formation), inform geotechnical design and to allow the installation of deep(er) groundwater wells. It is recommended that these are carried out prior to construction to assist in foundation design and provide geotechnical parameters.

Design parameters will also be required to inform the design of slope stabilisation measures on the elevated section to confirm the weight of the proposed development will not impact the stability of the slope.

Prior to undertaking any intrusive investigation at the site it is recommended that a detailed UXO Threat assessment is completed in order to better understand the potential risk for UXO being present at the site and if necessary to inform risk mitigation requirements.







Appendices



Appendix A – Report Conditions



Report Conditions

SITE INVESTIGATION

*This report is produced solely for the benefit of **Home and Communities Agency** and their Consultant partners and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.*

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.

This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research.

Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categorical assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYG. In time improved practices or amended legislation may necessitate a re-assessment.

The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.



Appendix B – Proposed Development Plans



WYG



Colt International,
New Lane, Havant
Residential option 13

27
revision B

Land use

- Employment (0.83 Hectares)
- Residential (1.93 Hectares)

Total no. of dwellings - 100
Quantum

1 bed	15	15 %
2 bed (house)	12	12 %
2 bed (apt)	42	42 %
3 bed	21	21 %
4 bed	10	10 %
Total	100	

Total employment space provided - 30,225 ft²
Total full-time employment provided - 120



A090070-182[ST1]27 revision B
File: A090070-182[ST1]drf01_v1.vwx
Scale 1:1250 @ A3

WYG
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Appendix C – Drawings



Contains Ordnance Survey data © Crown
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e-mail: cardiff@wyg.com



Client:
HOMES AND COMMUNITIES AGENCY

Project:
COLT, HAVANT

Drawing Title:
SITE LOCATION PLAN

REV	DESCRIPTION	BY	CHK	APP	DATE
	Scale @ NTS	Drawn	Date	Checked	Date
	PP	27.02.17	HE	28.02.17	
	Project No.	Office	Type	Drawing No.	Revision
	A090070-182	DN	N	SK01	00

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

LEGEND:

-  BOREHOLE LOCATION
-  SURFACE WATER SAMPLE LOCATION



01	SW2 REMOVED. NOT SAMPLED.	PP	HE	HE	27.03.17
REV	DESCRIPTION	BY	CHK	APP	DATE

Client:

HOMES AND COMMUNITIES AGENCY

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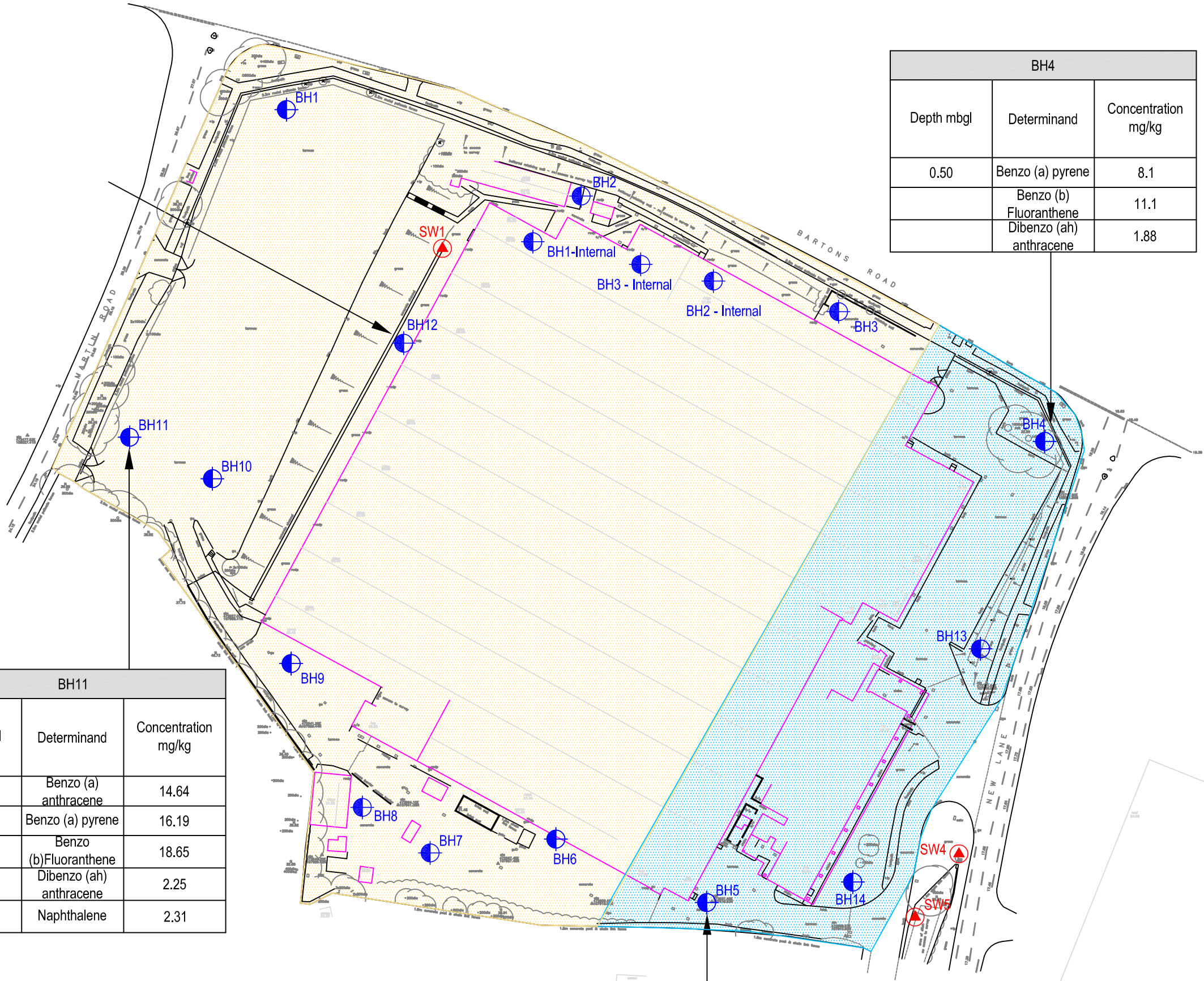
Project:

COLT, HAVANT

Drawing Title:

PROPOSED SITE INVESTIGATION LAYOUT PLAN

Scale @ A3	Drawn PP	Date 13.03.17	Checked HE	Date 13.03.17	Approved HE	Date 13.03.17
Project No. A090070-182	Office LDN	Type N	Drawing No. SK02	Revision 01		



BH4		
Depth mbgl	Determinand	Concentration mg/kg
0.50	Benzo (a) pyrene	8.1
	Benzo (b) Fluoranthene	11.1
	Dibenzo (ah) anthracene	1.88

LEGEND:

- BOREHOLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- PROPOSED COMMERCIAL END USE
- PROPOSED RESIDENTIAL END USE

BH11		
Depth mbgl	Determinand	Concentration mg/kg
0.30	Benzo (a) anthracene	14.64
	Benzo (a) pyrene	16.19
	Benzo (b) Fluoranthene	18.65
	Dibenzo (ah) anthracene	2.25
	Naphthalene	2.31

BH5		
Depth mbgl	Determinand	Concentration mg/kg
0.60	Benzo (b) fluoranthene	4.46
	Dibenzo (ah) anthracene	0.61

REV	DESCRIPTION	BY	CHK	APP	DATE
Client: HOMES AND COMMUNITIES AGENCY					

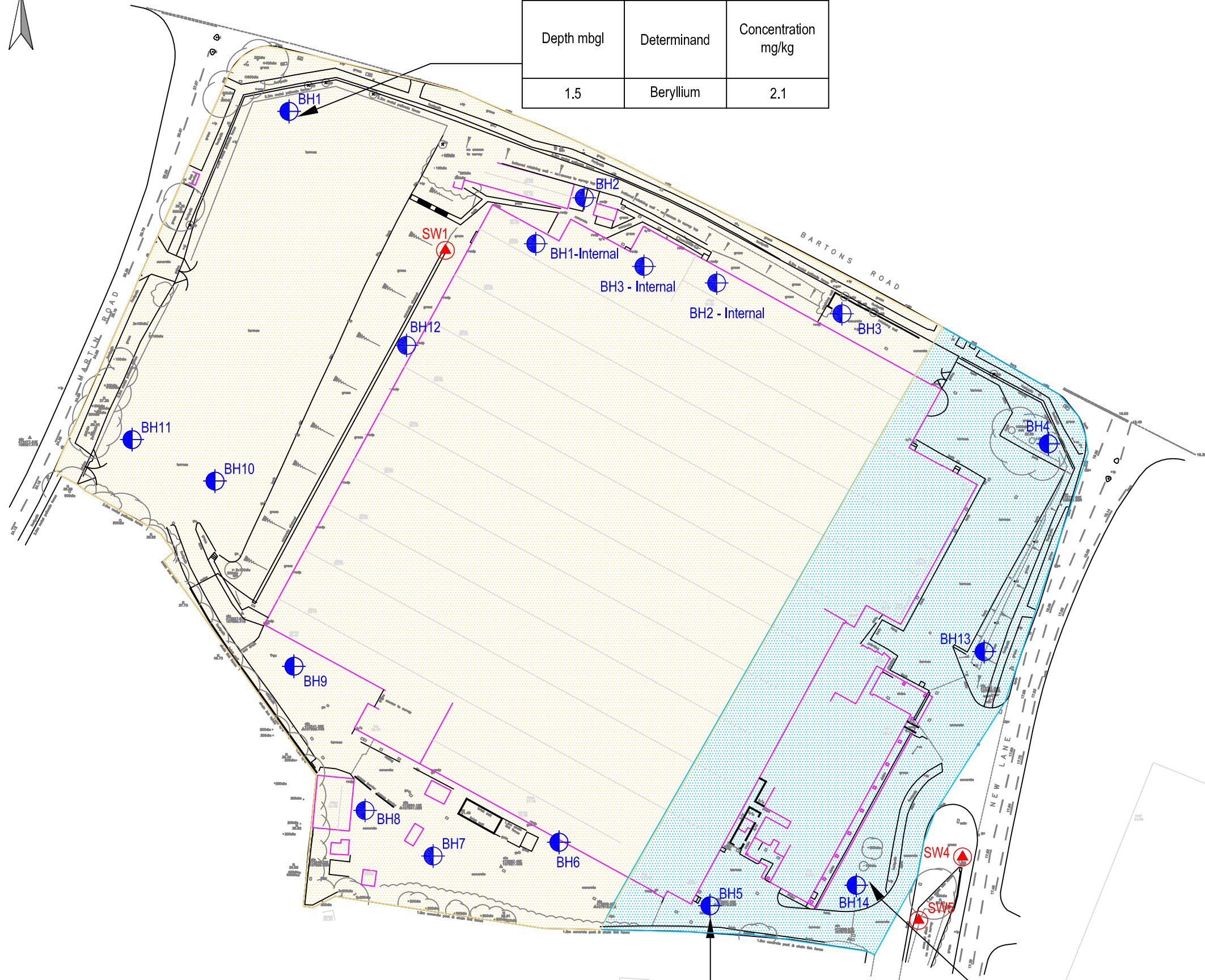
5th FLOOR
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47 NEWPORT ROAD
CARDIFF
CF24 0AD
TEL: +44 (0)29 2082 9200
FAX: +44 (0)29 2045 5321
e-mail: cardiff@wyg.com



Project:
COLT, HAVANT

Drawing Title:
SITE PLAN SHOWING AREAS OF ELEVATED PAH'S

Scale @	A3	Drawn	Date	Checked	Date	Approved	Date
Project No.	Office	Type	Drawing No.	Revision			
A090070-182	LDN	N	SK03	00			



BH14		
Depth mbgl	Determinand	Concentration mg/kg
1.5	Beryllium	2.1

BH5		
Depth mbgl	Determinand	Concentration mg/kg
0.60	Lead	370

BH14		
Depth mbgl	Determinand	Concentration mg/kg
0.30	Beryllium	2.4
0.30	Lead	1088

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

LEGEND:

- BOREHOLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- PROPOSED COMMERCIAL END USE
- PROPOSED RESIDENTIAL END USE

REV	DESCRIPTION	BY	CHK	APP	DATE
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Client:
HOMES AND COMMUNITIES AGENCY

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Project:
COLT, HAVANT

Drawing Title:
SITE PLAN SHOWING AREAS OF HEAVY METALS

Scale @	A3	Drawn	Date	Checked	Date	Approved	Date
Project No.	A090070-182	Office	LDN	Type	N	Drawing No.	SK04
Revision	00						

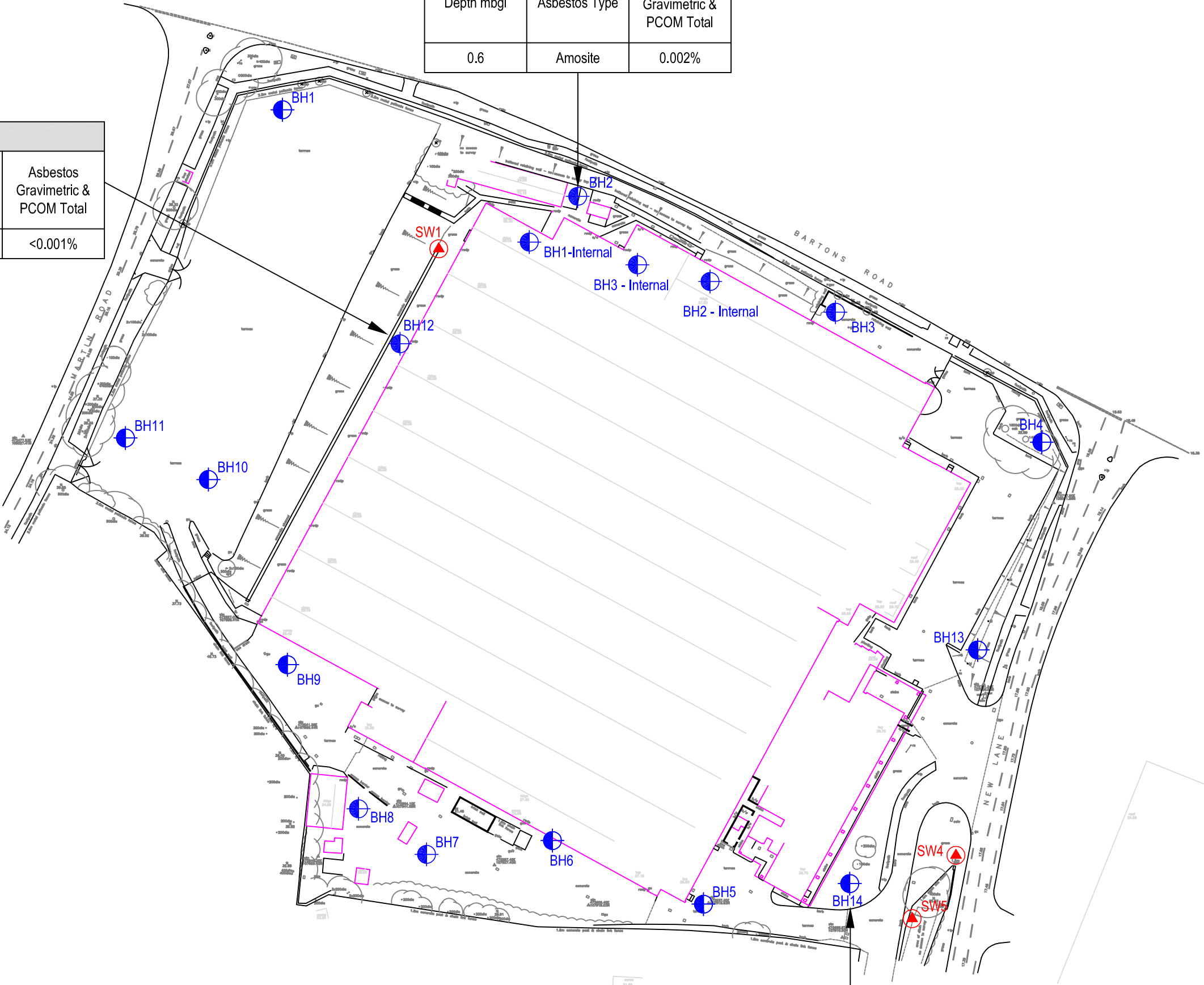


LEGEND:

- BOREHOLE LOCATION
- SURFACE WATER SAMPLE LOCATION

BH12		
Depth mbgl	Asbestos Type	Asbestos Gravimetric & PCOM Total
0.2	Chrysotile	<0.001%

BH2		
Depth mbgl	Asbestos Type	Asbestos Gravimetric & PCOM Total
0.6	Amosite	0.002%



BH14		
Depth mbgl	Asbestos Type	Asbestos Gravimetric & PCOM Total
0.3	Chrysotile	0.012%

REV	DESCRIPTION	BY	CHK	APP	DATE
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Client:
HOMES AND COMMUNITIES AGENCY

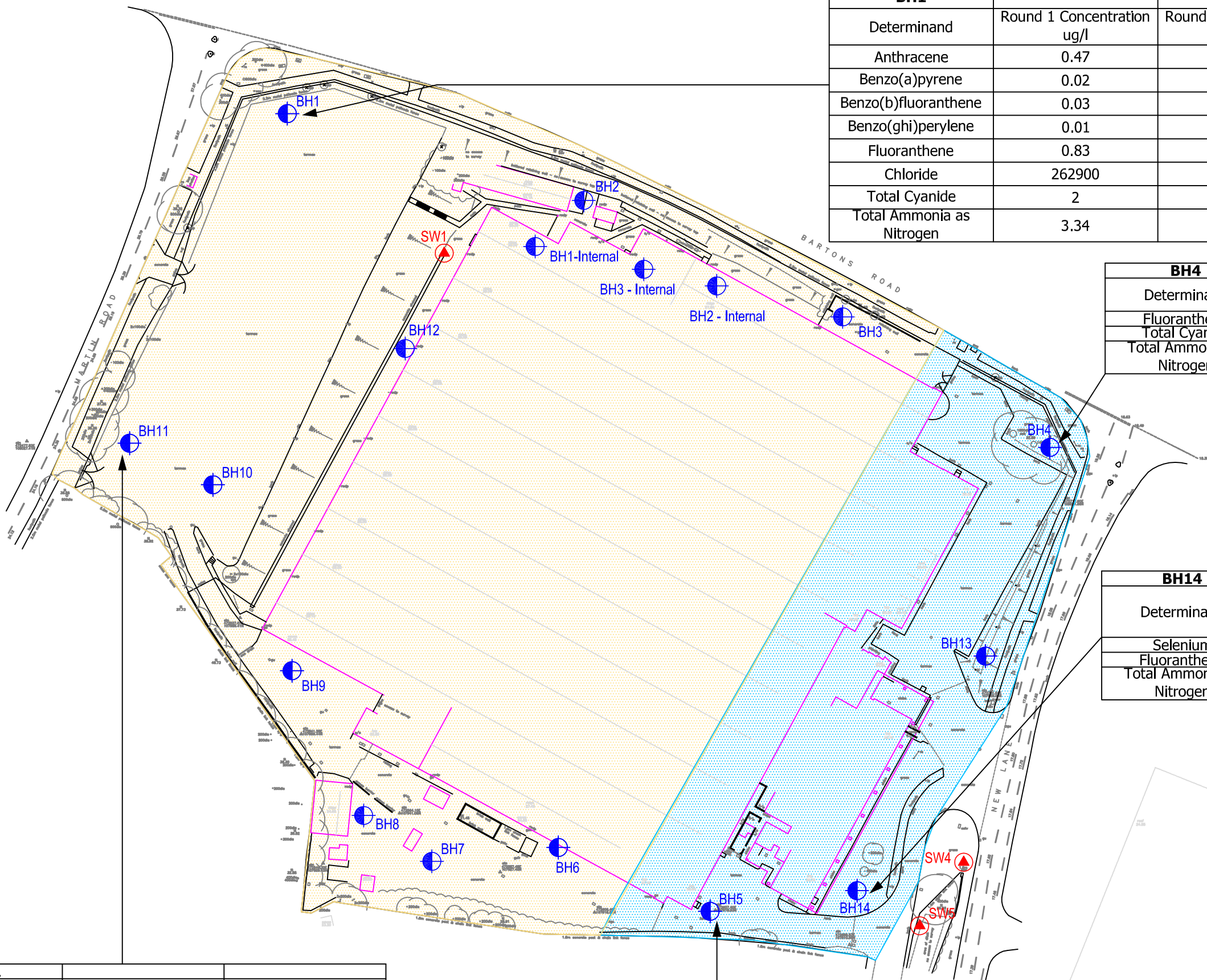
5th FLOOR
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47 NEWPORT ROAD
CARDIFF
CF24 0AD
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FAX: +44 (0)29 2045 5321
e-mail: cardiff@wyg.com



Project:
COLT, HAVANT

Drawing Title:
SITE PLAN INDICATING ASBESTOS ENCOUNTERED

Scale @	A3	Drawn	Date	Checked	Date	Approved	Date
Project No.	Office	Type	Drawing No.	Revision			
A090070-182	LDN	N	SK05	00			



BH1		
Determinand	Round 1 Concentration ug/l	Round 2 Concentration ug/l
Anthracene	0.47	0.14
Benzo(a)pyrene	0.02	<0.01
Benzo(b)fluoranthene	0.03	<0.01
Benzo(ghi)perylene	0.01	<0.01
Fluoranthene	0.83	<0.01
Chloride	262900	82500
Total Cyanide	2	4
Total Ammonia as Nitrogen	3.34	0.92

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS

LEGEND:

- BOREHOLE LOCATION
- SURFACE WATER SAMPLE LOCATION
- PROPOSED COMMERCIAL END USE
- PROPOSED RESIDENTIAL END USE

BH4		
Determinand	Round 1 Concentration ug/l	Round 2 Concentration ug/l
Fluoranthene	0.01	<0.01
Total Cyanide	<1	2
Total Ammonia as Nitrogen	0.32	0.29

BH14		
Determinand	Round 1 Concentration ug/l	Round 2 Concentration ug/l
Selenium	<1.2	23.8
Fluoranthene	0.03	<0.01
Total Ammonia as Nitrogen	1.22	1.21

BH11		
Determinand	Round 1 Concentration ug/l	Round 2 Concentration ug/l
Nickel	4.3	4.4
Fluoranthene	0.04	0.11
Chloride	423800	267000
Total Cyanide	3	4
Total Ammonia as Nitrogen	10.7	4.31

BH5		
Determinand	Round 1 Concentration ug/l	Round 2 Concentration ug/l
Nickel	6.7	7
Selenium	<1.2	18.2
Anthracene	0.05	0.15
Benzo(a)pyrene	<0.01	0.35
Benzo(b)fluoranthene	<0.01	0.58
Benzo(ghi)perylene	<0.01	0.23
Benzo(k)fluoranthene	<0.01	0.23
Fluoranthene	0.11	2.45
Sulphate	410300	87000
Total Cyanide	3	1
Total Ammonia as Nitrogen	1.62	1.56

REV	DESCRIPTION	BY	CHK	APP	DATE
Client: HOMES AND COMMUNITIES AGENCY					

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Project:
COLT, HAVANT

Drawing Title:
SITE PLAN SHOWING GROUNDWATER EXCEEDANCES

Scale @ A3	Drawn PP	Date 28.03.17	Checked HE	Date 28.03.17	Approved HE	Date 28.03.17
Project No. A090070-182	Office LDN	Type N	Drawing No. SK06	Revision 00		



Appendix D – Site Photographs



Photo 1 - Front Office and Landscaping



Photo 2 - Front Car Park, R&D Block Beyond

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Fax: +44 (0)2072 507 501
Environmental Consultancy
Ground Engineering Services



Project:

A099913

Client:

HCA

Report Title:

Phase 1 Geo-Environmental Assessment: Colt Havant

Created By:

Photo No:

1 & 2



Photo 3 - View west from offices across factory and warehouse roofs



Photo 4 - View south along embankment and edge of rear (western) car park area

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 Ground Engineering Services



Project:

A099913

Client:

HCA

Report Title:

Phase 1 Geo-Environmental Assessment: Colt Havant

Created By:

Photo No:

3&4



Photo 5 - View south along embankment and monsoon drain below the rear car park



Photo 6 - View north west across western parking area and housing estate beyond

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Project:	A099913		Report Title:	
			Phase 1 Geo-Environmental Assessment: Colt Havant	
Client:	HCA	Created By:	Photo No:	5&6



Photo 7 - View west along retaining wall at northern site boundary



Photo 8 - View south along western edge of factory floor: manufacturing area

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			Phase 1 Geo-Environmental Assessment: Colt Havant	
Client:	HCA	Created By:	Photo No:	7&8



Photo 9 - South Eastern Area of Factory



Photo 10 - View north west across factory floor

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Project:

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Report Title:

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Photo No:

9&10



Photo 11 - Segregated Area in North of Factory



Photo 12 - View north west across southern portion of warehouse area

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Project:

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Client:

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Report Title:

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Created By:

Photo No:

11&12



Photo 13- View north in western portion of warehouse



Photo 14 - View east: Material storage in north west of warehouse

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Client:

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Created By:

Photo No:

13&14

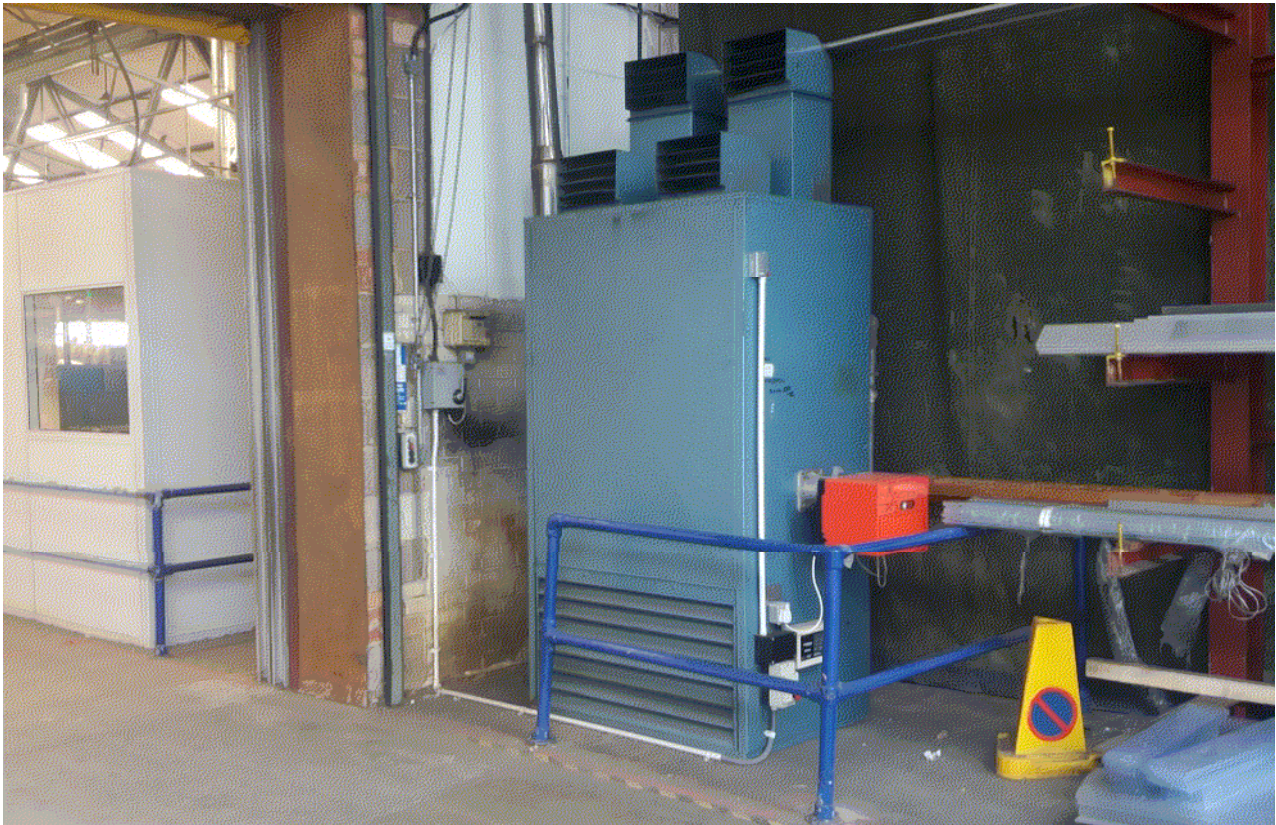


Photo 15- View south east at wall between traditional factory and warehouse of mains electricity powered heater

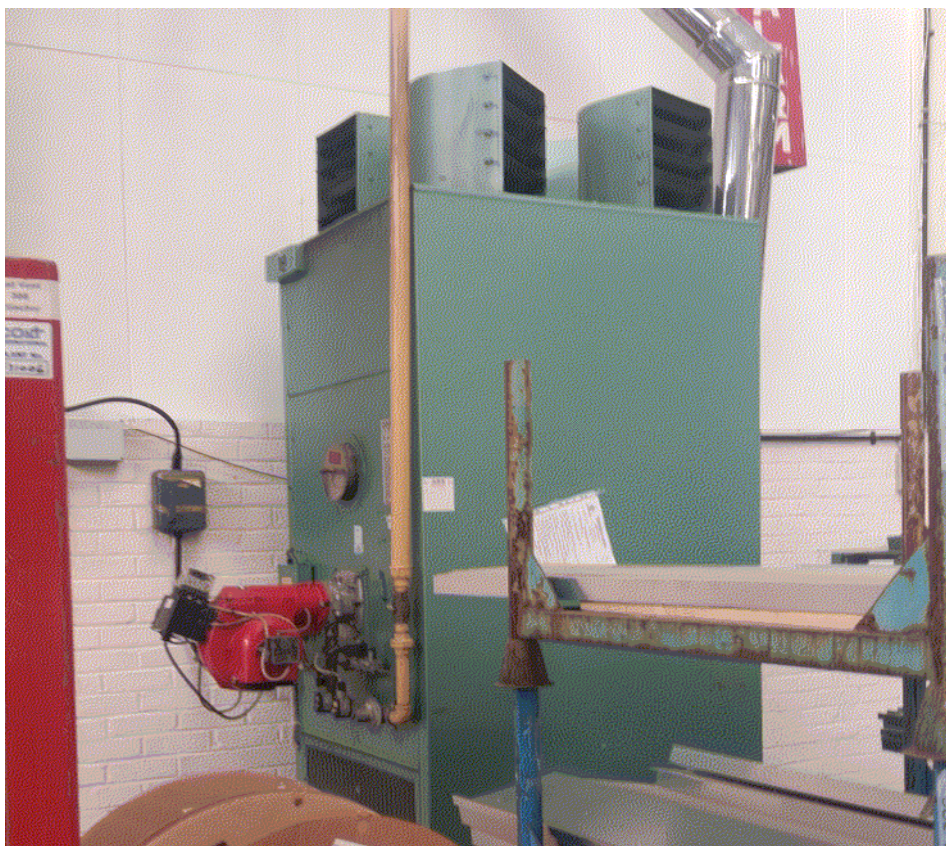


Photo 16 - Mains electricity powered heater in west of factory area



Photo 17- Lichen on floor in north west of warehouse area



Photo 18 - Bin containing aluminium fines



Photo 19 - Waste processing area to the south of factory building



Photo 20 - Wooden recreation building (not in use) adjacent northern site boundary

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Photo No:

19&20



Photo 21 - Unidentified brick outhouse close to north site boundary



Photo 22 - Inaccessible building adjoining north edge of warehouse - identified as "Air pollution testing"

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21&22



Photo 23 - Product testing in the weathering area in the south of the site



Photo 24 - External gas store in south of site



Photo 25 - Fire testing building and adjoining Fuel Oil AST in south of the site



Photo 26 - Fuel Oil AST

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Project:

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Client:

HCA

Report Title:

Phase 1 Geo-Environmental Assessment: Colt Havant

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Photo No:

25&26



Photo 27 - Brick outhouse housing emergency generator



Photo 28 - Brick plinths inside bund of former diesel AST

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Project:	A099913		Report Title:	
			Phase 1 Geo-Environmental Assessment: Colt Havant	
Client:	HCA	Created By:	Photo No:	27&28



Photo 29 - View east along southern edge of factory. Brick bund of former diesel AST in foreground



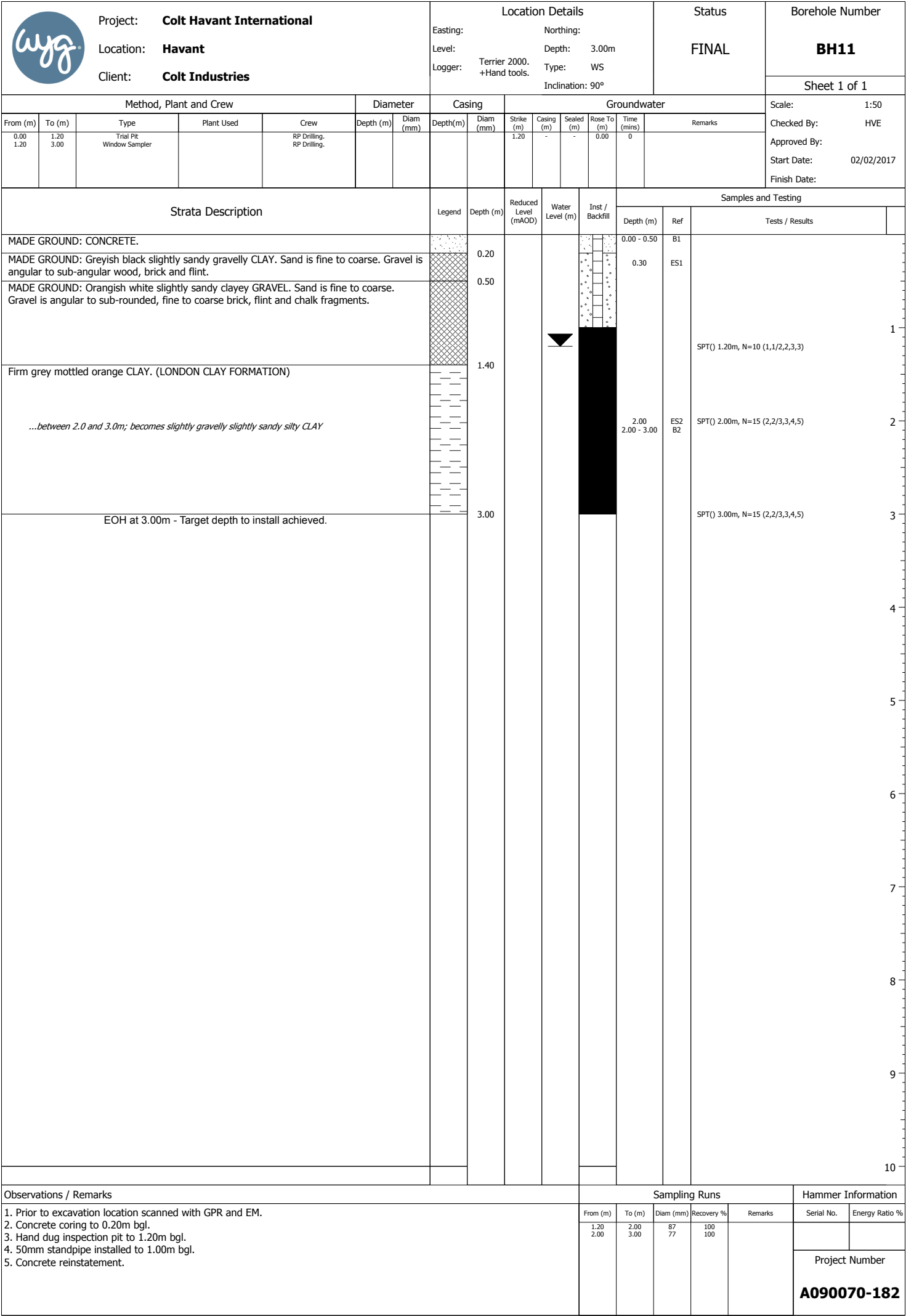
Photo 30 - Electricity Sub-Station south of main factory building



Appendix E – Engineering Logs

 Project: Colt Havant International Location: Havant Client: Colt Industries					Location Details Easting: Level: Logger: Northing: Depth: 4.00m Type: WS Inclination: 90°					Status FINAL		Borehole Number BH1			
										Sheet 1 of 1					
Method, Plant and Crew From (m) 0.00 1.20 To (m) 1.20 4.00 Type Trial Pit Window Sampler Plant Used Hand tools. Terrier 2000. Crew RP Drilling. RP Drilling.					Diameter Depth (m) Diam (mm)		Casing Depth(m) Diam (mm)		Groundwater Strike (m) 1.40 Casing (m) - Sealed (m) - Rose To (m) 0.00 Time (mins) 0 Remarks					Scale: 1:50 Checked By: HVE Approved By: Start Date: 02/02/2017 Finish Date:	
Strata Description					Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing Depth (m) Ref Tests / Results					
MADE GROUND: CONCRETE.															
MADE GROUND: Brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub-angular brick and mixed aggregates.						0.20									
MADE GROUND: Greyish black slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is angular, fine to medium brick and mixed aggregates.						0.40				0.40 - 0.80	B1				
Firm orangish brown CLAY. (LONDON CLAY FORMATION.) ...between 1.0 and 2.0m; becomes slightly sandy slightly gravelly CLAY						0.80				0.60	ES1				
										1.00 - 2.00	B2	1			
											SPT() 1.20m, N=8 (2,2/2,2,2,2)				
										1.50	ES2	2			
											SPT() 2.00m, N=13 (2,2/3,3,3,4)				
											SPT() 3.00m, N=12 (2,2/2,3,3,4)	3			
											SPT() 4.00m, N=25 (4,4/4,4,7,10)	4			
EOH at 4.00m - Target depth to install achieved.						4.00									
												5			
												6			
												7			
												8			
												9			
												10			
Observations / Remarks 1. Prior to excavation location scanned with GPR and EM. 2. Concrete coring to 0.20m bgl. 3. Hand dug inspection pit to 1.20m bgl. 4. 50mm standpipe installed to 1.00m bgl. 5. Concrete reinstatement.					Sampling Runs From (m) 1.20 2.00 3.00 To (m) 2.00 3.00 4.00 Diam (mm) 87 77 67 Recovery % 100 0 0 Remarks					Hammer Information Serial No. Energy Ratio %					
										Project Number					
										A090070-182					

		Project: Colt Havant International					Location Details					Status		Borehole Number			
		Location: Havant					Easting: Northing:					FINAL		BH10			
		Client: Colt Industries					Level: Depth: 0.30m Logger: Type: WS Inclination: °										
Method, Plant and Crew					Diameter		Casing		Groundwater							Scale: 1:50	
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks	Checked By: HVE		
0.00	0.30	Window Sampler	Hand tools.	RP Drilling.											Approved By:		
															Start Date: 03/02/2017		
															Finish Date:		
Strata Description							Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing					
												Depth (m)	Ref	Tests / Results			
MADE GROUND: CONCRETE.								0.30									
EOH at 0.30m - Terminated on hard obstruction - Concrete slab.																	
Observations / Remarks										Sampling Runs				Hammer Information			
1. Prior to excavation location scanned with GPR and EM. 2. Hand dug inspection pit to 0.30m bgl.										From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %	
										Project Number							
A090070-182																	





Easting:	Northing:	
Level:	Depth:	3.00m
Logger:	Type:	WS
	Inclination:	90°

FINAL

BH12

Sheet 1 of 1

Diameter

Groundwater

Scale: 1:50

From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks
0.00 1.20	1.20 3.00	Trial Pit Window Sampler	Hand tools. Terrier 2000.	RP Drilling. RP Drilling.					1.50	-	-	0.00	0	

Checked By: HVE

Approved By:

Start Date: 03/03/2017

Finish Date:

Legend

Depth (m)

Reduced
LevelWater
Level (m)Inst /
Backfill

--	--

Samples and Testing

Depth (m)

Ref

Tests / Results

MADE GROUND: Brown slightly clayey sandy GRAVEL. Sand is fine to coarse. Gravel is sub-angular to sub-rounded fine to coarse brick and mixed aggregates.

Orangish brown very silty SAND. Sand is fine to coarse. (HEAD DEPOSITS)
ALV

EOH at 3.00m - Hole collapsing - Unable to clear for UXO.

Observations / Remarks

1. Prior to excavation location scanned with GPR and EM.
2. Hand dug inspection pit to 1.20m bgl.

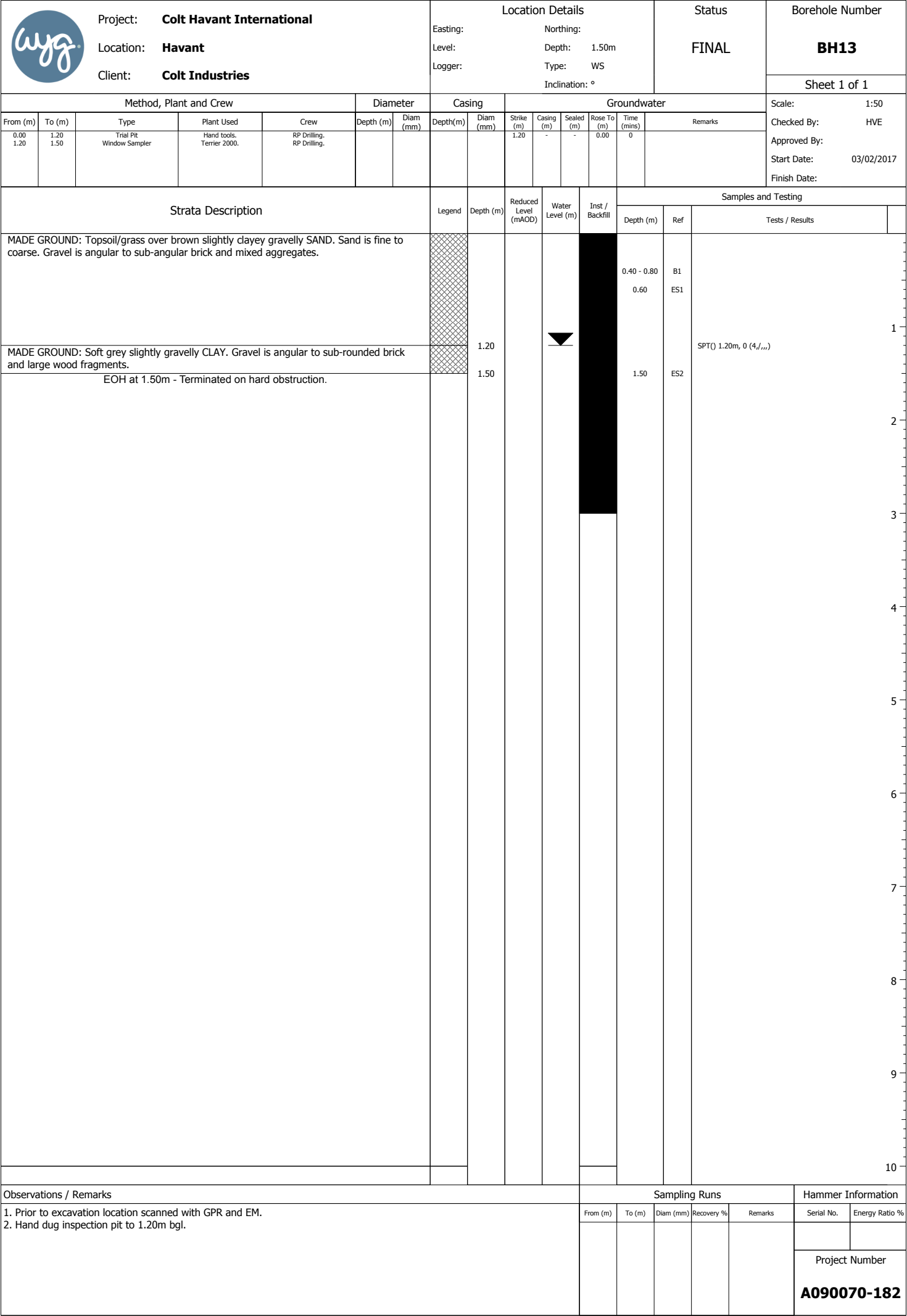
Sampling Runs

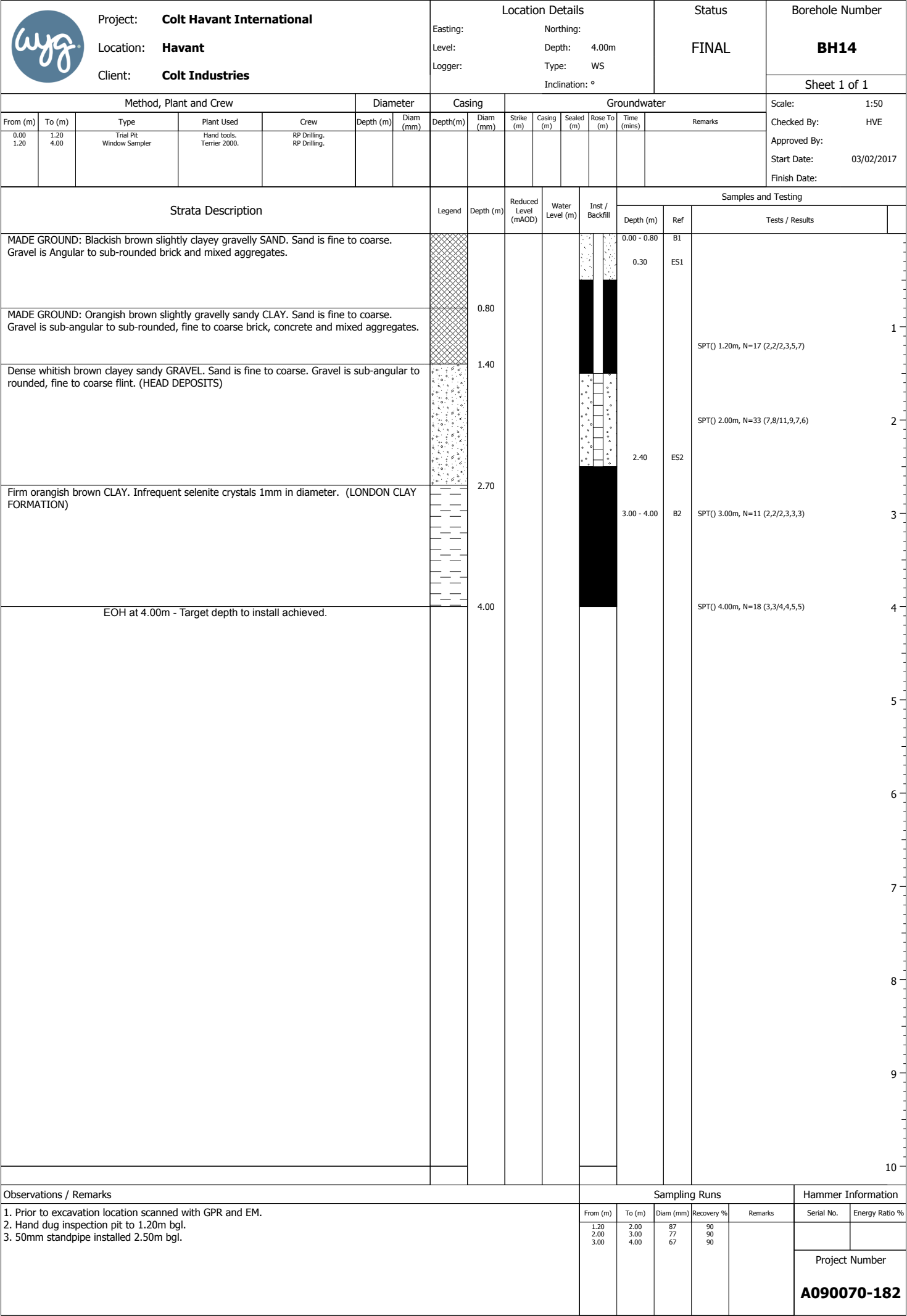
Hammer Information

From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
1.20	2.00	87	90			
2.00	3.00	77	90			

Project Number

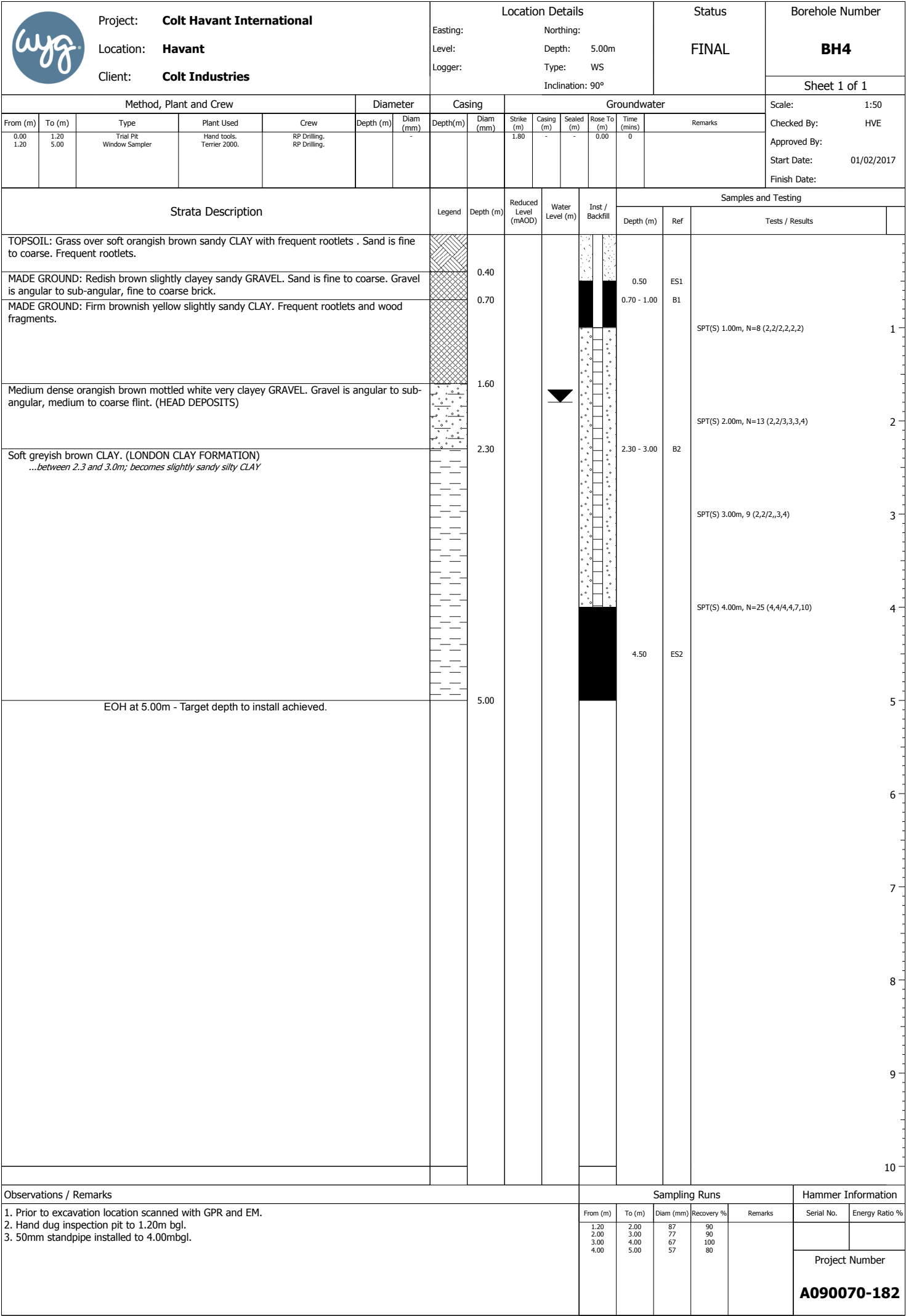
A090070-182

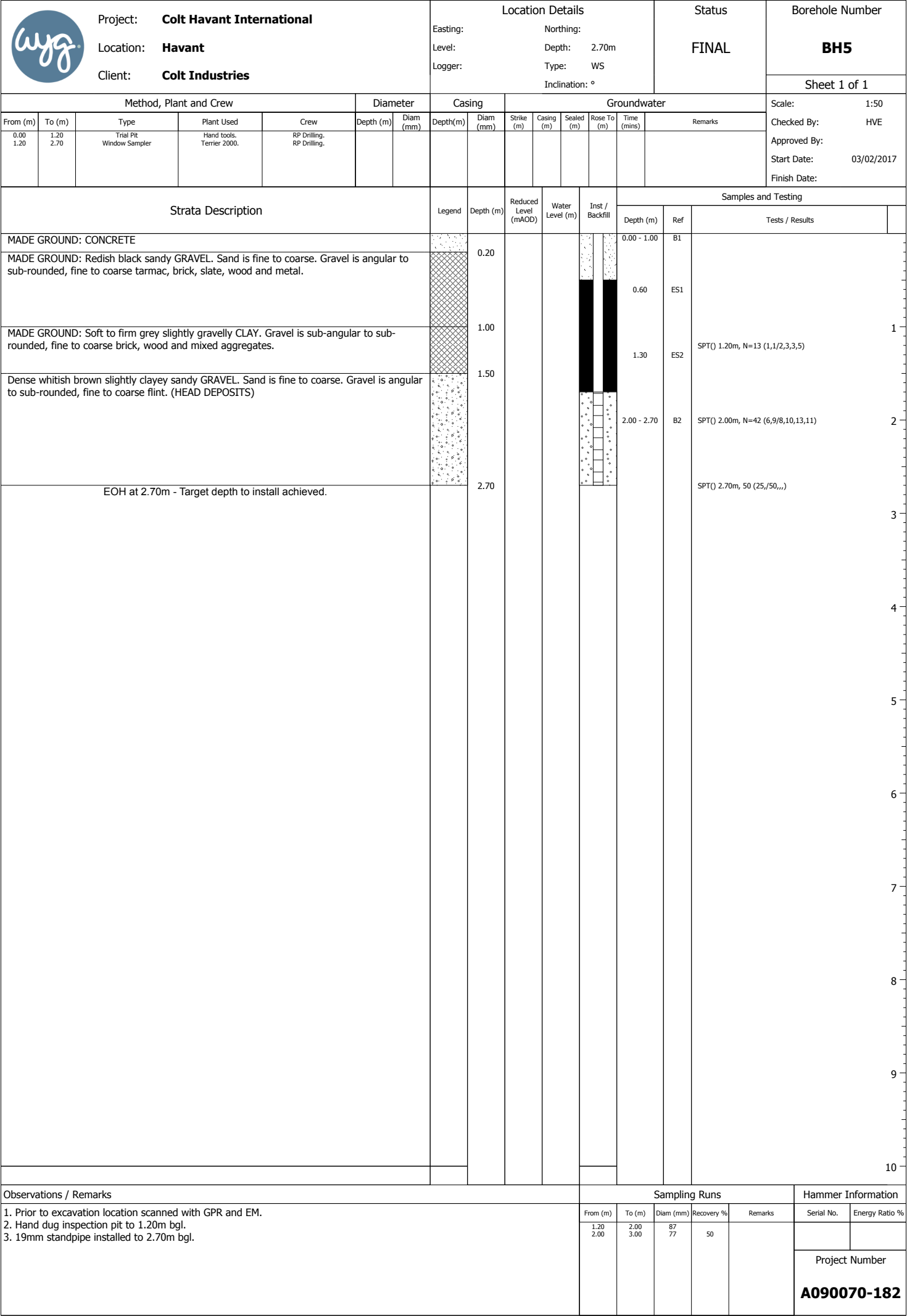


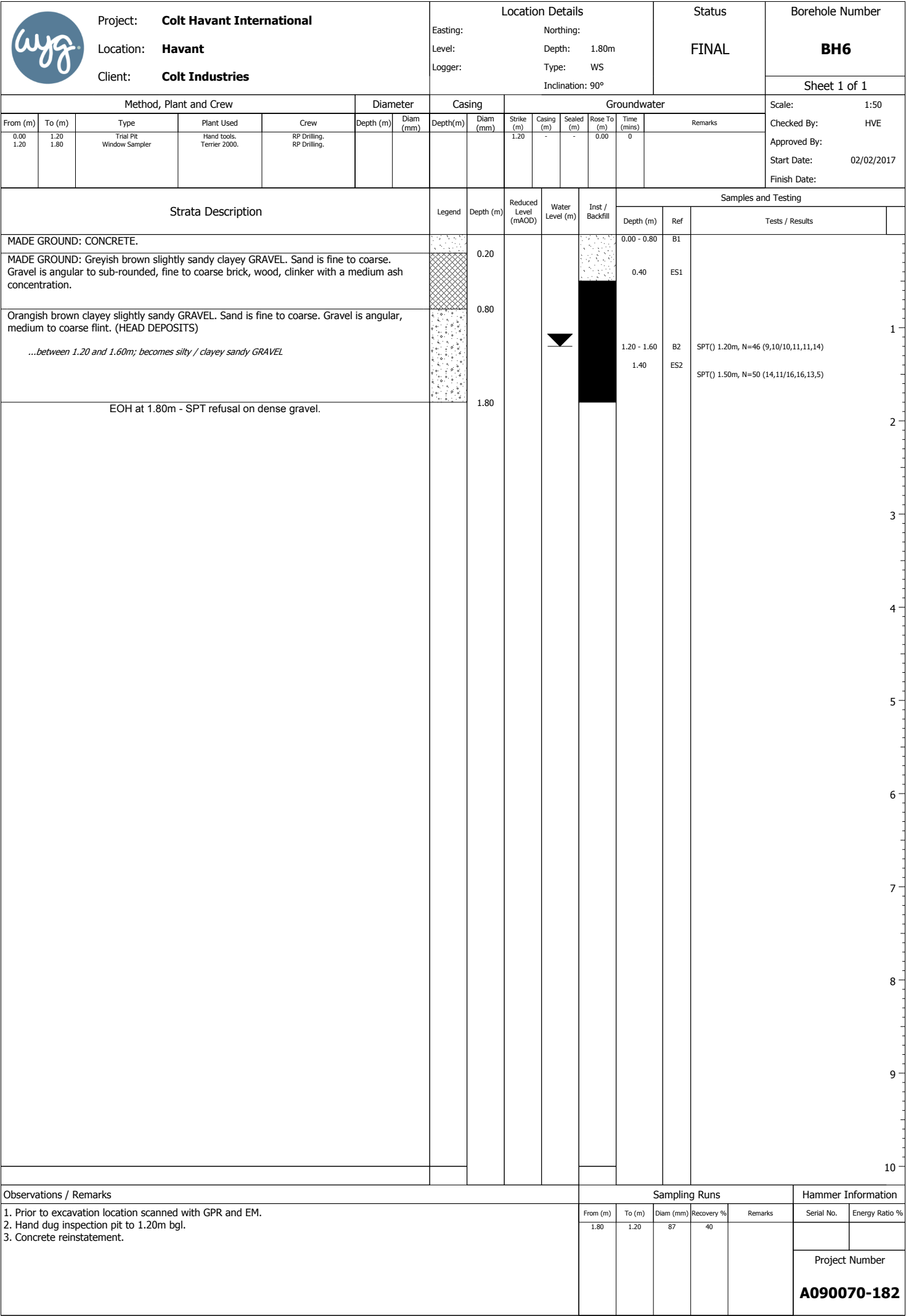




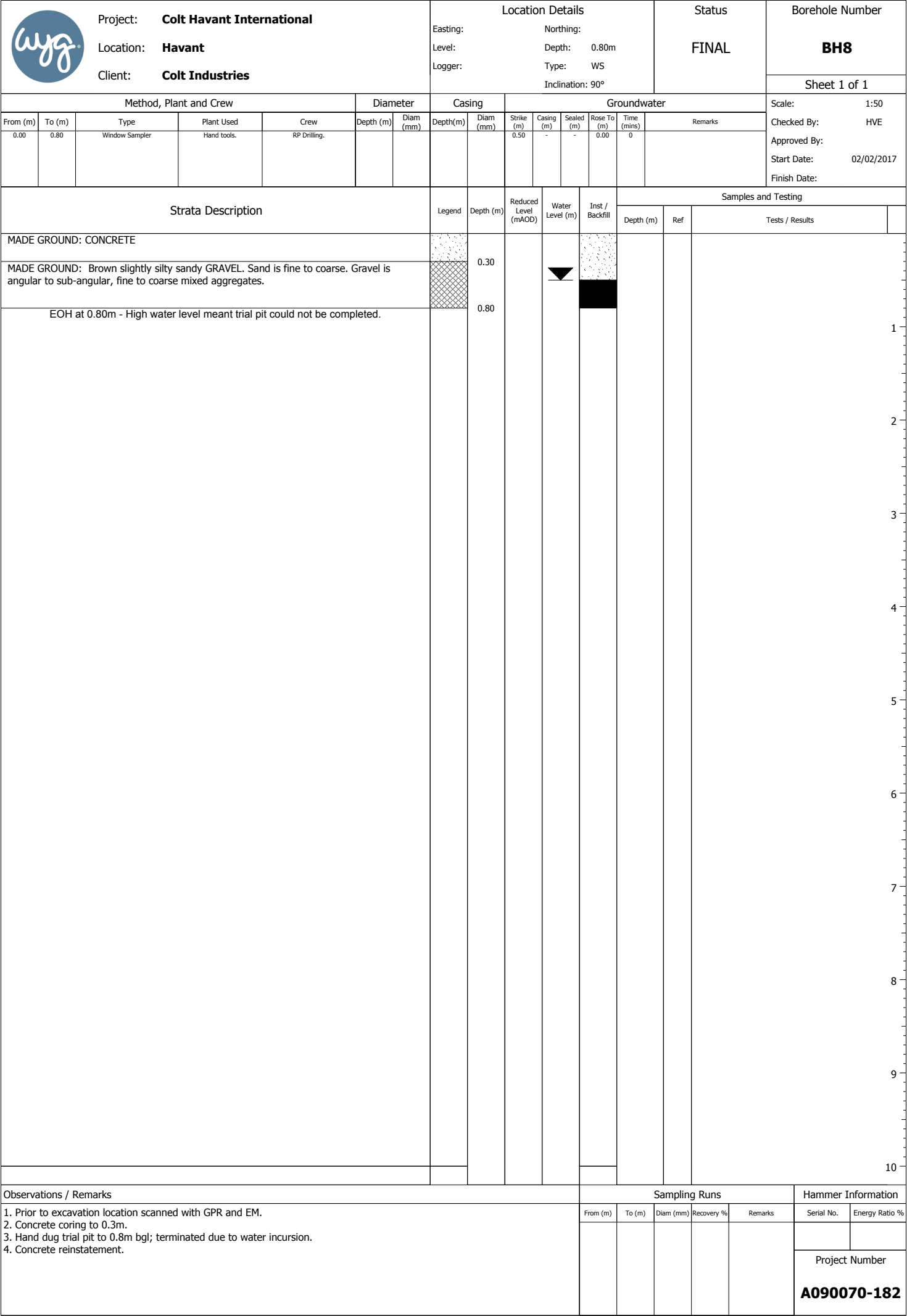
 Project: Colt Havant International Location: Havant Client: Colt Industries					Location Details Easting: Level: Logger: Northing: Depth: 4.00m Type: WS Inclination: 90°					Status FINAL		Borehole Number BH3			
Method, Plant and Crew From (m) 0.00 1.20 To (m) 1.20 4.00 Type Trial Pit Window Sampler Plant Used Hand tools. Terrier 2000. Crew RP Drilling. RP Drilling.					Diameter Depth (m) Diam (mm)		Casing Depth(m) Diam (mm)		Groundwater Strike (m) 1.00 Casing (m) - Sealed (m) - Rose To (m) 0.00 Time (mins) 0 Remarks					Scale: 1:50 Checked By: HVE Approved By: Start Date: 01/02/2017 Finish Date:	
Strata Description					Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing Depth (m) Ref Tests / Results					
MADE GROUND: CONCRETE						0.20									
MADE GROUND: Greyish brown sandy GRAVEL. Sand is fine to coarse. Gravel is sub-angular to sub-rounded, fine to coarse mixed aggregates.						0.60				0.60 - 1.00	B1				
MADE GROUND: Soft greyish brown slightly gravelly sandy CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded, fine to medium wood and flint.										1.00	ES1	SPT() 1.00m, N=2 (1,0/1,0,0,1)	1		
Soft orangish brown sandy very gravelly CLAY. Sand is fine to coarse. Gravel is sub-angular to sub-rounded, fine to coarse flint. (HEAD DEPOSITS)						1.60						SPT() 2.00m, N=7 (2,2/1,2,2,2)	2		
Firm greyish brown CLAY. (LONDON CLAY FORMATION)						2.80				2.80 - 4.00	B2				
										3.00	ES2	SPT() 3.00m, N=12 (2,2/3,3,3,3)	3		
EOH at 4.00m - Target depth achieved.						4.00						SPT() 4.00m, N=14 (3,3/3,3,4,4)	4		
														5	
														6	
														7	
														8	
														9	
														10	
Observations / Remarks 1. Prior to excavation location scanned with GPR and EM. 2. Concrete coring to 0.20m bgl. 3. Hand dug inspection pit to 1.20m bgl. 4. Concrete reinstatement.										Sampling Runs From (m) 1.20 2.00 3.00 To (m) 2.00 3.00 4.00 Diam (mm) 87 77 67 Recovery % 50 100 30 Remarks				Hammer Information Serial No. Energy Ratio %	
														Project Number A090070-182	

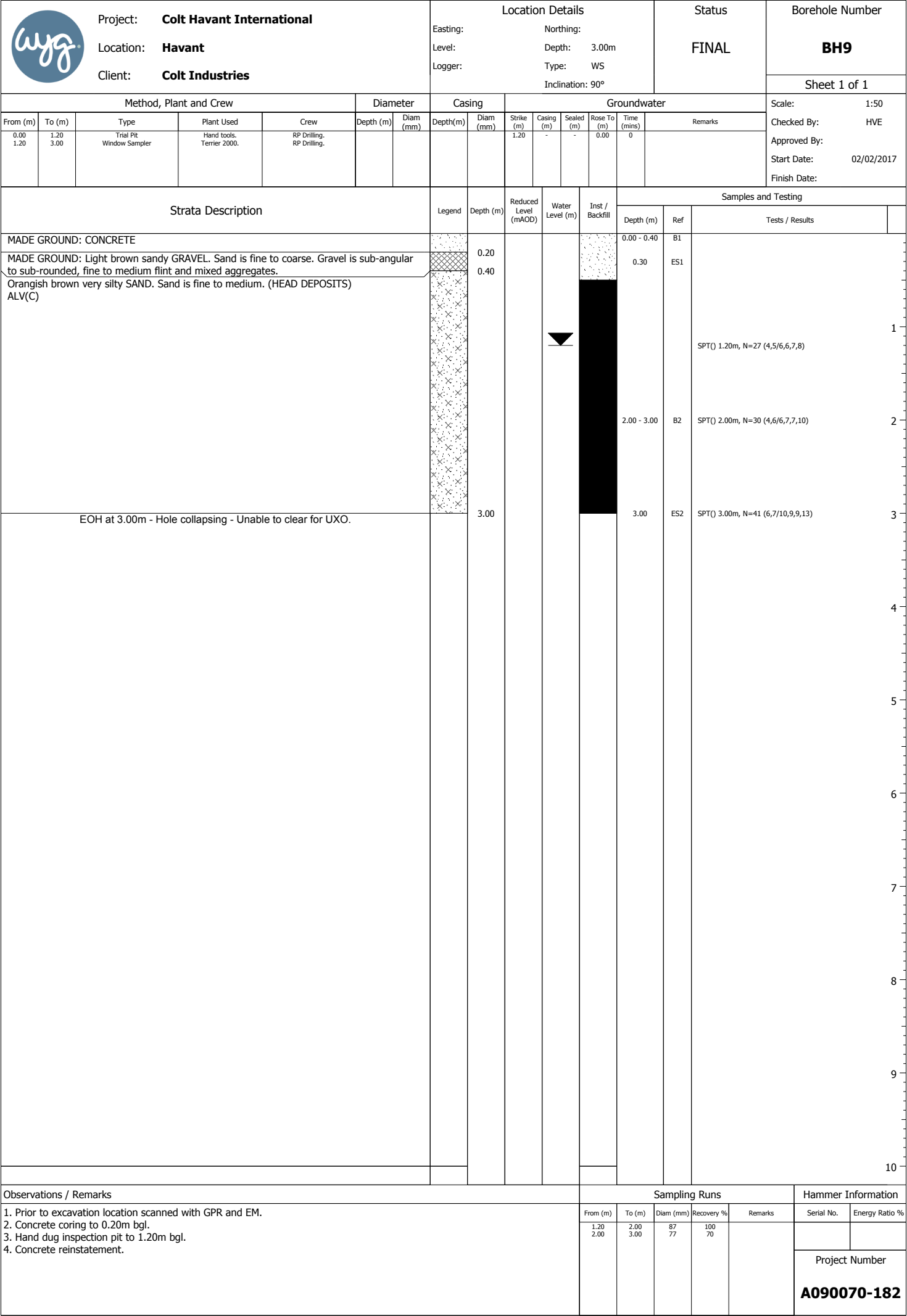






 Project: Colt Havant International Location: Havant Client: Colt Industries					Location Details Easting: Level: Logger: Northing: Depth: 4.00m Type: WS Inclination: 90°					Status FINAL		Borehole Number BH7							
										Sheet 1 of 1									
Method, Plant and Crew From (m) 0.00 1.20 To (m) 1.20 4.00 Type Trial Pit Window Sampler Plant Used Hand tools. Terrier 2000. Crew RP Drilling. RP Drilling.					Diameter Depth (m) Diam (mm)		Casing Depth(m) Diam (mm)		Groundwater Strike (m) 1.00 Casing (m) - Sealed (m) - Rose To (m) 0.00 Time (mins) 0 Remarks					Scale: 1:50 Checked By: HVE Approved By: Start Date: 02/02/2017 Finish Date:					
Strata Description					Legend		Depth (m)		Reduced Level (mAOD)		Water Level (m)		Inst / Backfill		Samples and Testing Depth (m) Ref Tests / Results				
MADE GROUND: CONCRETE.							0.20												
MADE GROUND: Brown slightly silty sandy GRAVEL. Sand is fine to coarse. Gravel is angular to sub-angular, fine to coarse mixed aggregates.																			
...between 1.0 and 2.0m; becomes slightly gravelly very clayey/silty SAND																			
Orangish brown silty / clayey sandy GRAVEL. Sand is fine to medium. (HEAD DEPOSITS)							2.00												
EOH at 4.00m - Target depth to install achieved.							4.00												
Observations / Remarks 1. Prior to excavation location scanned with GPR and EM. 2. Concrete coring to 0.2m 3. Hand dug inspection pit to 1.20m bgl. 4. 50mm standpipe installed to 2.00m bgl. 5. Concrete reinstatement.										Sampling Runs From (m) 1.20 2.00 3.00 To (m) 2.00 3.00 4.00 Diam (mm) 87 77 67 Recovery % 80 70 0 Remarks					Hammer Information Serial No. Energy Ratio %				
															Project Number A090070-182				





 Project: Colt Havant International Location: Havant Client: Colt Industries					Location Details Easting: Level: Logger: Northing: Depth: 3.00m Type: WS Inclination: 90°					Status FINAL		Borehole Number BHI1			
										Sheet 1 of 1					
Method, Plant and Crew From (m) 0.00 1.20 To (m) 1.20 3.00 Type Trial Pit Window Sampler Plant Used Hand tools. Terrier 2000. Crew RP Drilling. RP Drilling.					Diameter Depth (m) Diam (mm)		Casing Depth(m) Diam (mm)		Groundwater Strike (m) 1.30 Casing (m) - Sealed (m) - Rose To (m) 0.00 Time (mins) 0 Remarks					Scale: 1:50 Checked By: HVE Approved By: Start Date: 01/02/2017 Finish Date:	
Strata Description					Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing Depth (m) Ref Tests / Results					
CONCRETE.						0.20				0.00 - 0.40	B1	SPT() 1.00m, N=23 (4,5/6,6,5,6)	1		
MADE GROUND: Greyish brown clayey sand GRAVEL. Sand is fine to coarse. GRavel is sub-angular to sub-rounded concrete and mixed aggregates. FILL. Orangish brown very silty SAND. Sand is fine to medium.						0.40				0.20	ES1			SPT() 2.00m, N=25 (5,5/6,6,6,7)	2
										2.00 - 3.00	B2				
EOH at 3.00m - Hole collapsing - Unable to clear for UXO.						3.00			3.00	ES2		3			
													4		
													5		
													6		
													7		
													8		
													9		
													10		
Observations / Remarks 1. Prior to excavation location scanned with GPR and EM. 2. Concrete coring to 0.20m bgl. 3. Hand dug inspection pit to 1.20m bgl. 4. Concrete reinstatement.									Sampling Runs From (m) 1.20 2.00 To (m) 2.00 3.00 Diam (mm) 87 77 Recovery % 100 100 Remarks			Hammer Information Serial No. Energy Ratio %			
												Project Number A090070-182			



Easting:	Northing:	
Level:	Depth:	4.00m
Logger:	Type:	WS
	Inclination: °	

FINAL

BHI2

Sheet 1 of 1

Diameter

Groundwater

Scale: 1:50

From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Strike (m)	Casing (m)	Sealed (m)	Rose To (m)	Time (mins)	Remarks
0.00 1.20	1.20 4.00	Trial Pit Window Sampler	Hand tools. Terrier 2000.	RP Drilling. RP Drilling.					1.50	-	-	0.00	0	

Checked By: HVE

Approved By:

Start Date: 01/02/2017

Finish Date:

Legend

Depth (m)

Reduced
LevelWater
Level (m)

Inst /	Backfill
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Samples

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CONCRETE.

MADE GROUND: Slightly clayey sandy GRAVEL with a medium cobble content. Sand is fine to coarse. Gravel is angular to sub-rounded, fine to coarse brick, wood, chalk fragments and mixed aggregates. Cobbles up to 60mm. FILL.

Orangish brown very silty SAND. Sand is fine to medium.

Firm grey CLAY, LONDON CLAY FORMATION.

EOH at 4.00m - Target depth achieved.

Observations / Remarks

1. Prior to excavation location scanned with GPR and EM.
2. Concrete coring to 0.20m bgl.
3. Hand dug inspection pit to 1.20m bgl.
4. Concrete reinstatement.

Sampling Runs

Hammer Information

From (m)	To (m)	Diam (mm)	Recovery %	Remarks	Serial No.	Energy Ratio %
1.20	2.00	87	90			
2.00	3.00	77	90			
3.00	4.00	67	30			

Project Number

A090070-182

 Project: Colt Havant International Location: Havant Client: Colt Industries					Location Details Easting: Level: Logger: Northing: Depth: 3.00m Type: WS Inclination: 90°					Status FINAL		Borehole Number BHI3			
										Sheet 1 of 1					
Method, Plant and Crew From (m) 0.00 1.20 To (m) 1.20 3.00 Type Trial Pit Window Sampler Plant Used Hand tools. Terrier 2000. Crew RP Drilling. RP Drilling.					Diameter Depth (m) Diam (mm)		Casing Depth(m) Diam (mm)		Groundwater Strike (m) 1.40 Casing (m) - Sealed (m) - Rose To (m) 0.00 Time (mins) 0 Remarks					Scale: 1:50 Checked By: HVE Approved By: Start Date: 01/02/2017 Finish Date:	
Strata Description					Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing Depth (m) Ref Tests / Results					
MADE GROUND: CONCRETE.						0.20				0.50 - 1.00	B1	SPT() 1.00m, N=29 (4,5/7,7,8)	1		
MADE GROUND: Greyish brown clayey sandy GRAVEL. Sand is fine to coarse. Gravel is sub-angular to sub-rounded concrete and mixed aggregates. Orangish brown very silty SAND. Sand is fine to medium. (HEAD DEPOSITS)						0.40				0.80	ES1				
...between 2.0 and 3.0m; becomes gravelly very clayey / silty SAND										2.00 - 3.00	B2			SPT() 2.00m, N=32 (6,6/8,8,8)	2
EOH at 3.00m - Hole collapsing - Unable to clear for UXO.						3.00				3.00	ES2	SPT() 3.00m, N=36 (9,8/9,9,9)	3		
													4		
													5		
													6		
													7		
													8		
													9		
													10		
Observations / Remarks 1. Prior to excavation location scanned with GPR and EM. 2. Concrete coring to 0.20m bgl. 3. Hand dug inspection pit to 1.20m bgl. 4. Concrete reinstatement.					Sampling Runs From (m) 1.20 2.00 To (m) 2.00 3.00 Diam (mm) 87 77 Recovery % 100 100 Remarks					Hammer Information Serial No. Energy Ratio %					
										Project Number A090070-182					



Appendix F – Groundwater and Ground Gas Monitoring

WYG Environment

LANDGAS AND GROUNDWATER MONITORING RESULTS

100 St John Street, London, EC1M 4EH



Site Name: Colt Havant
Job No: A099913
Client: HCA

Date Monitored: 10/02/17
Monitoring Engineer: KG
Weather: Clear, sunny.

EQUIPMENT USED											
Type	Make		Serial		Last Calibrated						
Gas analyser PID	Geotechnical Instruments MineRae 2000										
	Geotechnical Instruments										
Dip tape											
LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS ³											
Exploratory Hole No	Peak ¹		Steady ²								
	CH ₄ (% vol)	CO ₂ (% vol)	CH ₄ (% vol)	CO ₂ (% vol)	O ₂ (% vol)	LEL (%)	PID (ppm)	H ₂ S (ppm)	HCN (ppm)	CO (ppm)	Time
BH4	0.2	2.5	0.1	2.5	18.2			0		1	
BH1	0.2	0.1	0.1	0.1	22.1			0		0	
BH5	0.9	0.3	0.9	0.3	14.2			0		40	
BH2	0.1	0.2	0.1	0.2	21.4			0		0	
B11	0.1	0.5	0.1	0.4	21.8			0		1	
BH14	0.1	0.4	0.1	0.4	21.1			0		0	
BH7	0.2	0.2	0.2	0.2	20.9			0		1	
LANDGAS - PHYSICAL PARAMETERS ³											
Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks				
			Peak ¹ (l/hr)	Steady ² (L/hr)	Peak ¹ (mbar)	Steady ² (mbar)					
BH4	1022.0	1.0	0.0	0.0							
BH1	1022.0	1.0	0.1	0.1							
BH5	1022.0	1.0	0.2	0.2							
BH2	1022.0	1.0	0.1	0.1							
B11	1022.0	1.0	0.0	0.0							
BH14	1022.0	1.0	0.0	0.0							
BH7	1022.0	1.0	0.1	0.1							
AMBIENT ATMOSPHERIC CONDITIONS ³						ATMOSPHERIC PRESSURE CONDITIONS					
Parameter		Before Monitoring		After Monitoring							
CH ₄ (% vol)						3 days prior (m bar)					
CO ₂ (% vol)						2 days prior (m bar)					
O ₂ (% vol)						1 day prior (m bar)					
PID (ppm)						during (m bar) am,midday,pm					
Atmos Press. (m bar)						1 day post (m bar)					
GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS ³											
Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators						Remarks
					Eh (mV)	EC (µs)	Ph (value)	DO (ppm)	Temp (°C)	TDS (ppm)	
BH4											
BH1											
BH5											
BH2											
B11											
BH14											
BH7											

Notes

NT = Not Tested
 ND = Not Detected

Data Compiled by: 21/02/2017
 Data Checked by:

WYG Environment

LANDGAS AND GROUNDWATER MONITORING RESULTS

100 St John Street, London, EC1M 4EH



Site Name:
Job No:
Client:

Colt Havant
A099913
HCA

Date Monitored: 20/02/17
Monitoring Engineer: KG
Weather:

Sunny

EQUIPMENT USED											
Type	Make		Serial		Last Calibrated						
Gas analyser	Geotechnical Instruments										
PID	MineRae 2000										
Dip tape	Geotechnical Instruments										

LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS ³											
Exploratory Hole No	Peak ¹		Steady ²								
	CH ₄ (% vol)	CO ₂ (% vol)	CH ₄ (% vol)	CO ₂ (% vol)	O ₂ (% vol)	LEL (%)	PID (ppm)	H ₂ S (ppm)	HCN (ppm)	CO (ppm)	Time

LANDGAS - PHYSICAL PARAMETERS ³							Remarks
Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		
			Peak ¹ (l/hr)	Steady ² (L/hr)	Peak ¹ (mbar)	Steady ² (mbar)	

AMBIENT ATMOSPHERIC CONDITIONS ³			ATMOSPHERIC PRESSURE CONDITIONS	
Parameter	Before Monitoring	After Monitoring		
CH ₄ (% vol)			3 days prior (m bar)	
CO ₂ (% vol)			2 days prior (m bar)	
O ₂ (% vol)			1 day prior (m bar)	
PID (ppm)			during (m bar) am,midday,pm	
Atmos Press. (m bar)			1 day post (m bar)	

GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS ³										
Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators					Remarks
					Eh (mV)	EC (µs)	Ph (value)	DO (ppm)	Temp (°C)	
BH1	0.20	1.03								
BH2	ND	ND								
BH4	1.95	4.00								
BH5	1.78	2.70								
BH7	ND	2.54								
BH11	0.42	1.17								
BH14	1.55	2.70								

Notes

NT = Not Tested
ND = Not Detected

Data Compiled by:
Data Checked by:

WYG Environment

LANDGAS AND GROUNDWATER MONITORING RESULTS

100 St John Street, London, EC1M 4EH



Site Name: Colt Havant
Job No: A099913
Client: HCA

Date Monitored: 27/02/17
Monitoring Engineer: KG
Weather: Showers

EQUIPMENT USED											
Type	Make				Serial			Last Calibrated			
Gas analyser	Geotechnical Instruments MineRae 2000										
PID											
Dip tape	Geotechnical Instruments										
LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS ³											
Exploratory Hole No	Peak ¹		Steady ²								
	CH ₄ (% vol)	CO ₂ (% vol)	CH ₄ (% vol)	CO ₂ (% vol)	O ₂ (% vol)	LEL (%)	PID (ppm)	H ₂ S (ppm)	HCN (ppm)	CO (ppm)	Time
BH1	0.0	0.1	0.0	0.1	20.3	NT	NT	<1	0	0	11:40:00
BH2	0.0	0.2	0.0	0.1	20.7	NT	NT	<1	0	0	12:40:00
BH4	0.0	0.1	0.0	0.1	20.8	NT	NT	<1	0	0	15:30:00
BH5	0.0	0.1	0.0	0.1	20.6	NT	NT	<1	0	0	15:45:00
BH7	0.0	0.1	0.0	0.1	20.8	NT	NT	<1	0	0	13:40:00
BH11	0.0	0.1	0.0	0.1	20.5	NT	NT	<1	0	0	13:10:00
BH14	0.0	0.1	0.0	0.1	20.4	NT	NT	<1	0	0	14:30:00
LANDGAS - PHYSICAL PARAMETERS ³											
Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks				
			Peak ¹ (l/hr)	Steady ² (L/hr)	Peak ¹ (mbar)	Steady ² (mbar)					
BH1	987.0	NT	0.3	0.3	NT	NT					
BH2	987.0	NT	0.4	0.4	NT	NT					
BH4	986.0	NT	0.3	0.3	NT	NT					
BH5	986.0	NT	0.2	0.2	NT	NT					
BH7	986.0	NT	0.2	0.2	NT	NT					
BH11	986.0	NT	0.2	0.2	NT	NT					
BH14	986.0	NT	0.2	0.2	NT	NT					
AMBIENT ATMOSPHERIC CONDITIONS ³						ATMOSPHERIC PRESSURE CONDITIONS					
Parameter		Before Monitoring		After Monitoring							
CH ₄ (% vol)						3 days prior (m bar)					
CO ₂ (% vol)						2 days prior (m bar)					
O ₂ (% vol)						1 day prior (m bar)					
PID (ppm)						during (m bar) am,midday,pm					
Atmos Press. (m bar)						1 day post (m bar)					
GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS ³											
Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators						Remarks
					Eh (mV)	EC (µs)	Ph (value)	DO (ppm)	Temp (°C)	TDS (ppm)	
BH1	0.00	1.00	ND	ND	NT	NT	NT	NT	NT	NT	
BH2	0.32	1.13	ND	ND	NT	NT	NT	NT	NT	NT	
BH4	1.63	4.00	ND	ND	NT	NT	NT	NT	NT	NT	
BH5	0.95	2.79	ND	ND	NT	NT	NT	NT	NT	NT	
BH7	ND	2.54	ND	ND	NT	NT	NT	NT	NT	NT	
BH11	ND	1.00	ND	ND	NT	NT	NT	NT	NT	NT	
BH14	1.40	2.69	ND	ND	NT	NT	NT	NT	NT	NT	

Notes

NT = Not Tested
 ND = Not Detected

Data Compiled by:
 Data Checked by:



Appendix G – Environmental Laboratory Testing



Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

WYG
100 St John Street
London
EC1M 4EH

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780

Fax: +44 (0) 1244 833781



4225



Attention :	Richard Tonge
Date :	28th March, 2017
Your reference :	A099913
Our reference :	Test Report 17/3401 Batch 1
Location :	Colt Havant
Date samples received :	3rd February, 2017
Status :	Final report
Issue :	2

Fifteen samples were received for analysis on 3rd February, 2017 of which thirteen were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge
JE Job No.: 17/3401

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	7-9	13-15	16-18	19-21	22-24	25-27	28-30	31-33	34-36	Please see attached notes for all abbreviations and acronyms		
Sample ID	BH3 1ES	BH4 1ES	BH12 1ES	BH6 1ES	BH6 2ES	BH9 1ES	BH9 2ES	BH1 1ES	BH1 2ES	BH11 1ES			
Depth	1.00	0.50	0.40	0.40	1.40	0.30	3.00	0.60	1.50	0.30			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	01/02/2017	01/02/2017	01/02/2017	02/02/2017	02/02/2017	02/02/2017	02/02/2017	02/02/2017	02/02/2017	02/02/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	03/02/2017	03/02/2017	03/02/2017	03/02/2017	03/02/2017	03/02/2017	03/02/2017	03/02/2017	03/02/2017	03/02/2017	LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 ^{#M}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 ^{#M}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 ^{#M}	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM16
>C12-C16 ^{#M}	22	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM16
>C16-C21 ^{#M}	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM16
>C21-C35 ^{#M}	<7	<7	<7	<7	<7	<7	<7	<7	<7	10	<7	mg/kg	TM5/PM16
>C35-C44	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM16
Total aliphatics C5-44	<26	<26	<26	<26	<26	<26	<26	<26	<26	<26	<26	mg/kg	TM5/PM16/PM18
Aromatics													
>C5-EC7 [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 ^{#M}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 [#]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM16
>EC12-EC16 [#]	7	12	<4	<4	<4	<4	<4	<4	<4	5	<4	mg/kg	TM5/PM16
>EC16-EC21 [#]	11	140	<7	<7	<7	<7	<7	10	<7	59	<7	mg/kg	TM5/PM16
>EC21-EC35 [#]	11	318	<7	<7	<7	<7	<7	99	<7	193	<7	mg/kg	TM5/PM16
>EC35-EC44	<7	51	<7	<7	<7	<7	<7	10	<7	30	<7	mg/kg	TM5/PM16
Total aromatics C5-44	29	521	<26	<26	<26	<26	<26	119	<26	287	<26	mg/kg	TM5/PM16/PM18
Total aliphatics and aromatics(C5-44)	<52	521	<52	<52	<52	<52	<52	119	<52	287	<52	mg/kg	TM5/PM16/PM18
MTBE [#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
Benzene [#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
Toluene [#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
Ethylbenzene [#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
m/p-Xylene [#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
o-Xylene [#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
PCB 28 [#]	-	-	-	<5	<5	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 52 [#]	-	-	-	<5	<5	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 101 [#]	-	-	-	<5	<5	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 118 [#]	-	-	-	<5	<5	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 138 [#]	-	-	-	<5	<5	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 153 [#]	-	-	-	<5	<5	-	-	-	-	-	<5	ug/kg	TM17/PM8
PCB 180 [#]	-	-	-	<5	<5	-	-	-	-	-	<5	ug/kg	TM17/PM8
Total 7 PCBs [#]	-	-	-	<35	<35	-	-	-	-	-	<35	ug/kg	TM17/PM8
Phenol ^{#M}	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM26/PM21
Natural Moisture Content	58.5	16.6	21.6	15.7	6.1	8.5	21.7	39.4	25.9	17.3	<0.1	%	PM4/PM0
Hexavalent Chromium [#]	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20

Please include all sections of this report if it is reproduced

Client Name: WYG
 Reference: A099913
 Location: Colt Havant
 Contact: Richard Tonge
 JE Job No.: 17/3401

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	37-38	39-40	41-43								Please see attached notes for all abbreviations and acronyms		
Sample ID	BH11 2ES	BH7 1ES	BH7 2ES										
Depth	2.00	0.80	3.50										
COC No / misc													
Containers	V T	J T	V J T										
Sample Date	02/02/2017	02/02/2017	02/02/2017										
Sample Type	Soil	Soil	Soil										
Batch Number	1	1	1										
Date of Receipt	03/02/2017	03/02/2017	03/02/2017								LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 ^{#M}	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C6-C8 ^{#M}	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C10-C12 ^{#M}	<0.2	<0.2	<0.2								<0.2	mg/kg	TM5/PM16
>C12-C16 ^{#M}	<4	<4	<4								<4	mg/kg	TM5/PM16
>C16-C21 ^{#M}	<7	<7	<7								<7	mg/kg	TM5/PM16
>C21-C35 ^{#M}	<7	<7	<7								<7	mg/kg	TM5/PM16
>C35-C44	<7	<7	<7								<7	mg/kg	TM5/PM16
Total aliphatics C5-44	<26	<26	<26								<26	mg/kg	TM5/PM16/PM18
Aromatics													
>C5-EC7 [#]	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC7-EC8 [#]	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC8-EC10 ^{#M}	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>EC10-EC12 [#]	<0.2	<0.2	<0.2								<0.2	mg/kg	TM5/PM16
>EC12-EC16 [#]	<4	<4	<4								<4	mg/kg	TM5/PM16
>EC16-EC21 [#]	<7	<7	<7								<7	mg/kg	TM5/PM16
>EC21-EC35 [#]	<7	<7	<7								<7	mg/kg	TM5/PM16
>EC35-EC44	<7	<7	<7								<7	mg/kg	TM5/PM16
Total aromatics C5-44	<26	<26	<26								<26	mg/kg	TM5/PM16/PM18
Total aliphatics and aromatics(C5-44)	<52	<52	<52								<52	mg/kg	TM5/PM16/PM18
MTBE [#]	<5	<5	<5								<5	ug/kg	TM31/PM12
Benzene [#]	<5	<5	<5								<5	ug/kg	TM31/PM12
Toluene [#]	<5	<5	<5								<5	ug/kg	TM31/PM12
Ethylbenzene [#]	<5	<5	<5								<5	ug/kg	TM31/PM12
m/p-Xylene [#]	<5	<5	<5								<5	ug/kg	TM31/PM12
o-Xylene [#]	<5	<5	<5								<5	ug/kg	TM31/PM12
PCB 28 [#]	-	-	-								<5	ug/kg	TM17/PM8
PCB 52 [#]	-	-	-								<5	ug/kg	TM17/PM8
PCB 101 [#]	-	-	-								<5	ug/kg	TM17/PM8
PCB 118 [#]	-	-	-								<5	ug/kg	TM17/PM8
PCB 138 [#]	-	-	-								<5	ug/kg	TM17/PM8
PCB 153 [#]	-	-	-								<5	ug/kg	TM17/PM8
PCB 180 [#]	-	-	-								<5	ug/kg	TM17/PM8
Total 7 PCBs [#]	-	-	-								<35	ug/kg	TM17/PM8
Phenol ^{#M}	<0.01	<0.01	<0.01								<0.01	mg/kg	TM26/PM21
Natural Moisture Content	21.6	6.9	23.1								<0.1	%	PM4/PM0
Hexavalent Chromium [#]	<0.3	<0.3	<0.3								<0.3	mg/kg	TM38/PM20

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge
JE Job No.: 17/3401

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

[illegible]

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge

Note:

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:



Ryan Butterworth
 Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
17/3401	1	BH3 1ES	1.00	2	10/02/2017	General Description (Bulk Analysis)	soil-stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	1	BH4 1ES	0.50	8	10/02/2017	General Description (Bulk Analysis)	soil-stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	1	BHI2 1ES	0.40	14	10/02/2017	General Description (Bulk Analysis)	Soil/Stone
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	1	BH6 1ES	0.40	17	10/02/2017	General Description (Bulk Analysis)	soil-stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	1	BH6 2ES	1.40	20	10/02/2017	General Description (Bulk Analysis)	soil-stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
17/3401	1	BH6 2ES	1.40	20	10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	1	BH9 1ES	0.30	23	10/02/2017	General Description (Bulk Analysis)	soil-stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
17/3401	1	BH9 2ES	3.00	26	10/02/2017	General Description (Bulk Analysis)	soil/stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
17/3401	1	BH1 1ES	0.60	29	10/02/2017	General Description (Bulk Analysis)	soil/stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
17/3401	1	BH1 2ES	1.50	32	10/02/2017	General Description (Bulk Analysis)	soil-stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
17/3401	1	BH11 1ES	0.30	35	10/02/2017	General Description (Bulk Analysis)	Soil/Stone
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
17/3401	1	BH11 2ES	2.00	38	10/02/2017	General Description (Bulk Analysis)	Soil/Stone
					10/02/2017	Asbestos Fibres	NAD

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
17/3401	1	BH11 2ES	2.00	38	10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	1	BH7 1ES	0.80	39	10/02/2017	General Description (Bulk Analysis)	stones-soil
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	1	BH7 2ES	3.50	42	10/02/2017	General Description (Bulk Analysis)	Soil/Stone
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 17/3401

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM12/PM16	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis./Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.	Yes	Yes	AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes		AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes	Yes	AD	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM38	Samples are brominated to reduce all mercury compounds to Mercury (II) which is analysed using method TM061.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes	Yes	AD	Yes

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.			AR	Yes
NONE	No Method Code	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	



Exova Jones Environmental

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4225



Attention :	Richard Tonge
Date :	28th March, 2017
Your reference :	A099913
Our reference :	Test Report 17/3401 Batch 2
Location :	Colt Havant
Date samples received :	4th February, 2017
Status :	Final report
Issue :	3

Eighteen samples were received for analysis on 4th February, 2017 of which fourteen were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge
JE Job No.: 17/3401

Solids: V=60g VOC jar. J=250g glass jar. T=plastic tub

Please see attached notes for all abbreviations and acronyms

Exova Jones Environmental

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge
JE Job No.: 17/3401

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	44-46	47-49	50-52	53-55	56-58	59-61	62-64	68-70	71-73	74-76	Please see attached notes for all abbreviations and acronyms		
Sample ID	BH12-2ES	BH11-1ES	BH11-2ES	BH13-1ES	BH13-2ES	BH2-1ES	BH2-2ES	BH5-1ES	BH5-2ES	BH14-1ES			
Depth	3.50	0.20	3.00	0.80	3.00	0.60	3.50	0.60	1.30	0.30			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	01/02/2017	01/02/2017	01/02/2017	01/02/2017	01/02/2017	02/02/2017	02/02/2017	03/02/2017	03/02/2017	03/02/2017			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	2	2	2	2	2	2	2	2	2	2			
Date of Receipt	04/02/2017	04/02/2017	04/02/2017	04/02/2017	04/02/2017	04/02/2017	04/02/2017	04/02/2017	04/02/2017	04/02/2017	LOD/LOR	Units	Method No.
PAH MS													
Naphthalene ^{#M}	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.10	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.20	<0.03	0.04	<0.03	mg/kg	TM4/PM8
Acenaphthene ^{#M}	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.07	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene ^{#M}	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.66	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene ^{#M}	<0.03	<0.03	<0.03	<0.03	<0.03	0.10	<0.03	5.23	<0.03	0.11	<0.03	mg/kg	TM4/PM8
Anthracene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	1.26	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene ^{#M}	<0.03	<0.03	<0.03	<0.03	<0.03	0.09	<0.03	9.72	<0.03	0.37	<0.03	mg/kg	TM4/PM8
Pyrene [#]	<0.03	<0.03	<0.03	<0.03	<0.03	0.08	<0.03	6.49	<0.03	0.31	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	4.51	<0.06	0.22	<0.06	mg/kg	TM4/PM8
Chrysene ^{#M}	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	3.51	<0.02	0.24	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene ^{#M}	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	6.20	<0.07	0.45	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	3.31	<0.04	0.26	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene ^{#M}	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	2.00	<0.04	0.12	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.61	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	1.72	<0.04	0.12	<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	<0.6	46.6	<0.6	2.2	<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	4.46	<0.05	0.32	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	1.74	<0.02	0.13	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	101	110	109	113	101	105	103	101	107	98	<0	%	TM4/PM8
Methyl Tertiary Butyl Ether [#]	-	<2	<2	<2	<2	-	-	-	-	-	<2	ug/kg	TM15/PM10
Benzene [#]	-	<3	<3	<3	<3	-	-	-	-	-	<3	ug/kg	TM15/PM10
Toluene [#]	-	<3	<3	<3	<3	-	-	-	-	-	<3	ug/kg	TM15/PM10
Ethylbenzene [#]	-	<3	<3	<3	<3	-	-	-	-	-	<3	ug/kg	TM15/PM10
p/m-Xylene [#]	-	<5	<5	<5	<5	-	-	-	-	-	<5	ug/kg	TM15/PM10
o-Xylene [#]	-	<3	<3	<3	<3	-	-	-	-	-	<3	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	-	104	102	102	101	-	-	-	-	-	<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	118	117	117	120	-	-	-	-	-	<0	%	TM15/PM10
TPH CWG													
Aliphatics													
>C5-C6 ^{#M}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 ^{#M}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 ^{#M}	<0.2	<0.2	<0.2	<0.2	<0.2	3.0	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM16
>C12-C16 ^{#M}	<4	<4	<4	<4	<4	45	<4	<4	<4	<4	<4	mg/kg	TM5/PM16
>C16-C21 ^{#M}	<7	<7	<7	<7	<7	63	<7	9	<7	<7	<7	mg/kg	TM5/PM16
>C21-C35 ^{#M}	<7	<7	<7	<7	<7	14	<7	53	<7	<7	<7	mg/kg	TM5/PM16
>C35-C44	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM16
Total aliphatics C5-44	<26	<26	<26	<26	<26	125	<26	62	<26	<26	<26	mg/kg	TM5/PM16

Please include all sections of this report if it is reproduced

Please see attached notes for all abbreviations and acronyms

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge
JE Job No.: 17/3401

Solids: V=60g VOC jar. J=250g glass jar. T=plastic tub

Please see attached notes for all abbreviations and acronyms

Exova Jones Environmental

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge
JE Job No.: 17/3401

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	77-79	83-85	86-88	89-91							Please see attached notes for all abbreviations and acronyms		
Sample ID	BH14-2ES	BH13-2ES	BH12-1ES	BH12-2ES									
Depth	2.40	1.50	0.20	3.00									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	03/02/2017	03/02/2017	03/02/2017	03/02/2017									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	2	2	2	2									
Date of Receipt	04/02/2017	04/02/2017	04/02/2017	04/02/2017							LOD/LOR	Units	Method No.
PAH MS													
Naphthalene ^{#M}	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Acenaphthene ^{#M}	<0.05	<0.05	<0.05	<0.05							<0.05	mg/kg	TM4/PM8
Fluorene ^{#M}	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Phenanthrene ^{#M}	<0.03	<0.03	0.15	<0.03							<0.03	mg/kg	TM4/PM8
Anthracene [#]	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Fluoranthene ^{#M}	<0.03	<0.03	0.38	<0.03							<0.03	mg/kg	TM4/PM8
Pyrene [#]	<0.03	<0.03	0.63	<0.03							<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	<0.06	<0.06	0.19	<0.06							<0.06	mg/kg	TM4/PM8
Chrysene ^{#M}	<0.02	<0.02	0.16	<0.02							<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene ^{#M}	<0.07	<0.07	0.40	<0.07							<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	<0.04	<0.04	0.36	<0.04							<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene ^{#M}	<0.04	<0.04	0.28	<0.04							<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	<0.04	<0.04	0.40	<0.04							<0.04	mg/kg	TM4/PM8
PAH 16 Total	<0.6	<0.6	3.0	<0.6							<0.6	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	0.29	<0.05							<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	0.11	<0.02							<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	116	107	106	101							<0	%	TM4/PM8
Methyl Tertiary Butyl Ether [#]	-	-	-	-							<2	ug/kg	TM15/PM10
Benzene [#]	-	-	-	-							<3	ug/kg	TM15/PM10
Toluene [#]	-	-	-	-							<3	ug/kg	TM15/PM10
Ethylbenzene [#]	-	-	-	-							<3	ug/kg	TM15/PM10
p/m-Xylene [#]	-	-	-	-							<5	ug/kg	TM15/PM10
o-Xylene [#]	-	-	-	-							<3	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	-	-	-	-							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	-	-	-	-							<0	%	TM15/PM10
TPH CWG													
Aliphatics													
>C5-C6 ^{#M}	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C6-C8 ^{#M}	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C10-C12 ^{#M}	<0.2	0.6	<0.2	<0.2							<0.2	mg/kg	TM5/PM16
>C12-C16 ^{#M}	<4	51	<4	<4							<4	mg/kg	TM5/PM16
>C16-C21 ^{#M}	<7	83	<7	<7							<7	mg/kg	TM5/PM16
>C21-C35 ^{#M}	<7	<7	<7	<7							<7	mg/kg	TM5/PM16
>C35-C44	<7	<7	<7	<7							<7	mg/kg	TM5/PM16
Total aliphatics C5-44	<26	135	<26	<26							<26	mg/kg	TM5/PM16/PM12/PM10

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge
JE Job No.: 17/3401

Solids: V=60g VOC jar. J=250g glass jar. T=plastic tub

Please see attached notes for all abbreviations and acronyms

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge
JE Job No.: 17/3401

VOC Report : Solid

J E Sample No.	47-49	50-52	53-55	56-58							Please see attached notes for all abbreviations and acronyms		
Sample ID	BHI1-1ES	BHI1-2ES	BHI3-1ES	BHI3-2ES									
Depth	0.20	3.00	0.80	3.00									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	01/02/2017	01/02/2017	01/02/2017	01/02/2017									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	2	2	2	2							LOD/LOR	Units	Method No.
Date of Receipt	04/02/2017	04/02/2017	04/02/2017	04/02/2017									
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2							<2	ug/kg	TM15/PM10
Methyl Tertiary Butyl Ether #	<2	<2	<2	<2							<2	ug/kg	TM15/PM10
Chloromethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Vinyl Chloride	<2	<2	<2	<2							<2	ug/kg	TM15_A/PM10
Bromomethane	<1	<1	<1	<1							<1	ug/kg	TM15/PM10
Chloroethane #	<2	<2	<2	<2							<2	ug/kg	TM15/PM10
Trichlorofluoromethane #	<2	<2	<2	<2							<2	ug/kg	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<6	<6	<6	<6							<6	ug/kg	TM15/PM10
Dichloromethane (DCM) #	<30	<30	<30	<30							<30	ug/kg	TM15/PM10
trans-1,2-Dichloroethene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
cis-1,2-Dichloroethene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
2,2-Dichloropropane	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
Bromochloromethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Chloroform #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1,1-Trichloroethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Carbon tetrachloride #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,2-Dichloroethane #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
Benzene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,2-Dichloropropane #	<6	<6	<6	<6							<6	ug/kg	TM15/PM10
Dibromomethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Bromodichloromethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
cis-1,3-Dichloropropene	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
Toluene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
trans-1,3-Dichloropropene	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1,2-Trichloroethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,3-Dichloropropane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Dibromochloromethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,2-Dibromoethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Chlorobenzene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1,1,2-Tetrachloroethane	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Ethylbenzene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
p/m-Xylene #	<5	<5	<5	<5							<5	ug/kg	TM15/PM10
o-Xylene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Styrene	<3	<3	<3	<3							<3	ug/kg	TM15_A/PM10
Bromoform	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,1,2,2-Tetrachloroethane #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
Bromobenzene	<2	<2	<2	<2							<2	ug/kg	TM15/PM10
1,2,3-Trichloropropane #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
Propylbenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
2-Chlorotoluene	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
4-Chlorotoluene	<3	<3	<3	<3							<3	ug/kg	TM15/PM10
tert-Butylbenzene #	<5	<5	<5	<5							<5	ug/kg	TM15/PM10
1,2,4-Trimethylbenzene #	<6	<6	<6	<6							<6	ug/kg	TM15/PM10
sec-Butylbenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
4-Isopropyltoluene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,3-Dichlorobenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,4-Dichlorobenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
n-Butylbenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,2-Dichlorobenzene #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,2-Dibromo-3-chloropropane #	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
1,2,4-Trichlorobenzene #	<7	<7	<7	<7							<7	ug/kg	TM15/PM10
Hexachlorobutadiene	<4	<4	<4	<4							<4	ug/kg	TM15/PM10
Naphthalene	<27	<27	<27	<27							<27	ug/kg	TM15/PM10
1,2,3-Trichlorobenzene #	<7	<7	<7	<7							<7	ug/kg	TM15/PM10
Surrogate Recovery Toluene D8	104	102	102	101							<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	118	117	117	120							<0	%	TM15/PM10

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge

Note:

Analysis was carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:



Ryan Butterworth
 Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
17/3401	2	BHI2-2ES	3.50	45	10/02/2017	General Description (Bulk Analysis)	soil/stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	2	BHI1-1ES	0.20	48	10/02/2017	General Description (Bulk Analysis)	soil/stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	2	BHI1-2ES	3.00	51	10/02/2017	General Description (Bulk Analysis)	soil/stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	2	BHI3-1ES	0.80	54	10/02/2017	General Description (Bulk Analysis)	Soil/Stone
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	2	BHI3-2ES	3.00	57	10/02/2017	General Description (Bulk Analysis)	Soil/Stone
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
17/3401	2	BHI3-2ES	3.00	57	10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	2	BH2-1ES	0.60	60	10/02/2017	General Description (Bulk Analysis)	soil-stones
					10/02/2017	Asbestos Fibres	Fibre Bundles
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos Type	Amosite
					10/02/2017	Asbestos Level Screen	<0.1%
					25/02/2017	Asbestos Gravimetric Quantification	<0.001 (mass %)
					25/02/2017	Asbestos PCOM Quantification (Fibres)	0.002 (mass %)
17/3401	2	BH2-2ES	3.50	63	25/02/2017	Asbestos Gravimetric & PCOM Total	0.002 (mass %)
					10/02/2017	General Description (Bulk Analysis)	sand-stones
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
					10/02/2017	General Description (Bulk Analysis)	soil-stones
					10/02/2017	Asbestos Fibres	NAD
17/3401	2	BH5-1ES	0.60	69	10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
					10/02/2017	General Description (Bulk Analysis)	soil-stones
17/3401	2	BH5-2ES	1.30	72	10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	2	BH14-1ES	0.30	75	10/02/2017	General Description (Bulk Analysis)	soil-stones
					10/02/2017	Asbestos Fibres	Free Fibres
					10/02/2017	Asbestos ACM	Asbestos Cement Debris
					10/02/2017	Asbestos Type	Chrysotile
					27/02/2017	Asbestos Gravimetric Quantification	0.012 (mass %)
					27/02/2017	Asbestos PCOM Quantification (Fibres)	<0.001 (mass %)
					27/02/2017	Asbestos Gravimetric & PCOM Total	0.012 (mass %)
17/3401	2	BH14-2ES	2.40	78	10/02/2017	General Description (Bulk Analysis)	Soil/Stone
					10/02/2017	Asbestos Fibres	NAD

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
17/3401	2	BH14-2ES	2.40	78	10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	2	BH13-2ES	1.50	84	10/02/2017	General Description (Bulk Analysis)	Soil/Stone
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD
17/3401	2	BH12-1ES	0.20	87	10/02/2017	General Description (Bulk Analysis)	Soil/Stone
					10/02/2017	Asbestos Fibres	Fibre Bundles
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos Type	Chrysotile
					10/02/2017	Asbestos Level Screen	<0.1%
					25/02/2017	Asbestos Gravimetric Quantification	<0.001 (mass %)
					25/02/2017	Asbestos PCOM Quantification (Fibres)	<0.001 (mass %)
					25/02/2017	Asbestos Gravimetric & PCOM Total	<0.001 (mass %)
17/3401	2	BH12-2ES	3.00	90	10/02/2017	General Description (Bulk Analysis)	Soil/Stone
					10/02/2017	Asbestos Fibres	NAD
					10/02/2017	Asbestos Fibres (2)	NAD
					10/02/2017	Asbestos ACM	NAD
					10/02/2017	Asbestos ACM (2)	NAD
					10/02/2017	Asbestos Type	NAD
					10/02/2017	Asbestos Type (2)	NAD
					10/02/2017	Asbestos Level Screen	NAD

Matrix : Solid

QF-PM 3.1.7 v10 Please include all sections of this report if it is reproduced 13 of 20

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 17/3401

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.				
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM12/PM16	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis./Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM21	Modified USEPA 415.1. Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO ₂ generated is quantified using infra-red detection.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.	Yes	Yes	AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes		AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes	Yes	AD	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM60	As received solid samples are extracted with deionised water in a 2:1 ratio of water to solid.			AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM38	Samples are brominated to reduce all mercury compounds to Mercury (II) which is analysed using method TM061.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	Yes

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.			AR	
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes	Yes	AD	Yes
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM61	As received solid samples are extracted with hot water in a 20:1 ratio of water to soil ready for analysis by ICP.			AR	Yes
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.			AR	Yes
NONE	No Method Code	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	
TM15_A	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds, Vinyl Chloride & Styrene by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes



Exova Jones Environmental

Registered Address : Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian, EH28 8PL

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Attention :	Richard Tonge
Date :	27th February, 2017
Your reference :	A099913
Our reference :	Test Report 17/3401 Batch 3
Location :	Colt Havant
Date samples received :	21st February, 2017
Status :	Final report
Issue :	1

Five samples were received for analysis on 21st February, 2017 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: WYG
 Reference: A099913
 Location: Colt Havant
 Contact: Richard Tonge
 JE Job No.: 17/3401

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HNO₃

J E Sample No.	92-98	99-104	105-111	112-118	119-124						Please see attached notes for all abbreviations and acronyms		
Sample ID	BH4	BH5	BH1	BH11	BH14								
Depth													
COC No / misc													
Containers	V H H N N P G	V H N P G	V H H N N P G	V H H N N P G	V H N P G								
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017	20/02/2017								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	3	3	3	3	3								
Date of Receipt	21/02/2017	21/02/2017	21/02/2017	21/02/2017	21/02/2017						LOD/LOR	Units	Method No.
Dissolved Antimony #	<2	<2	<2	<2	<2						<2	ug/l	TM30/PM14
Dissolved Arsenic #	5.7	4.4	3.5	8.2	2.7						<0.9	ug/l	TM30/PM14
Dissolved Barium #	88.8	219.2	25.1	37.3	34.1						<1.8	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM30/PM14
Dissolved Boron	47	84	167	333	94						<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.03	<0.03	<0.03	<0.03	<0.03						<0.03	ug/l	TM30/PM14
Dissolved Calcium #	172.3	168.3	82.9	140.5	71.1						<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<0.2	0.3	<0.2	<0.2	<0.2						<0.2	ug/l	TM30/PM14
Dissolved Copper #	<3	<3	<3	<3	<3						<3	ug/l	TM30/PM14
Dissolved Lead #	<0.4	<0.4	<0.4	<0.4	<0.4						<0.4	ug/l	TM30/PM14
Dissolved Molybdenum #	1.9	1.4	2.7	2.7	3.8						<0.2	ug/l	TM30/PM14
Dissolved Nickel #	3.7	6.7	2.9	4.3	3.2						<0.2	ug/l	TM30/PM14
Dissolved Selenium #	<1.2	<1.2	<1.2	<1.2	<1.2						<1.2	ug/l	TM30/PM14
Dissolved Zinc #	2.4	<1.5	3.2	5.5	1.5						<1.5	ug/l	TM30/PM14
Mercury Dissolved by CVAf #	0.01	<0.01	<0.01	0.03	0.01						<0.01	ug/l	TM61/PM38
Total Hardness Dissolved (as CaCO3)	576	490	282	489	215						<1	mg/l	TM30/PM14
PAH MS													
Naphthalene	<0.1	0.1	0.5	0.4	<0.1						<0.1	ug/l	TM4/PM30
Acenaphthylene	0.01	0.10	0.06	0.04	<0.01						<0.01	ug/l	TM4/PM30
Acenaphthene	0.02	0.35	2.43	0.08	<0.01						<0.01	ug/l	TM4/PM30
Fluorene	0.01	0.29	0.98	0.05	<0.01						<0.01	ug/l	TM4/PM30
Phenanthrene	0.02	0.10	1.24	0.08	<0.01						<0.01	ug/l	TM4/PM30
Anthracene	<0.01	0.05	0.47	0.02	<0.01						<0.01	ug/l	TM4/PM30
Fluoranthene	0.01	0.11	0.83	0.04	0.03						<0.01	ug/l	TM4/PM30
Pyrene	0.01	0.08	0.47	0.04	0.03						<0.01	ug/l	TM4/PM30
Benzo(a)anthracene	<0.01	0.02	0.06	<0.01	<0.01						<0.01	ug/l	TM4/PM30
Chrysene	<0.01	0.02	0.08	0.01	0.01						<0.01	ug/l	TM4/PM30
Benzo(bk)fluoranthene	<0.01	0.01	0.04	<0.01	<0.01						<0.01	ug/l	TM4/PM30
Benzo(a)pyrene	<0.01	<0.01	0.02	<0.01	<0.01						<0.01	ug/l	TM4/PM30
Indeno(123cd)pyrene	<0.01	<0.01	0.01	<0.01	<0.01						<0.01	ug/l	TM4/PM30
Dibenzo(ah)anthracene	<0.01	<0.01	<0.01	<0.01	<0.01						<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene	<0.01	<0.01	0.01	<0.01	<0.01						<0.01	ug/l	TM4/PM30
PAH 16 Total	<0.1	1.2	7.2	0.8	<0.1						<0.1	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	<0.01	0.03	<0.01	<0.01						<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	<0.01	0.01	<0.01	<0.01						<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	77	76	79	82	79						<0	%	TM4/PM30
VOC TICs	ND	ND	ND	ND	ND							None	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5	<5						<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge
JE Job No.: 17/3401

VOC Report : Liquid

J E Sample No.	92-98	99-104	105-111	112-118	119-124						Please see attached notes for all abbreviations and acronyms		
Sample ID	BH4	BH5	BH1	BH11	BH14								
Depth													
COC No / misc													
Containers	V H H N N P G	V H N P G	V H H N N P G	V H H N N P G	V H N P G								
Sample Date	20/02/2017	20/02/2017	20/02/2017	20/02/2017	20/02/2017								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water						LOD/LOR	Units	Method No.
Batch Number	3	3	3	3	3								
Date of Receipt	21/02/2017	21/02/2017	21/02/2017	21/02/2017	21/02/2017								
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5	<5						<5	ug/l	TM15/PM10
trans-1,2-Dichloroethene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
cis-1,2-Dichloroethene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
cis-1,3-Dichloropropene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5	<5						<5	ug/l	TM15/PM10
trans-1,3-Dichloropropene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4						<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	102	100	100	98	99						<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	99	100	100	99	98						<0	%	TM15/PM10

Please include all sections of this report if it is reproduced

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 17/3401

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	Yes			
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO ₂ and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM38	Samples are brominated to reduce all mercury compounds to Mercury (II) which is analysed using method TM061.	Yes			
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.				



Exova Jones Environmental

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Attention :	Richard Tonge
Date :	24th March, 2017
Your reference :	A099913
Our reference :	Test Report 17/3401 Batch 4
Location :	Colt Havant
Date samples received :	28th February, 2017
Status :	Final report
Issue :	2

Nine samples were received for analysis on 28th February, 2017 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: WYG
 Reference: A099913
 Location: Colt Havant
 Contact: Richard Tonge
 JE Job No.: 17/3401

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
 H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HNO₃

J E Sample No.	125-131	132-138	139-140	141-145,172	146-152	153-156	157-161	162-164			Please see attached notes for all abbreviations and acronyms		
Sample ID	BH1	BH11	BH5	BH14	BH4	SW1	SW4	SW5					
Depth													
COC No / misc													
Containers	V H H N N P G	V H H N N P G	P G	V H N P G	V H H N N P G	V P G	V H P G	V G					
Sample Date	27/02/2017	27/02/2017	27/02/2017	27/02/2017	27/02/2017	27/02/2017	27/02/2017	27/02/2017					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water	Surface Water					
Batch Number	4	4	4	4	4	4	4	4					
Date of Receipt	28/02/2017	28/02/2017	28/02/2017	28/02/2017	28/02/2017	28/02/2017	28/02/2017	28/02/2017			LOD/LOR	Units	Method No.
Dissolved Antimony #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM30/PM14
Dissolved Arsenic #	1.7	8.5	2.4	3.2	6.1	<0.9	2.6	<0.9			<0.9	ug/l	TM30/PM14
Dissolved Barium #	19.2	25.5	137.2	35.2	88.4	26.5	13.5	12.4			<1.8	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM30/PM14
Dissolved Boron	135	309	61	101	49	30	24	21			<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	ug/l	TM30/PM14
Dissolved Calcium #	70.9	130.1	88.0	68.4	179.2	69.8	34.5	33.9			<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	0.9	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	6.0			<0.2	ug/l	TM30/PM14
Dissolved Copper #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM30/PM14
Dissolved Lead #	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4			<0.4	ug/l	TM30/PM14
Dissolved Molybdenum #	1.8	2.1	1.6	3.0	1.3	<0.2	<0.2	<0.2			<0.2	ug/l	TM30/PM14
Dissolved Nickel #	1.1	4.4	7.0	2.7	2.8	0.8	1.9	1.1			<0.2	ug/l	TM30/PM14
Dissolved Selenium #	<1.2	<1.2	18.2	23.8	<1.2	<1.2	<1.2	<1.2			<1.2	ug/l	TM30/PM14
Dissolved Zinc #	<1.5	6.3	2.4	3.7	3.9	5.7	3.4	<1.5			<1.5	ug/l	TM30/PM14
Mercury Dissolved by CVAF #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM61/PM38
Total Hardness Dissolved (as CaCO ₃)	229	442	266	215	602	239	104	102			<1	mg/l	TM30/PM14
PAH MS													
Naphthalene	0.3 ^B	0.1 ^B	<0.1 ^B	<0.1 ^B	<0.1 ^B	<0.1 ^B	<0.1 ^B	<0.1 ^B			<0.1	ug/l	TM4/PM30
Acenaphthylene	0.05	0.02	0.04	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Acenaphthene	1.03	0.04	0.27	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Fluorene	0.37	0.05	0.07	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Phenanthrene	0.34	0.12	0.48	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Anthracene	0.14	0.03	0.15	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Fluoranthene	0.27	0.11	2.45	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Pyrene	0.15	0.09	1.64	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Benzo(a)anthracene	0.02	0.02	0.69	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Chrysene	0.03	0.02	0.84	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Benzo(bk)fluoranthene	<0.01	<0.01	0.81	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Benzo(a)pyrene	<0.01	<0.01	0.35	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Indeno(123cd)pyrene	<0.01	<0.01	0.26	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Dibenzo(ah)anthracene	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Benzo(ghi)perylene	<0.01	<0.01	0.23	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
PAH 16 Total	2.7	0.6	8.3	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.01	<0.01	0.58	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.01	<0.01	0.23	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	ug/l	TM4/PM30
PAH Surrogate % Recovery	80	79	73	80	79	83	80	79			<0	%	TM4/PM30
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM15/PM10
Toluene #	6	<5	<5	<5	8	<5	<5	<5			<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1	1	<1	<1	<1			<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2	4	<2	<2	<2			<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1	1	<1	<1	<1			<1	ug/l	TM15/PM10

Please include all sections of this report if it is reproduced

Client Name: WYG
Reference: A099913
Location: Colt Havant
Contact: Richard Tonge
JE Job No.: 17/3401

VOC Report : Liquid

J E Sample No.	125-131	132-138	139-140	141-145,172	146-152	153-156	157-161	162-164			Please see attached notes for all abbreviations and acronyms		
Sample ID	BH1	BH11	BH5	BH14	BH4	SW1	SW4	SW5					
Depth													
COC No / misc Containers	V H H N N P G	V H H N N P G	P G	V H N P G	V H H N N P G	V P G	V H P G	V G					
Sample Date	27/02/2017	27/02/2017	27/02/2017	27/02/2017	27/02/2017	27/02/2017	27/02/2017	27/02/2017					
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water	Surface Water	Surface Water	Surface Water					
Batch Number	4	4	4	4	4	4	4	4			LOD/LOR	Units	Method No.
Date of Receipt	28/02/2017	28/02/2017	28/02/2017	28/02/2017	28/02/2017	28/02/2017	28/02/2017	28/02/2017					
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/l	TM15/PM10
trans-1,2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
cis-1,2-Dichloroethene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
cis-1,3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Toluene #	6	<5	<5	<5	8	<5	<5	<5			<5	ug/l	TM15/PM10
trans-1,3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1	1	<1	<1	<1			<1	ug/l	TM15/PM10
p/m-Xylene #	<2	<2	<2	<2	4	<2	<2	<2			<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1	1	<1	<1	<1			<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4	<4	<4	<4			<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	104	100	104	99	99	98	99	97			<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	94	98	95	97	97	97	97	96			<0	%	TM15/PM10

Please include all sections of this report if it is reproduced

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 17/3401

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS) accredited - UK.
SA	ISO17025 (SANAS) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to a Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	TM005: Modified USEPA 8015B. Determination of solvent Extractable Petroleum Hydrocarbons (EPH) including column fractionation in the carbon range of C10-35 into aliphatic and aromatic fractions by GC-FID. TM036: Modified USEPA 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C5-10 by headspace GC-FID. Including determination of	PM30/PM12	CWG GC-FID	Yes			
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using the Thermo Aquakem Photometric Automatic Analyser. Modified US EPA methods 325.2, 375.4, 365.2, 353.1, 354.1	PM0	No preparation is required.	Yes			

JE Job No: 17/3401

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	Modified USEPA 9060. Determination of TOC by calculation from Total Carbon and Inorganic Carbon using a TOC analyser, the carbon in the sample is converted to CO ₂ and then passed through a non-dispersive infrared gas analyser (NDIR).	PM0	No preparation is required.	Yes			
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM38	Samples are brominated to reduce all mercury compounds to Mercury (II) which is analysed using method TM061.	Yes			
TM73	Modified US EPA methods 150.1 and 9045D. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.				



Appendix H – Geotechnical Laboratory Testing



LABORATORY REPORT



4043

Contract Number: PSL17/0604

Report Date: 17 February 2017

Client's Reference: A09913

Client Name: WYG London
100 St John Street
London
EC1M 4EH

For the attention of: Richard Tonge

Contract Title: Colt International

Date Received: 9/2/2017

Date Commenced: 9/2/2017

Date Completed: 17/2/2017

Notes: Opinions and Interpretations are outside the UKAS Accreditation

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

Checked and Approved Signatories:

R Gunson
(Director)

A Watkins
(Director)

R Berriman
(Quality Manager)


L Knight
(Senior Technician)

S Royle
(Senior Technician)

A Fry
(Senior Technician)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH1		Bulk	1.00	2.00	MADE GROUND brown mottled grey gravelly slightly sandy clay.
BH2		Bulk	2.00	3.00	Brown slightly clayey very silty SAND.
BH3		Bulk	2.80	4.00	Dark brown slightly gravelly sandy CLAY.
BH4		Bulk	2.30	3.00	Brown mottled grey sandy CLAY.
BH6		Bulk	1.20	1.60	Brown mottled grey sandy clayey GRAVEL.
BH7		Bulk	1.00	2.00	Brown slightly gravelly very silty SAND.
BH7		Bulk	2.00	3.00	Brown mottled grey very clayey sandy GRAVEL.
BH11		Bulk	2.00	3.00	Brown mottled grey slightly gravelly slightly sandy CLAY.
BH12		Bulk	2.00	3.00	Light brown clayey SAND.
BH14		Bulk	3.00	4.00	Brown sandy CLAY.
BHI2		Bulk	0.60	1.00	Brown very silty SAND.
BHI2		Bulk	2.80	4.00	Dark brown SAND.
BHI3		Bulk	0.50	1.00	Light brown slightly gravelly slightly clayey very silty SAND.
BHI3		Bulk	2.00	3.00	Light brown gravelly very silty SAND.



Colt International

Contract No:

PSL17/0604

Client Ref:

A09913

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

[illegible]

SYMBOLS : NP : Non Plastic

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



PSL
Professional Soils Laboratory

Colt International

Contract No:

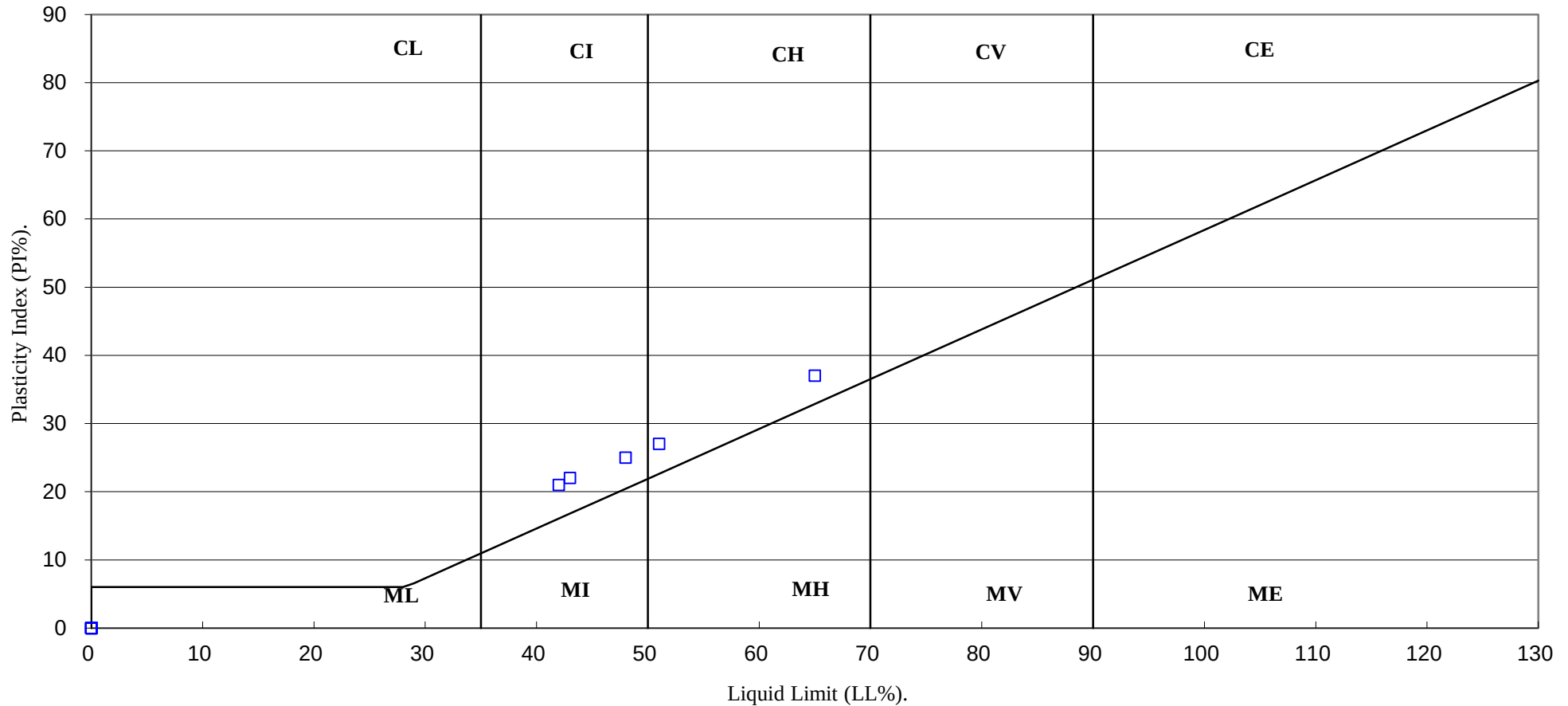
PSL17/0604

Client Ref:

A09913

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



PSL
Professional Soils Laboratory

Colt International

Contract No:

PSL17/0604

Client Ref:

A09913

PARTICLE SIZE DISTRIBUTION TEST

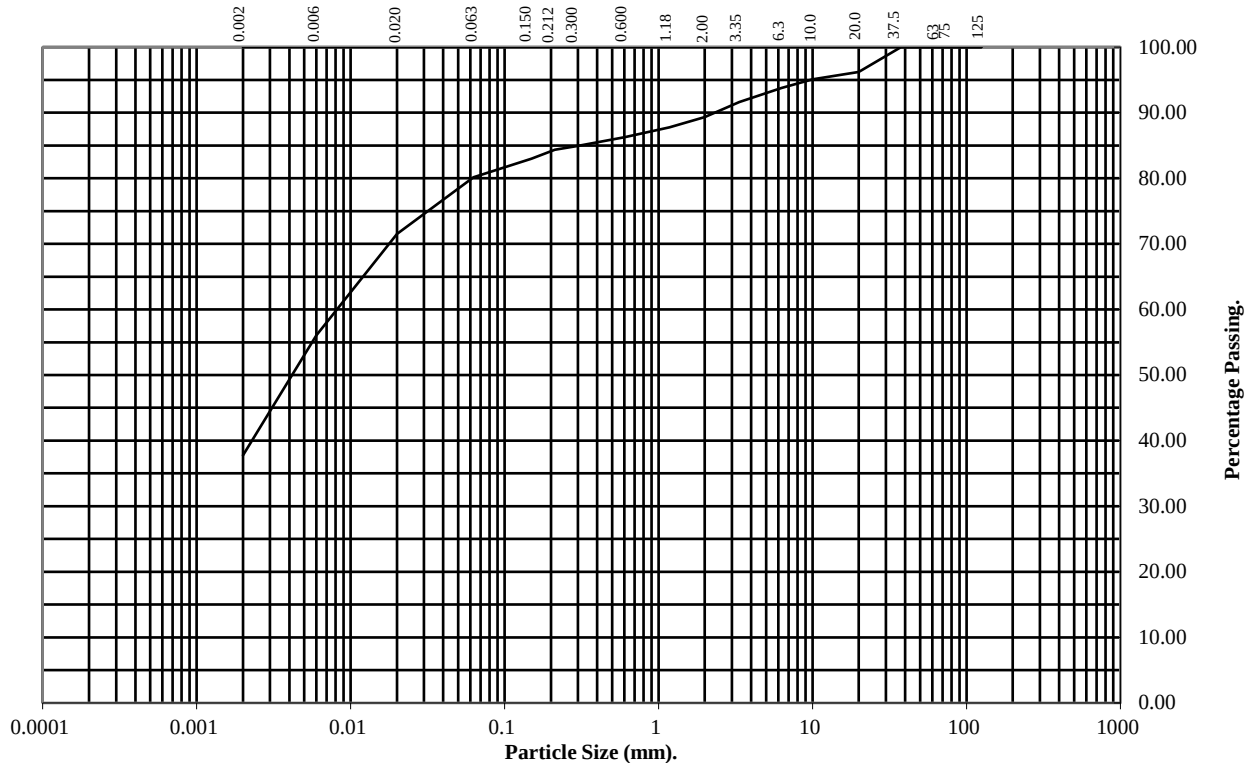
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH1 Top Depth (m): 1.00

Sample Number: Base Depth(m): 2.00

Sample Type: Bulk



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	96
10	95
6.3	94
3.35	92
2	89
1.18	88
0.6	86
0.3	85
0.212	84
0.15	83
0.063	80

Particle Diameter	Percentage Passing
0.02	72
0.006	56
0.002	38

Soil Fraction	Total Percentage
Cobbles	0
Gravel	11
Sand	9
Silt	42
Clay	38

Remarks:
See summary of soil descriptions.



Colt International

Contract No:
PSL17/0604
Client Ref:
A09913

PARTICLE SIZE DISTRIBUTION TEST

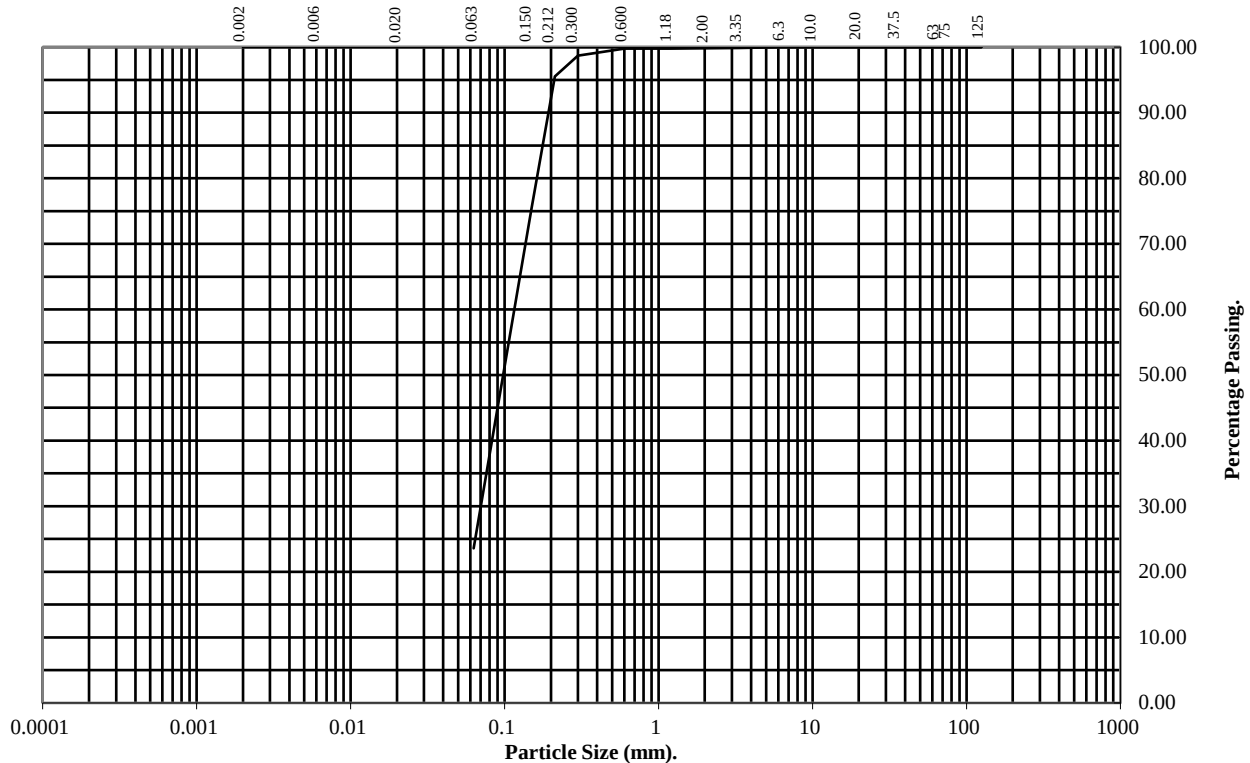
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH2 Top Depth (m): 2.00

Sample Number: Base Depth(m): 3.00

Sample Type: Bulk



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	100
0.3	99
0.212	96
0.15	75
0.063	24

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	76
Silt/Clay	24

Remarks:

See summary of soil descriptions.



Colt International

Contract No:
PSL17/0604
Client Ref:
A09913

PARTICLE SIZE DISTRIBUTION TEST

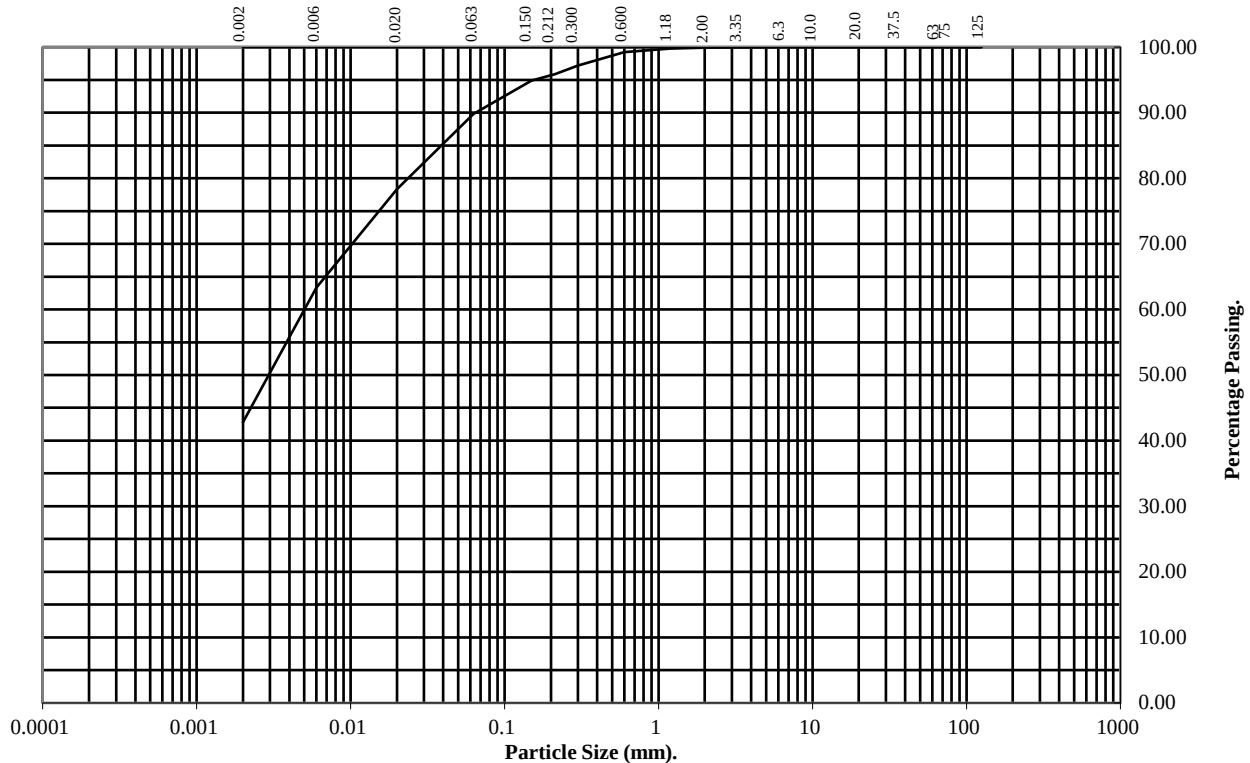
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH4 Top Depth (m): 2.30

Sample Number: Base Depth(m): 3.00

Sample Type: Bulk



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	99
0.3	97
0.212	96
0.15	95
0.063	90

Particle Diameter	Percentage Passing
0.02	78
0.006	63
0.002	43

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	10
Silt	47
Clay	43

Remarks:
See summary of soil descriptions.



Colt International

Contract No:
PSL17/0604
Client Ref:
A09913

PARTICLE SIZE DISTRIBUTION TEST

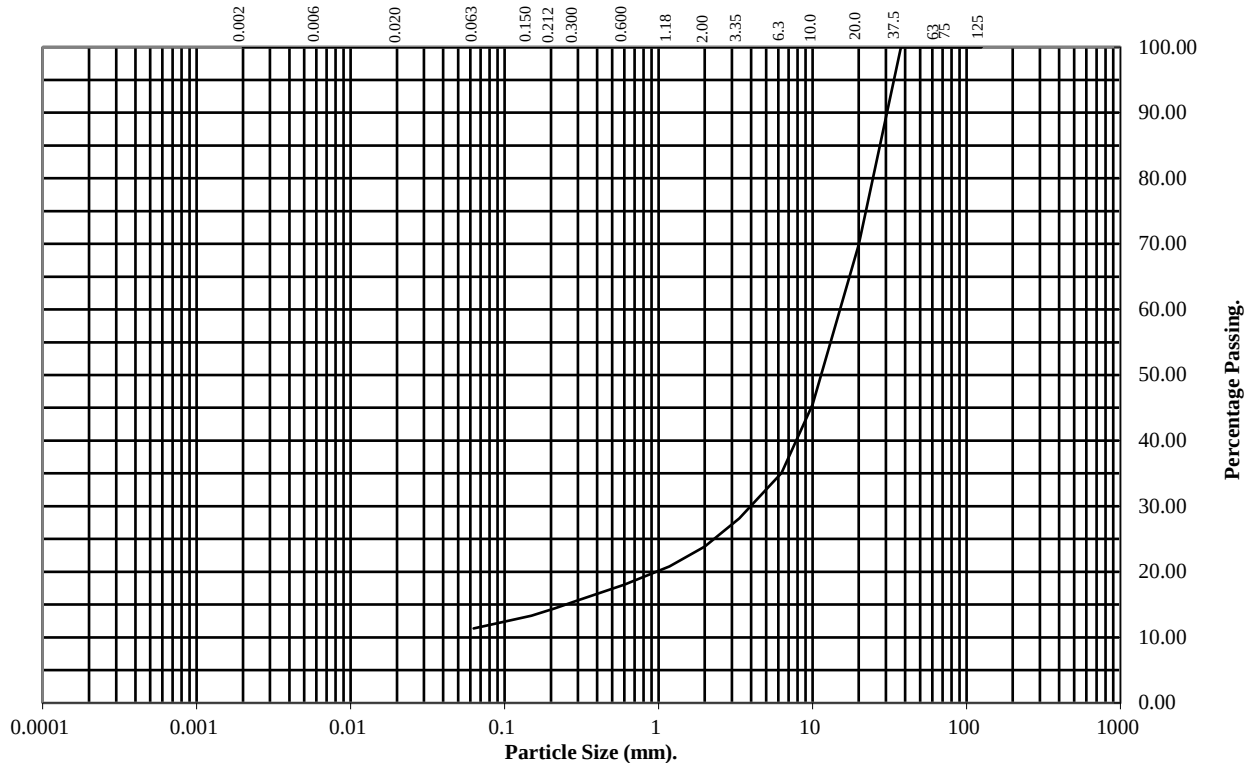
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH6 Top Depth (m): 1.20

Sample Number: Base Depth(m): 1.60

Sample Type: Bulk



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	70
10	45
6.3	35
3.35	28
2	24
1.18	21
0.6	18
0.3	16
0.212	14
0.15	13
0.063	11

Soil Fraction	Total Percentage
Cobbles	0
Gravel	76
Sand	13
Silt/Clay	11

Remarks:

See summary of soil descriptions.



Colt International

Contract No:
PSL17/0604
Client Ref:
A09913

PARTICLE SIZE DISTRIBUTION TEST

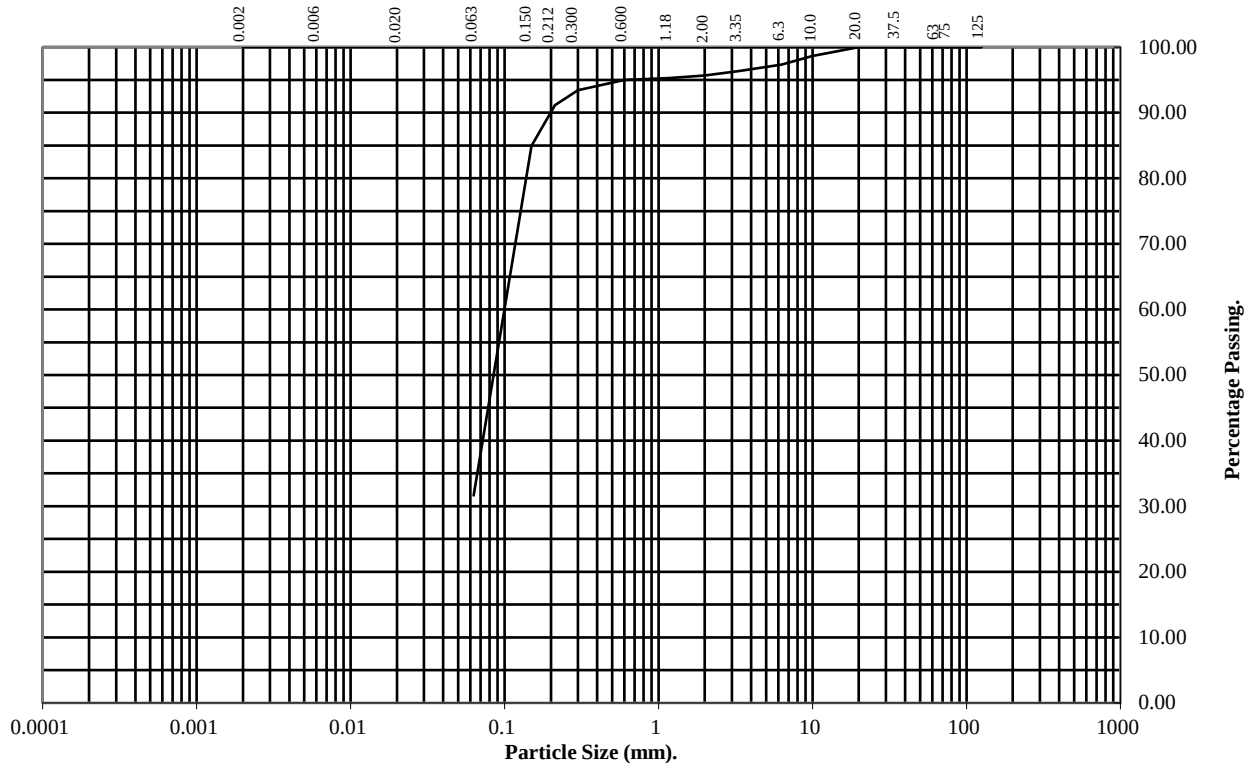
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH7 Top Depth (m): 1.00

Sample Number: Base Depth(m): 2.00

Sample Type: Bulk



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	99
6.3	97
3.35	96
2	96
1.18	95
0.6	95
0.3	93
0.212	91
0.15	85
0.063	32

Soil Fraction	Total Percentage
Cobbles	0
Gravel	4
Sand	64
Silt/Clay	32

Remarks:

See summary of soil descriptions.



Colt International

Contract No:
PSL17/0604
Client Ref:
A09913

PARTICLE SIZE DISTRIBUTION TEST

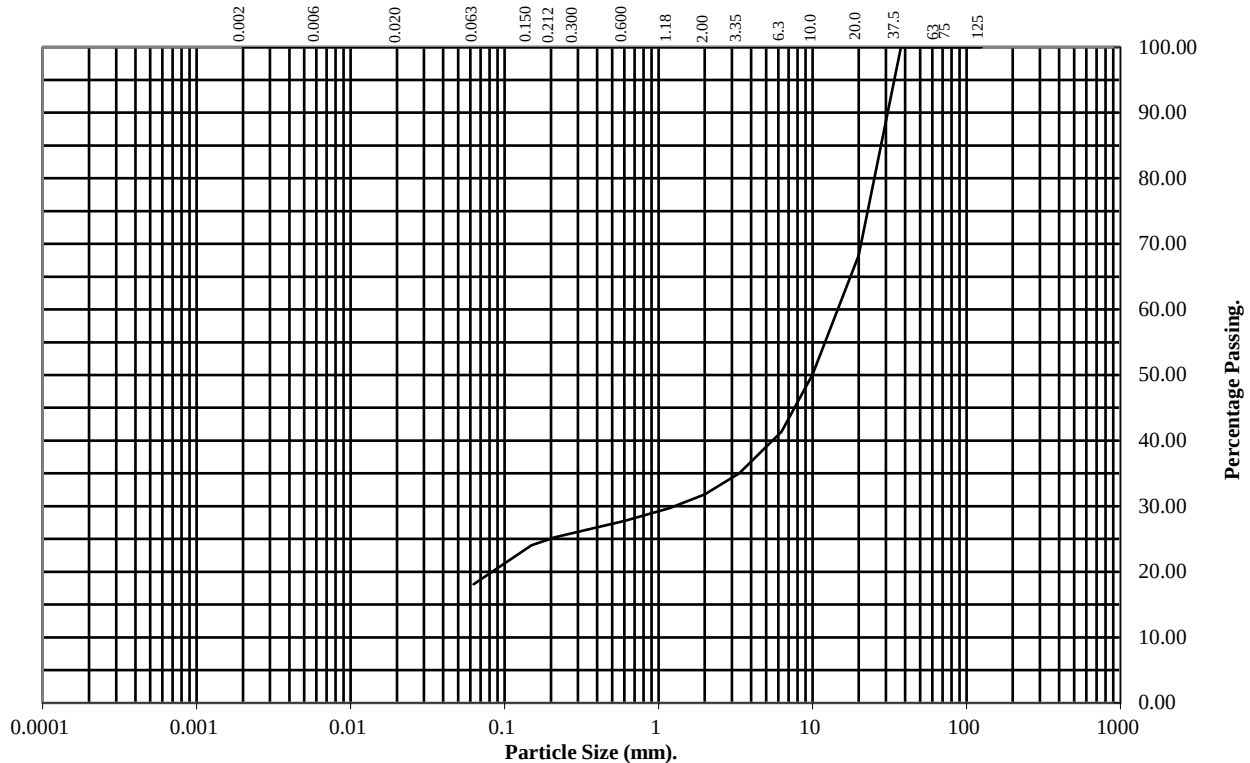
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH7 Top Depth (m): 2.00

Sample Number: Base Depth(m): 3.00

Sample Type: Bulk



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	68
10	50
6.3	41
3.35	35
2	32
1.18	30
0.6	28
0.3	26
0.212	25
0.15	24
0.063	18

Soil Fraction	Total Percentage
Cobbles	0
Gravel	68
Sand	14
Silt/Clay	18

Remarks:

See summary of soil descriptions.



Colt International

Contract No:
PSL17/0604
Client Ref:
A09913

PARTICLE SIZE DISTRIBUTION TEST

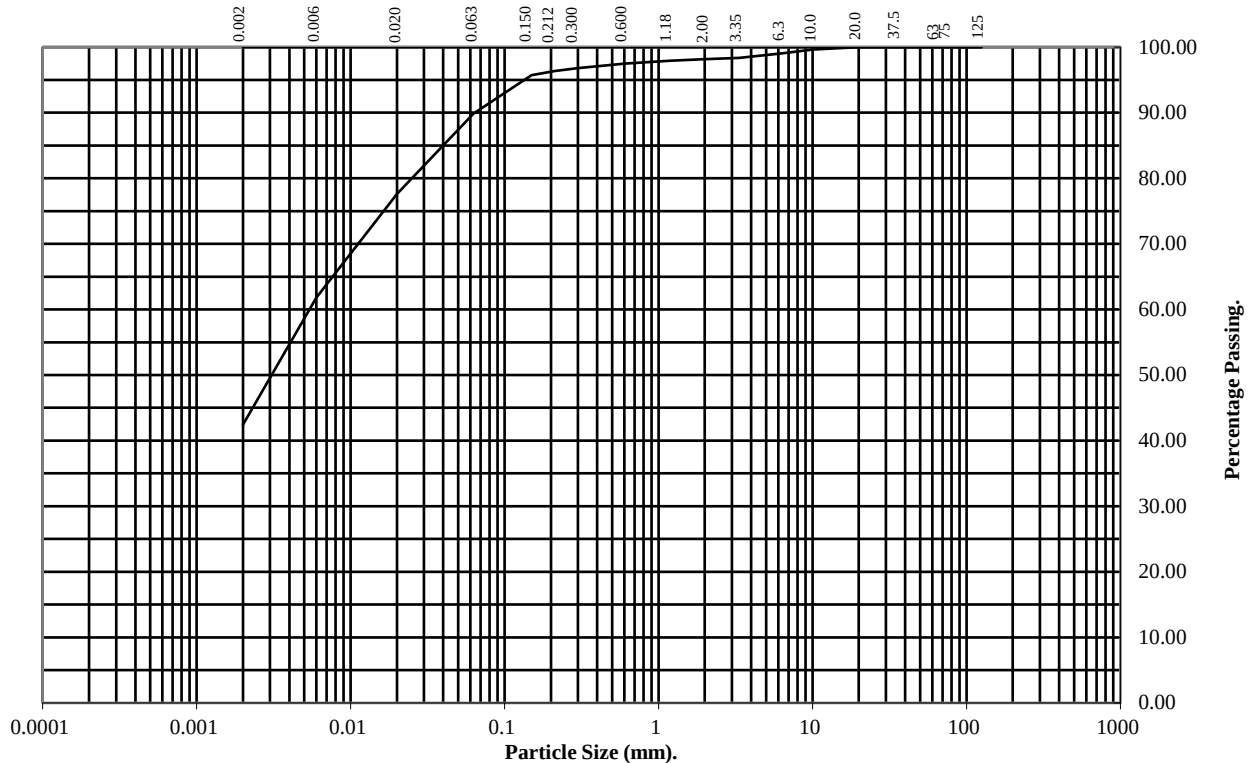
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: BH11 Top Depth (m): 2.00

Sample Number: Base Depth(m): 3.00

Sample Type: Bulk



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	98
2	98
1.18	98
0.6	97
0.3	97
0.212	96
0.15	96
0.063	90

Particle Diameter	Percentage Passing
0.02	78
0.006	62
0.002	42

Soil Fraction	Total Percentage
Cobbles	0
Gravel	2
Sand	8
Silt	48
Clay	42

Remarks:

See summary of soil descriptions.



Colt International

Contract No:
PSL17/0604
Client Ref:
A09913

PARTICLE SIZE DISTRIBUTION TEST

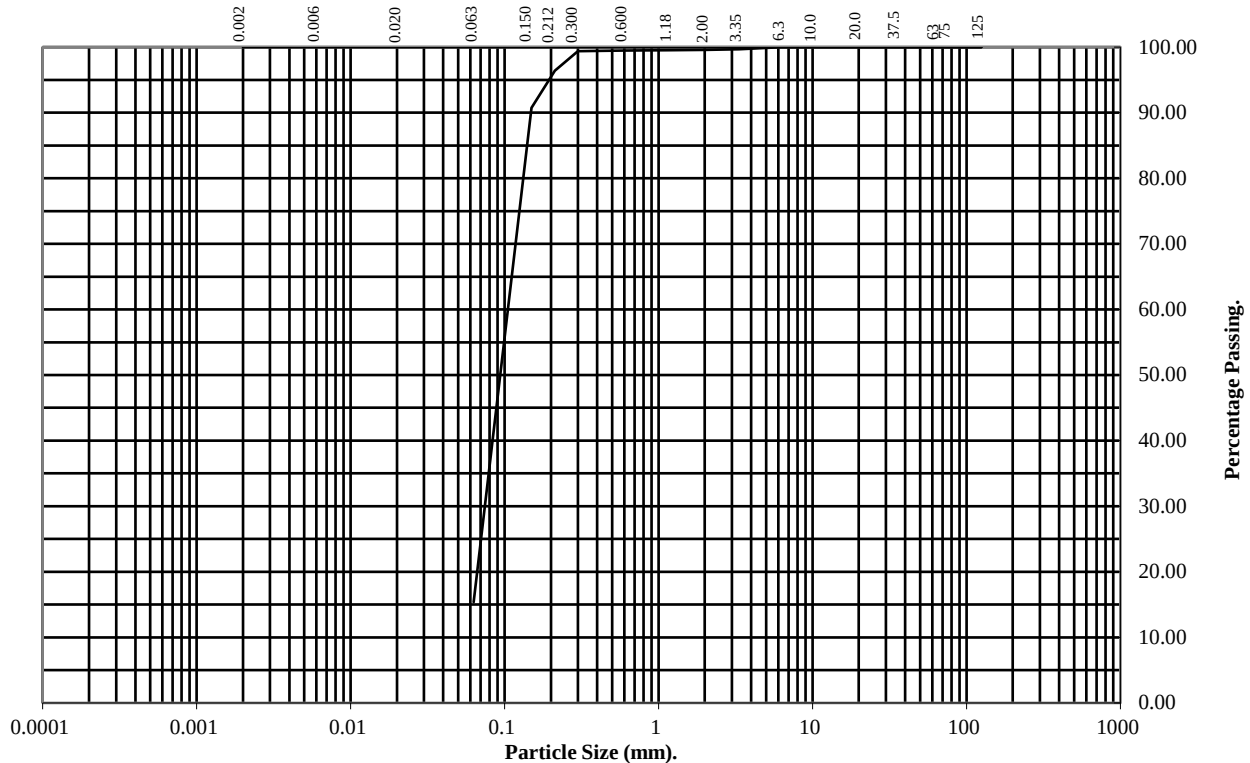
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH12 Top Depth (m): 2.00

Sample Number: Base Depth(m): 3.00

Sample Type: Bulk



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	100
0.6	99
0.3	99
0.212	96
0.15	91
0.063	15

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	85
Silt/Clay	15

Remarks:

See summary of soil descriptions.



Colt International

Contract No:
PSL17/0604
Client Ref:
A09913

PARTICLE SIZE DISTRIBUTION TEST

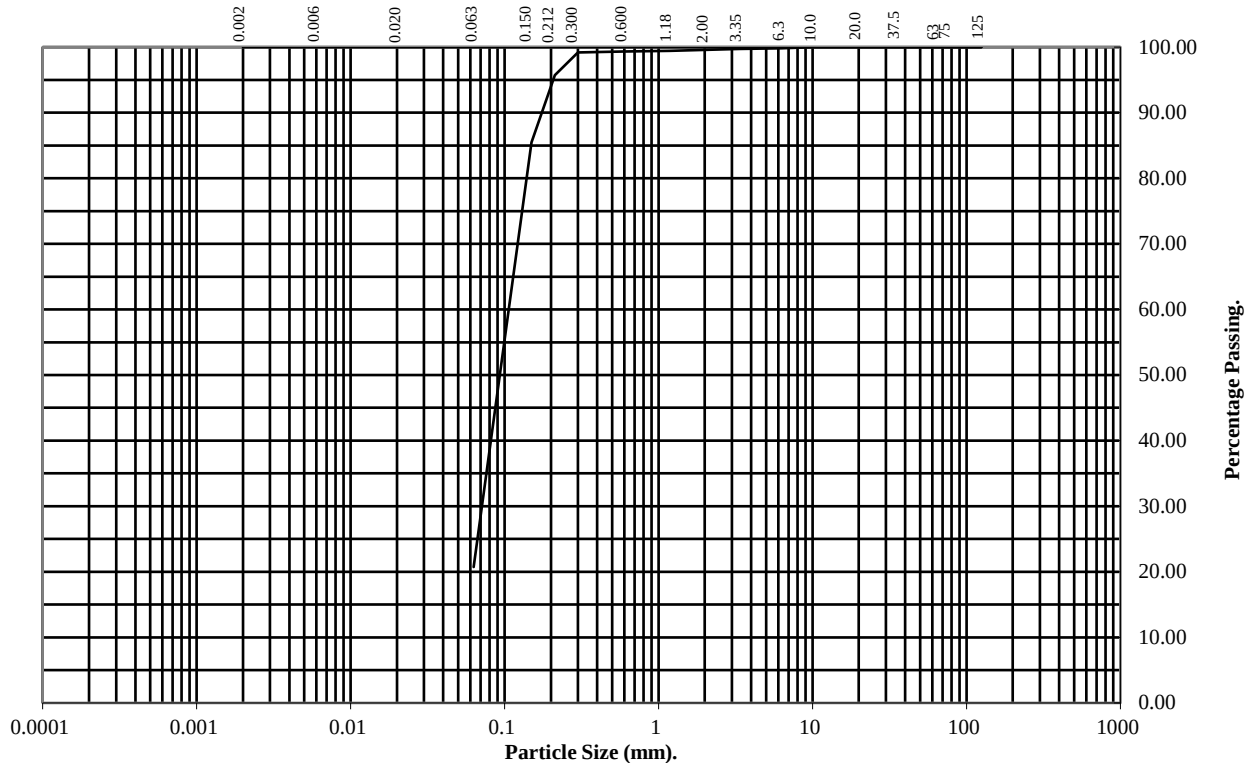
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BHI2 Top Depth (m): 0.60

Sample Number: Base Depth(m): 1.00

Sample Type: Bulk



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	99
0.3	99
0.212	96
0.15	85
0.063	21

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	79
Silt/Clay	21

Remarks:

See summary of soil descriptions.



Colt International

Contract No:
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A09913

PARTICLE SIZE DISTRIBUTION TEST

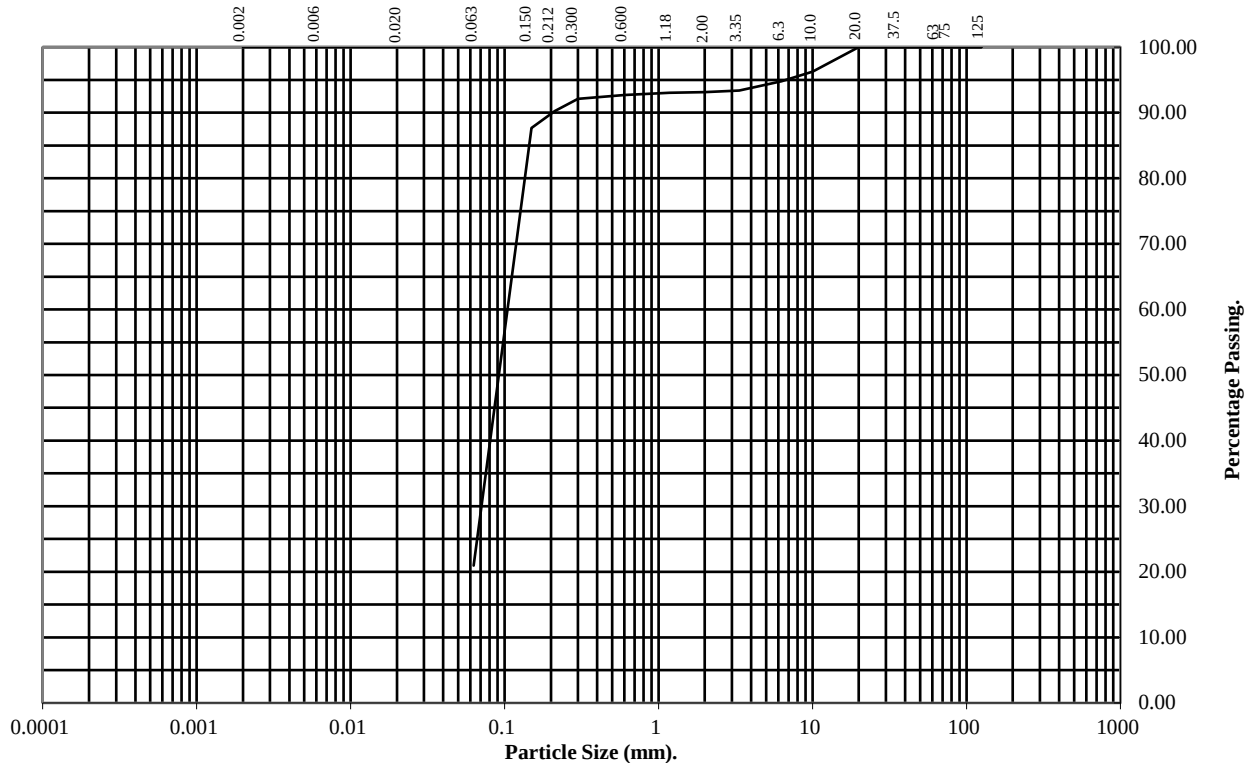
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BHI3 Top Depth (m): 0.50

Sample Number: Base Depth(m): 1.00

Sample Type: Bulk



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	96
6.3	95
3.35	93
2	93
1.18	93
0.6	93
0.3	92
0.212	90
0.15	88
0.063	21

Soil Fraction	Total Percentage
Cobbles	0
Gravel	7
Sand	72
Silt/Clay	21

Remarks:

See summary of soil descriptions.



Colt International

Contract No:
PSL17/0604
Client Ref:
A09913

PARTICLE SIZE DISTRIBUTION TEST

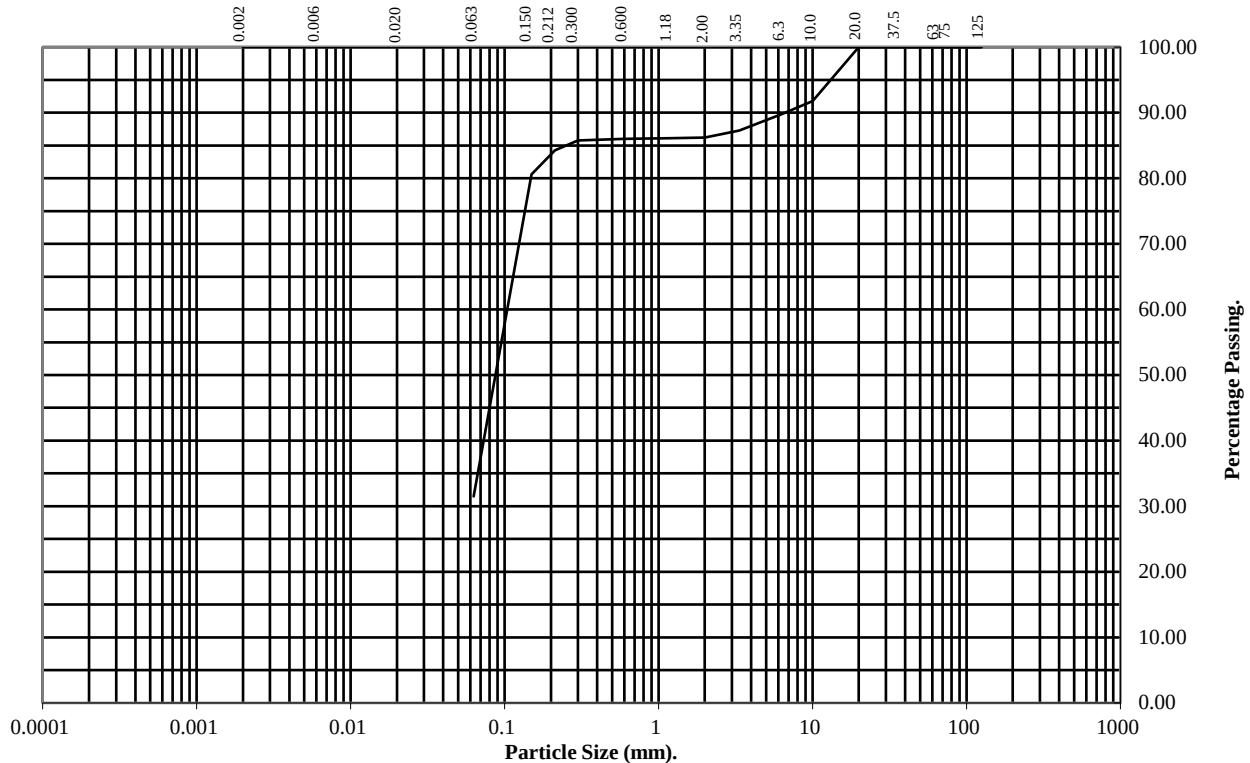
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BHI3 Top Depth (m): 2.00

Sample Number: Base Depth(m): 3.00

Sample Type: Bulk



BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	92
6.3	90
3.35	87
2	86
1.18	86
0.6	86
0.3	86
0.212	84
0.15	81
0.063	31

Soil Fraction	Total Percentage
Cobbles	0
Gravel	14
Sand	55
Silt/Clay	31

Remarks:

See summary of soil descriptions.



Colt International

Contract No:
PSL17/0604
Client Ref:
A09913



Certificate of Analysis

Certificate Number 17-91843

21-Feb-17

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 17-91843

Client Reference PSL17/0604

Order No (not supplied)

Contract Title Colt International

Description 6 Soil samples.

Date Received 16-Feb-17

Date Started 16-Feb-17

Date Completed 21-Feb-17

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

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

Approved By

Rob Brown
Business Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 17-91843

Client Ref PSL17/0604

Contract Title Colt International

Lab No	1128543	1128544	1128545	1128546	1128547	1128548
Sample ID	BH1	BH3	BH4	BH11	BH14	BH12
Depth	1.00-2.00	2.80-4.00	2.30-3.00	2.00-3.00	3.00-4.00	2.80-4.00
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Metals									
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10	< 10	< 10	< 10	< 10	< 10
Inorganics									
pH	DETSC 2008#			8.8	8.4	8.3	8.1	8.0	8.1
Chloride Aqueous Extract	DETSC 2055	1	mg/l	18	35	18	7.1	17	3.9
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	< 1.0	< 1.0	1.2	< 1.0	2.4	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	31	120	41	16	81	120

Information in Support of the Analytical Results

Our Ref 17-91843
 Client Ref PSL17/0604
 Contract Colt International

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1128543	BH1 1.00-2.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1128544	BH3 2.80-4.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1128545	BH4 2.30-3.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1128546	BH11 2.00-3.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1128547	BH14 3.00-4.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1128548	BH12 2.80-4.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

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

Soil Analysis Notes

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

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

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

Disposal

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

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



Appendix I – Risk Assessment Methodology



Qualitative Risk Assessment Approach

This qualitative risk assessment has been undertaken in accordance with CIRIA C552: Contaminated Land Risk Assessment, A Guide to Good Practice (Rudland et al., 2001). The CIRIA C552 risk categories and the assessment methodology are detailed in the following Table F1.

Table F1 Definition of Magnitude of Consequence.

Category	Definition
Severe	Acute risks to human health, catastrophic damage to buildings/property, major pollution of controlled waters.
Medium	Chronic risk to human health, pollution of sensitive controlled waters, significant effects on sensitive ecosystems or species, significant damage to buildings or structures.
Mild	Pollution of non sensitive waters, minor damage to buildings or structures.
Minor	Requirement for protective equipment during site works to mitigate health effects, damage to non sensitive ecosystems or species.

The likelihood of an event (probability) takes into account both the presence of the hazard and target and the integrity of the pathway and has been assessed based on the categories given in Table F.2 below.

**Table F.2 Definition of Probability of Exposure.**

Category	Definition
High Likelihood	Pollutant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor.
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term.
Low Likelihood	Pollutant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so.
Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable.

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the matrix presented in Table F.3 below, in order to give a level of risk for each potential hazard.

Table F.3 Risk Assessment Matrix.

		Potential Severity			
		Severe	Medium	Mild	Minor
Probability of Risk	High Likelihood	Very High	High	Moderate	Low / Moderate
	Likely	High	Moderate	Low / Moderate	Low
	Low Likelihood	Moderate	Low / Moderate	Low	Very Low
	Unlikely	Low / Moderate	Low	Very Low	Very Low

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