

CampbellReith
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Former Colt International

Updated GQRA and Outline Remediation Strategy

For

Homes England

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Contents

1.0 EXECUTIVE SUMMARY 3
2.0 Introduction 5
2.1. Appointment and Scope 5
2.2. Proposed Development & Planning 5
2.3. Previous Reports 7
3.0 Site Description and Environmental Setting 8
3.1. Summary 8
3.2. Site Location & Description 8
3.3. Geology 8
3.4. Hydrogeology 9
3.5. Hydrology 11
3.6. Previous Assessment Findings 11
4.0 Preliminary Conceptual Site Model 14
4.1. Introduction 14
4.2. Classification of Risk 14
4.3. Potential Sources of Contamination 14
4.4. Receptors and Exposure Pathways 15
4.5. Previous Investigation and GQRA findings 16
4.6. Requirements of the Supplementary Ground Investigation 18
5.0 Supplementary Site Investigation & Ground conditions 19
5.1. Scope of work 19
5.2. Investigation Summary 19
5.3. Ground Conditions Encountered 19
6.0 Generic Quantitative Risk Assessment 22
6.1. Assessment Framework 22
6.2. Soils 23
6.3. Asbestos 28
6.4. Ground Gas 28
6.5. Controlled Waters – Principal Aquifer Chalk at depth 30
6.6. Controlled Waters - Surface Waters 30
7.0 Revised Conceptual Site Model 32
8.0 Conclusions 35
8.1. Summary of Sensitivity 35
8.2. Summary of Contamination 35
8.3. Summary of Recommendations 35
9.0 Outline Remediation Strategy 38
9.2. Approvals 38
9.3. Human health exposure to shallow soils - Cover System 38
9.4. Surface water risk from shallow groundwater - Source Removal and Monitoring 38
9.5. Unforeseen Contamination – Watching brief during slab removal 39
9.6. Remediation and Verification Control Documents 39
ENVIRONMENTAL RISK ASSESSMENT SUPPORTING INFORMATION 40
LIMITATIONS 46

Appendices

Appendix A: Figures
Appendix B: Site Photographs
Appendix C: Site Investigation Information

1.0 EXECUTIVE SUMMARY

SITE LOCATION & PROPOSED DEVELOPMENT	The site is located at the northern end of New Lane, Havant, PO9 2LZ. The proposed development is for residential use in the centre and the west of the site. The east of the site is proposed for employment use. The detailed layout has not yet been determined.
ENVIRONMENTAL SETTING	The site is underlain by made ground over superficial Head Deposits which are geologically mapped as 'variable head' along the centre of the site and gravelly head in the east. The superficials overly London Clay Formation, which directly outcrops in the western car park. The Bognor Sand Member has been identified in the west of the site between 5.5m and 11.5m bgl, although not identified in the centre of the site. Cohesive London Clay is present in excess of 6m below the Bognor Sand. The site has an open drain and culvert which discharges to the River Lavant immediately south east of the site. • Hydrogeology – Low/ moderate sensitivity • Hydrology – Moderate/ High sensitivity, the River Lavant is very close to the site, however the River is channelised, reducing this sensitivity. • End users – High sensitivity
CONTAMINATION ISSUES	Risk Summary: • End Users. A **High** risk has been identified associated with concentrations of lead, polycyclic aromatic hydrocarbons and asbestos in shallow soils. • Groundwater. A **Very Low** risk has been identified due to the London Clay acting as an aquitard preventing shallow groundwater affecting the aquifer at depth. Should piling be proposed a piling risk assessment should be conducted. • Surface Water. A **Low/ Moderate** risk has been identified due to identified hydrocarbon contamination in shallow soils in the south east of the site. Although no impact to the River has been identified to date. • Ground Gas. The site has been classified as a CIRIA Characteristic Situation 1 (CS1), however elevated concentrations of methane and carbon dioxide require local consideration of increasing to characteristic situation 2. • Services. Made ground has hydrocarbon contamination which should be assessed for the potential requirement for protective water supply pipework. • Groundworks. A **Low/ moderate** risk has been identified based on the assumption that basic health and safety provisions are in place. Additional assessments with regard to asbestos in soils may be required.
RECOMMENDATIONS	**Soils –** A cover system, appropriate for the proposed use should be installed in areas of soft landscaping. **Ground gas –** Although the bulk of ground gas monitoring suggest that ground gas protection is not required (CS1), an increased classification (to CS2) is required in certain areas due to localised elevated carbon dioxide and methane concentrations encountered during monitoring. **Surface Water –** It is considered that there is a theoretical pollutant linkage between shallow groundwater on the site and the River Lavant. In the south east of the site a small area of odorous soils may present a risk.

OUTLINE REMEDIATION STRATEGY	**Human health exposure:** a cover system is recommended in order to mitigate the potential risks to end users from shallow soils. The depth and validation criteria should be determined with regard to the detailed layout when available. This should be submitted to and approved by the Local Planning Authority. **Surface water risk:** Although it has been shown that no discernible effect on the River Lavant, it is considered that there is a theoretical risk to surface waters from the odours soils in the location of TP 202. It is recommended that localised source removal is conducted in the location of TP 202 and groundwater monitoring wells are installed between TP 202 and the river Lavant. The requirements of the monitoring should be agreed with the Local Planning Authority. **Unforeseen Contamination:** A watching brief for unforeseen contamination during slab removal is recommended. This is recommended to be conducted on a grid basis, where inspections should be made and evidence of unforeseen contamination should be investigated and remediated as required.
Approvals	A detailed remediation method statement will be conducted by the enabling works contractor with regard to controlled waters remediation. This will require submission and approval by the Local Planning Authority and consultees where appropriate.

2.0 INTRODUCTION

2.1. Appointment and Scope

2.1.1. This report has been produced by CampbellReith on behalf of Homes England to provide an updated Generic Quantitative Risk Assessment (GQRA) and Outline Remediation Strategy for the former Colt International Premises. Figures showing the location of the site and the development proposals are presented in Appendix A.

2.1.2. This report is intended to also discharge parts 1 and 2 of condition 8 associated with consent reference APP/18/00244.

2.1.3. The report has been produced in general accordance with the procedures for ground investigation, interpretation and reporting set out in DEFRA Contaminated Land Report (CLR) 11, BS 5930:2015 and BS 10175:2011 (+A2:2017). The objective of the report is to summarise the previous desktop study and phase 2 report, present and assess additional ground investigation data and establish an outline remediation strategy for the identified risks. This includes:

a) a preliminary conceptual model for the site ground conditions (soil, water and gas), based on previous assessments

b) an updated generic quantitative risk assessment (human health, controlled waters and gas) based on the recent investigation and previous assessments

c) revised conceptual site model & risk summary

d) outline recommendations for the required remediation strategy such that identified risks can be mitigated once the detailed proposals are finalised

2.2. Proposed Development & Planning

2.2.1. The proposed development is shown on Figure 4. At the time of writing outline planning consent had been granted (APP/18/00244). This comprises up to 100 homes across the centre and west of the site and 2860m^2 of employment space next to New Lane in the east of the site.

2.2.2. The previously issued Desktop Study and Phase 2 Interpretative Report as noted in Table 2.1 were submitted and reviewed as part of the planning submission. The planning conditions relating to contamination issues are repeated verbatim below:

8. Prior to the commencement of any specific phase of development hereby approved by this planning permission (or such other date or stage in development as may be agreed in writing with the Local Planning Authority) a remediation strategy to deal with the risks associated with contamination of the site has been submitted to, and approved in writing by, the Local Planning Authority. This strategy will include the following components:

1. A preliminary risk assessment which has identified:

- all previous uses
- potential contaminants associated with those uses
- a conceptual model of the site indicating sources, pathways and receptors

- potentially unacceptable risks arising from contamination at the site

2. A site investigation scheme, based on (1) to provide information for a detailed assessment of the risk to all receptors that may be affected, including those off site.

3. The results of the site investigation and the detailed risk assessment referred to in (2) and, based on these, an options appraisal and remediation strategy giving full details of the remediation measures required and how they are to be undertaken.

4. A verification plan providing details of the data that will be collected in order to demonstrate that the works set out in the remediation strategy in (3) are complete and identifying any requirements for longer-term monitoring of pollutant linkages, maintenance, relevant triggers and arrangements for contingency action (a "long-term monitoring and maintenance plan").

Any changes to these components require the written consent of the local planning authority. The scheme shall be implemented as approved.

Reason: Having due regard to policies DM10 of the Havant Borough Adopted Core Strategy (2011) and DM17 of the Havant Borough Local Plan (Allocations) [2014) and the National Planning Policy Framework, contamination may be present at the site as a result of both previous land uses (& /or activities) in areas of the site that have not previously been subject to investigation, that could pose a risk to future residential occupants, to buildings and to controlled waters.

The applicants 'Ground Investigation Report' (reference A090070-182) has identified potential sources of contamination at the site requiring further investigation once the site is fully assessable. This is needed in order to confirm whether any contamination present poses a risk to groundwater in the chalk aquifer underlying the site and whether remediation is required. The site is located in the groundwater Source Protection Zone 1c for the Bedhampton and Havant Springs. Public drinking water supplies may be at risk from contamination at the site.

2.2.3. This report seeks to obtain partial discharge of Condition 8 to allowing the enabling works as defined in informatives 23 and 24. Parts 1 and 2 are considered to be suitable for full discharge by way of this report and the previous reports summarised in Table 2.1.

2.2.4. This report is intended to comprise an outline remediation strategy, outlining the mitigation measures required with regard to controlled waters, therefore allowing the removal of the floors slabs.

2.2.5. The detailed design of mitigation measures and verification plan required for the protection of human health however will be designed by the developer, which will require submission and approval by the Local Planning Authority.

2.3. Previous Reports

2.3.1. Table 2.1 details the two previous reports submitted with the outline planning application.

Report Title	Author	Job Code	Report Reference
Phase I Geo-environmental Assessment November 2016	WYG	A099913	1
Colt International, Havant Ground Investigation and Assessment April 2017	WYG	A090070-182	2

Table 2.1: Previous Land Quality Assessments

2.3.2. The data and conclusions of the above reports have been referenced throughout this report. The data has been included in the GQRA for human health, gas assessment and controlled waters GQRA.

3.0 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

3.1. Summary

3.1.1. The following section summarises the site's environmental setting, including summarising the findings of the WYG Desktop Study [1] and Phase 2 Interpretative Report [2]. For full details of the desktop study and previous GQRA the original reports should be referred to.

3.2. Site Location & Description

3.2.1. The site is the former Colt International Office and Factory. The site is located at address New Lane, Havant, PO9 2LZ, approximate grid reference 472601, 108011.

3.2.2. The site is flanked to the north by Bartons Road, to the east by New Lane and to the west by Martin Road. To the south of the site are other light industrial uses including a precision tools machining shop and a plant hire depot.

3.2.3. The buildings on the site have been demolished to slab level. The substation on the site has been retained. An open monsoon drain passes across the site from north to south before entering a culvert along the south boundary of the site. A site layout plan in shown on Figure 2.

3.3. Geology

3.3.1. With reference to BGS 1:50,000 series mapping, the site is shown to be directly underlain London Clay in the west of the site, head deposits overly London Clay in the centre and east of the site. The Head Deposits are differentiated into variable head deposits in the centre of the site and gravelly head deposits in the east of the site.

3.3.2. The London Clay Formation, overlies the Lambeth Group (Reading Formation) which in turn overlies the Upper Chalk. The Bognor Sand Member is shown on mapping approximately 500m to the north of the site and 200m west of the site. The Bognor Sand is shown to lie stratigraphically within the London Clay Formation of up to 10m thickness.

3.3.3. Given the orientation and proximity of the Chichester Syncline and strata shown on mapping to be dipping to the south, it is expected that the Bognor Sand Member may be present beneath the site, possibly at shallow depth.

3.3.4. The strip of head deposits in the centre of the site are described as variable deposits of sandy silty clay, locally gravelly, chalky and flinty on dry valleys. The gravelly head deposits mapped along the east of the site is described as Head Gravel, Clayey Gravel.

3.3.5. The London Clay is described as a bioturbated, poorly laminated, blue grey or grey brown, slightly calcareous silty to very silty clay, clayey silt and sometimes silt, with some layers of sandy clay.

3.3.6. The Bognor Sand Member within the London Clay Formation is described as a Glauconitic fine to medium grained sand partially cemented.

3.3.7. The Lambeth Group (Reading Formation) is described as being mainly clay, some silty or sandy, with some sands and gravels, minor limestones and lignites and occasional sandstone and conglomerate.

3.3.8. A BGS borehole record 1.6km south west of the site noted River Drift deposits to 5.2m bgl, London Clay Formation from 5.2 to 41.1m bgl, Lambeth Group 41.8 to 80.5m bgl over the Upper chalk from 80.3m bgl to unproven depth.

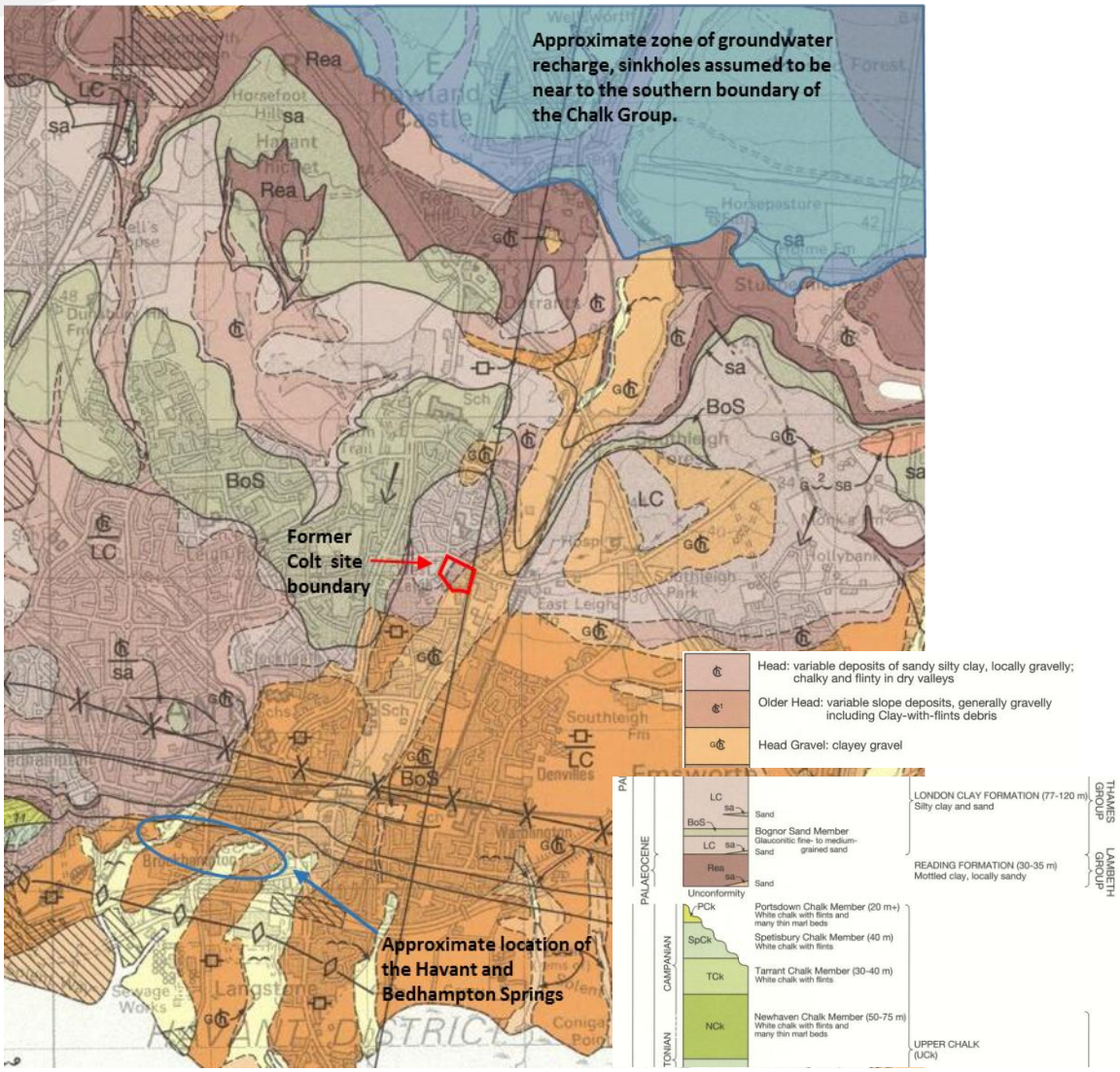


Figure 3.1: Annotated excerpt from British Geological Survey, map sheet 316, Fareham, including selective extracts from the stratigraphy (Contains British Geological Survey materials © NERC 2019).

3.4. Hydrogeology

3.4.1. The Head Deposits described as 'variable' in the centre of the site are classified as a Secondary Undifferentiated Aquifer and the gravelly Head Deposits in the east of the site is classified as a Secondary A Aquifer. The London Clay Formation is classified unproductive strata, the Lambeth Group (Reading Formation) is classified as a Secondary A Aquifer and Upper Chalk is classified as a Principal Aquifer. The Bognor Sand Member within the London Clay is classified as a Secondary A Aquifer.

3.4.2. The site is located in a source protection zone (SPZ) 1c, subsurface activity only. This is defined by the Environment Agency as; 'extends Zone 1 where the aquifer is confined and may be impacted by deep drilling activities'.

3.4.3. Specifically the subsurface SPZ is associated with the Bedhampton and Havant Springs which are used as an important source of drinking water by Portsmouth Water. It is understood that

groundwater recharge from the south downs passes through the chalk and understood to emerge in springs east of Bedhampton, immediately north of the A27.

3.4.4. Shown on Figure 3.1 is an indication of the site location in the centre of the excerpt. The shaded area in the north of the excerpt is an assumed area of groundwater recharge, closest to, and most likely to pass beneath the site on its flow path to the Havant and Bedhampton Springs.

3.4.5. The recharge area of the South Downs and the emergence zone to the south of Havant are classified as SPZ 1 and located within a Drinking Water Safeguard Zone (Groundwater).

3.4.6. The shortest distance from the site, to the surface SPZ 1 assumed to be associated with the springs is 1.8 km south. An excerpt from the Envirocheck Report is provided below showing the source protection zones.

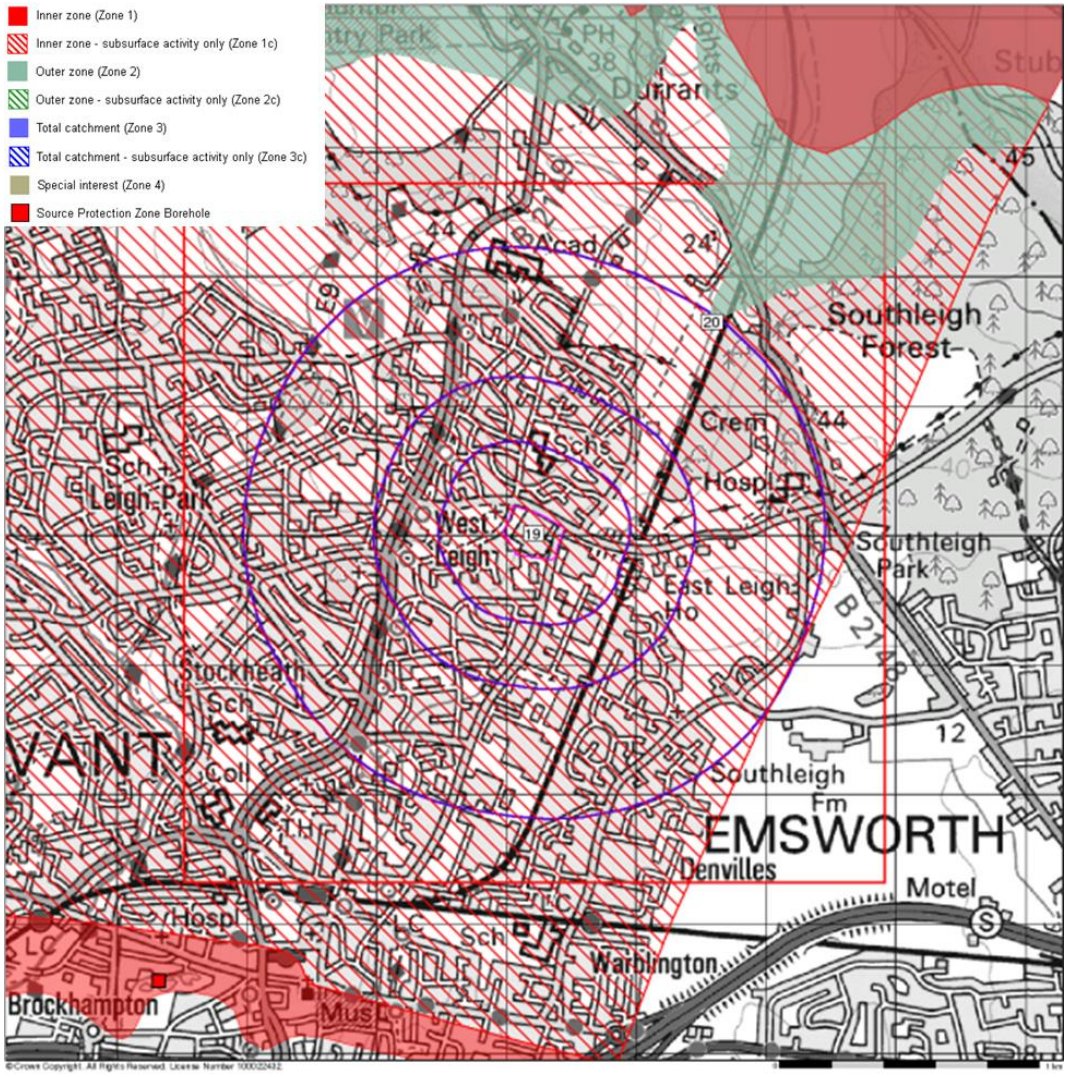


Figure 3.2: Excerpt from the Envirocheck Report showing the site's setting in proximity of various source protection zones relating to the site.

3.4.7. The site is expected to be underlain by the London Clay Formation, situated below made ground and Head Deposits (superficial deposits). The London Clay is expected to provide a level of protection to the Principal Aquifer and subsurface SPZ 1 in the Chalk.

3.4.8. The head deposits mapped on site (Secondary Undifferentiated and Secondary A) are shown to be partially present providing a chance of hydraulic continuity between the site and the surface

SPZ 1 in the south of the site. However the significant distance between the site and the SPZ 1 indicates that the superficial deposits would not typically be considered highly sensitive with regard to hydrogeological receptors.

3.4.9. The Bognor Sand Member is not mapped as outcropping on the site, however if present and outcropping, it may present a theoretical pathway from the site, beneath the Chichester Syncline to emerge at the Havant and Bedhampton Spring area. This formation is not however considered to be primary source of the water emerging from the spring due to the fact that there is not an associated SPZ with the Bognor Sand Formation.

3.4.10. The London Clay which is mapped on the site is considered likely to provide a level of protection to the principal aquifer at depth which is known to be the primary source of the spring water emerging at the Havant and Bedhampton Springs.

3.4.11. Based on the discussion above, the hydrogeological sensitivity of the site is **Low/ Moderate**. The London Clay Formation's depth should be proven to demonstrate the absence of a pathway between the site and the Principal Aquifer at depth.

3.5. Hydrology

3.5.1. There is a 'monsoon drain' on the site which originates in the north of the site, passes south along an open concrete lined channel before entering a culvert on the site, which runs along the south of the site, directly discharging to the River Lavant to the east of the site. The River Lavant passes across the east of the site in a north-south orientation, flowing south as shown on Figure 1 and 2.

3.5.2. The River Lavant is noted to have a River Quality A and is classified as a 'main river' by the EA, it later discharges to Langstone Harbour.

3.5.3. Although the River Lavant is generally noted as a high quality river, the flow has been observed to be low, the base of river is concrete and the banks are engineered with paving slabs protecting the banks along the length of the river where it passes near the South East the site. Generally the river is not naturalised in proximity to the site.

3.5.4. Photos 1 to 4 included in Appendix B show the River Lavant where it passes below New Lane and where the Monsoon Drain outfalls.

3.5.5. The hydrological sensitivity of the site is **Moderate/High.**

3.6. Previous Assessment Findings

3.6.1. The WYG ground investigation was limited to shallow windowless sampler boreholes located around the outskirts of the site. They progressed to a maximum depth of 4m bgl.

General Investigation Coverage & Findings

3.6.2. An initial phase of ground investigation comprised 13 no. windowless sampler boreholes spread around the perimeter of the site. The investigation locations were predominantly shallow investigation locations not exceeding 5m bgl investigation depth.

3.6.3. Made Ground was typically found to be around 1m deep, in isolated locations it was found to be 1.5m to 2m deep (BH5 and BH7).

3.6.4. No significant observations of contamination were encountered in the windowless samplers progressed in this phase of investigation. Visual observations were limited to instances of ash, mixed aggregate and wood.

3.6.5. The Head deposits encountered on the site were previously found to be a maximum thickness of >2.7 bgl at 4m bgl.

3.6.6. London Clay was recorded as present at shallow depth in the west of the site and often not encountered in investigation locations in the east of the site.

Human Health Assessment

3.6.7. A generic quantitative risk assessment was conducted for human health where a high risk to end users was concluded. This was due to exceedances of residential with plant uptake screening criteria. No statistical assessment was made. In addition minor detections of asbestos in soils were found in made ground.

Ground Gas Assessment

3.6.8. Minor elevated concentrations of carbon dioxide (2.5%) and methane (0.9%). Combining the worst case gas concentration and highest flow rate, the result was characteristic situation 1 where the risk is considered low, and ground gas protection measures are not required. However only two ground gas monitoring rounds were conducted.

Controlled waters Assessment

3.6.9. Minor exceedances of the Environmental Quality Standards (EQS) and Drinking Water Standards (DWS) were found in leachate tests and groundwater samples.

3.6.10. The principal aquifer Chalk Group at depth is a high sensitivity aquifer. Although there are exceedances of drinking water standards in shallow groundwater, it is likely protected by the low permeability London Clay severing the pathway.

3.6.11. The River Lavant is also noted as a sensitive receptor, and detections of metals and polycyclic aromatic hydrocarbons exceeded the EQS, however no contaminants of concern detected in the River Lavant or the monsoon drain and therefore the risk was considered Low.

Recommendations

3.6.12. General recommendations were to increase the coverage of investigation locations by investigating within the building footprint and by progressing deeper boreholes to prove the depth of London Clay and thereby prove its effectiveness as an aquitard overlying the Lambeth Group and Chalk.

3.6.13. It was noted that it may be appropriate to delineate shallow sources identified in the vicinity of BH2, BH4, BH5, BH12 and BH14 with regard to the elevated concentrations encountered in these locations. It is not specified in the report which pollutant linkage drives the requirement for further investigation in these locations, nor was visual evidence of contamination identified on borehole logs.

3.6.14. It was acknowledged that the above ground tank to the south of the site may have redundant pipework in the ground which will require removal.

Potential Remediation Requirements

3.6.15. It was identified that shallow soils exposure to human health receptors would require some form of remediation or cover system of validated soils.

4.0 PRELIMINARY CONCEPTUAL SITE MODEL

4.1. Introduction

4.1.1. Current practice for land contamination evaluation involves classification of risk for each of the identified contaminant source-pathway-receptor pollutant linkages. These are summarised below, considering the desk study information and the previous phase 2 report. This information has been utilised to design the site investigation considering the proposed end use.

4.2. Classification of Risk

4.2.1. Risk is defined by the combination of two factors: i) the probability of an occurrence (expressed as a likelihood); and ii) the consequence of it happening (expressed as a severity). The procedure for classifying risk is summarised in Table 4.1. The categories of risk have been based upon those defined in the Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D66: 2008 Volume 1 (Environment Agency, NHBC and CIEH). The categories are defined in the Environmental Risk Assessment Supporting Information section to the rear of this report, together with definitions of the classifications of probability and consequence.

Probability (Likelihood)		Consequence			
		Severe	Medium	Mild	Minor
	High likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

Table 4.1: Classification of Risk

4.3. Potential Sources of Contamination

4.3.1. Table 4.2 summarises the potential contamination sources that have been identified on or near the site in the previous reports. Although demolition has progressed, no further potential sources of contamination have been identified furthermore some of the identified sources of contamination said to require investigation, are no longer identifiable.

Feature on or near site	Potential Contaminant
Former above ground diesel storage tank, below ground pipework is understood to remain in place.	H
Oil powered heaters in the former buildings reported to have been fed by above ground pipework (location unknown).	H
Unforeseen contamination below slabs.	ACM, H.
Electrical substation	PCB

Feature on or near site	Potential Contaminant
Notes: M – Metals. H – Hydrocarbons. VOC – Volatile Organic Compounds. ACM – Asbestos containing Materials. PCB – Polychlorinated biphenyls, GG – Ground Gases.	

Table 4.2: Potential Sources of Contamination

4.3.2. Various sources of contamination have been identified in the table above which have been previously investigated.

4.3.3. The former tank and electrical substation were investigated as part of previous investigation works and not considered to have caused significant contamination.

4.3.4. The investigation conducted in 2018 and presented in this report consider the potential unforeseen contamination below floor slabs.

4.4. Receptors and Exposure Pathways

4.4.1. Potential risks have been identified based on the proposed site use, the receptors and potential pathways by which the receptor/s may be exposed to the contaminant source/s. These are presented in Table 4.3 and have been used to inform the supplementary site investigation.

4.4.2. The table below, is in line with the previous conceptual site model as presented in the WYG report [2]. Additional discussion of the potential pollutant linkages is presented in this section with regard to controlled waters.

Receptor	Pathway	Risk
End Users	Ingestion of soil/dust	High
Neighbours		Low
Construction Workers		High*
End Users	Inhalation of soil/dust	High
Neighbours		Low
Construction Workers		High*
End Users	Dermal contact with soil/dust/water	High
Neighbours		Low
Construction Workers		Low*
End Users	Inhalation of vapour from soil/dust	Low
Neighbours		Low
Construction Workers		Low*
End Users	Consumption of vegetables/plants	High
End Users	Migration of soil gases to confined spaces/structures	Low
Construction Workers		Low
Building		Low
End Users	Inhalation of vapour from groundwater	Low
Neighbours		Low
Construction Workers		Low

Receptor	Pathway	Risk
Surface Waters	Migration of water borne contaminants from on site	Moderate – minor detections of PAHs in shallow groundwater and leachate results may present a risk to the River Lavant to the south east of the site.
Groundwater Aquifer	Migration of water borne contamination from on-site	Moderate - only if there is a pathway from shallow made ground to the principal aquifer at depth. The Bognor Sand Member may be present on the site which may present a potential pathway for contamination to reach the underlying Principal Aquifer at depth.
End Users	Movement of contaminants to engineered structures (water pipes)	Moderate

Table 4.3: Receptors Pollutant Linkages

* Basic health and safety measures should be applied during the construction phase, this would reduce the previously concluded potential risk significantly.

4.5. Previous Investigation and GQRA findings

4.5.1. The conceptual site model presented in this section is consistent with the conceptual site model present in the desktop study [1] and phase 2 interpretative report [2].

4.5.2. In 2017 WYG conducted a ground investigation comprising windowless sampler boreholes in the external areas of the site. The investigation included soil and water sampling and testing. The following section summarises the previous risk assessment findings and a review of the recommendations.

Soils

4.5.3. Shallow soils across the site were screened in their entirety against residential with plant uptake scenario as a conservative measure. Exceedances of the screening criteria were identified for beryllium, lead, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(ah)anthracene and naphthalene. This, combined with three asbestos in soils detections of fibres and asbestos containing materials, resulted in a conclusion that end users were at a high risk of exposure to shallow soils on the site.

4.5.4. An investigation location near to the electrical substation, did not reveal the presence of polychlorinated biphenyls. Should be substation be moved, it is possible some form of contamination will be present below the location of the substation which will require localised remediation and a cover system.

4.5.5. Recommendations by WYG for mitigation of this risk are for placement of a cover layer of validated topsoil of a typical depth of 600mm to 1m of topsoil and subsoil. This assessment of risk and recommendation is considered broadly accurate.

4.5.6. Further assessment with regard to human health exposure to shallow soils has been conducted to incorporate the results from within the building footprint with the existing data set.

Ground Gas

4.5.7. Two ground gas monitoring visits were conducted, where concentrations and flow rates of carbon dioxide and methane were within the limit of characteristic situation 1. A very low risk, where protection measures are not required was concluded.

4.5.8. Further monitoring rounds have been conducted to supplement this data.

Controlled waters - Groundwater

4.5.9. Shallow installations and groundwater samples were obtained during the ground investigation and screened against drinking water standards due to the site overlying a principal aquifer. Exceedances of drinking water standards were noted for benzo(a)pyrene, dissolved selenium, Sum of 4 PAHs (benzo(b)fluoranthene, benzo(ghi)perylene, Benzo(k)fuoranthene and indeno(123cd)pyrene), sulphate, chloride and ammonia as nitrogen.

4.5.10. It was noted that although it is expected that the thickness of overlying London Clay provides protection to the Principal Aquifer at depth, this should be proven by a deep borehole.

Controlled waters – Surface water

4.5.11. The surface water assessment comprised the comparison of shallow groundwater samples and leachate preparations screened against EQSs. The exceedances of PAH compared to the EQS's presented in the WYG report are considered generally marginal with the exception of the location BH5. Fluoranthene in groundwater from BH5 exceeded the screening criteria by a number of orders of magnitude.

4.5.12. Total PAHs from BH5 during round 1 were 1.2µg/l. TPH and VOCs were below detection. Monitoring round 2 detected total PAHs at 8.3µg/l, but again TPH is below detection. BH5 and BH14 were not found during the 2018 ground investigation work and therefore have not been further monitored. Access during the demolition prevented replacement boreholes from being progressed in these locations.

4.5.13. Although a number of minor exceedances of the EQS's of PAHs and nickel in leachate and shallow groundwater were noted, no exceedances of the EQS's obtained from the actual River Lavant were noted and therefore a low risk was concluded. It is anecdotally known that the EHO considers that this risk may have been under estimated.

General recommendations

4.5.14. More generally, the coverage of the previous ground investigation was limited to the boundaries of the site and it was recommended that the coverage of the ground investigation should be improved by investigating below the building footprint.

4.5.15. The report recommends that locations BH1, BH5 and BH14 should be further investigated due to their exceedances of EQS criteria from leachate samples.

4.6. Requirements of the Supplementary Ground Investigation

4.6.1. Based on the results of the previous investigation, Table 4.4 details the pollutant linkages known to require further investigation.

Issue	Exploration
Potential contamination below the building footprint	General coverage.
Potential vertical migration of contamination from made ground into the principal aquifer at depth	15 to 20m deep cable percussive boreholes to prove the thickness of London Clay overlying the Principal Aquifer.
Investigate the potential pollutant linkage between contaminated shallow groundwater and the River Lavant	Investigation of previously identified groundwater contamination and leachate exceedances.

Table 4.4: Targeted Pollutant Linkages

5.0 SUPPLEMENTARY SITE INVESTIGATION & GROUND CONDITIONS

5.1. Scope of work

5.1.1. During the summer of 2018 supplementary ground investigation was conducted with the objective of addressing the recommendations of the WYG 2017 report [2] and the objectives noted in Table 4.4.

5.1.2. The ground investigation factual report should be consulted for full record of the ground investigation: Ground Investigation Factual Report, Colt International Havant, Harrisons Group Environmental Ltd, September 2018 [3] and is contained in Appendix C.

5.2. Investigation Summary

5.2.1. The ground investigation locations are shown on Figure 3 of this report. They comprised:

- Two cable percussive boreholes to a maximum depth of 17.5m bgl
- Seven windowless sampler boreholes to a maximum depth of 5.45m bgl
- Four hand dug pits to a maximum depth of 1.2m bgl
- Nine machine dug trial pits to a maximum depth of 3.1m bgl
- Four Groundwater and ground gas monitoring visits

5.3. Ground Conditions Encountered

5.3.1. The two deep cable percussive boreholes, were progressed to 12.5 and 17.5m bgl, both encountering Made Ground, overlying Superficial Deposits (head) (BH202 only) overlying London Clay to the base of the boreholes.

5.3.2. Nine exploratory locations (three windowless samplers, three trial pits and one cable percussive borehole) were progressed across the building footprint to provide additional coverage across the area previously not investigated.

5.3.3. Trial pits TP209, TP210 and TP211 were progressed into the bank to the west of the monsoon drain, with the intention of investigation the drainage, there were no visual observations of contamination in the bank.

5.3.4. Table 5.1 includes a summary of the general distribution of stratum including data from the previous WYG investigation from 2017 and the Harrisons Group Environmental investigation from 2018. Although WYG did not survey the locations, therefore the m AOD levels are provided for data which was obtained by Harrisons Group Environmental only.

Stratum	Maximum bottom Depth (m BGL)	Maximum Bottom Depth (m AOD)	Thickness Range (m)	Description
Made Ground	2.m		0.4 – 2.0	Typically gravelly clay or clayey sand, with occasional gravel of brick, concrete, glass, chalk and charcoal. Below former buildings pea gravel is present, understood to be associated with a land drainage system.

Stratum	Maximum bottom Depth (m BGL)	Maximum Bottom Depth (m AOD)	Thickness Range (m)	Description
Superficial Deposits – Head (both the 'variable' head & gravelly head)	>3	15.89	1.3 - >3	Not found to be present on the western car park. Firm blueish grey mottled orangish brown slightly gravelly clay. Occasionally very gravelly, occasionally sand, typically in the centre and west of the site. Various investigation locations refused on dense gravels understood to be the gravelly head deposits.
Bedrock – London Clay Formation	17.50	7.58	>12.5	Brown and grey clay/ dark grey clay, occasionally gravelly with flint gravel. Bognor Sand present between 4.5 and 10.5 m bgl in the west of the site, not encountered in the centre of the site.
Bognor Sand Member	10.50	15.24	6	Lies within the London Clay Formation, fine to coarse orangish brown silty fine to coarse sand.
Lambeth Group (Reading Formation)	Strata not encountered during ground investigation.			Expect to be present below the London Clay.
Upper Chalk	Strata not encountered during ground investigation.			Expected to be present below Lambeth Group.

Table 5.1: Ground conditions encountered during ground investigation.

5.3.5. Superficial deposits are not considered to be present in significant thickness in the western car park. Superficial deposits of variable head deposits are present across the bulk of the centre of the site, often trial pits did not prove the maximum depth of superficial deposits (around 2 to 3m bgl). The borehole in the centre of the site demonstrated the base of the superficial deposits to be 3.2m bgl.

5.3.6. A 12.50m deep borehole in the centre of the site encountered London Clay from 3.2 to 12.5m bgl (16.88 - 7.58 M AOD). The deep borehole in the western car park encountered London Clay from 1.3 – 4.5 m bgl, followed by brown mottled orange brown silty, fine to coarse sand, from 4.5 to 11.5, inferred to be the Bognor Sand Member. The London Clay of stiff dark greenish grey slightly sandy clay is present from 11.5 to 17.5m bgl.

5.3.7. Visual and olfactory evidence of contamination is summarised in Table 5.2 below. This has been referred to later in the report when assessing potential contamination of concern.

Exploratory Hole	Depth (m bgl)	Strata	Observation
BH201	0.1 – 0.9	Made Ground	Glass and clinker
HP202	0.2	Made Ground	Suspected ACM fragment (not confirmed)
TP202	0.35 – 0.8	Made Ground	Dark Grey Staining (no odours)

Exploratory Hole	Depth (m bgl)	Strata	Observation
	1.2 – 2.5	Head Deposits	Strong Hydrocarbon odour. Rare dark grey staining. Groundwater strike at the base of the sit 2.5m bgl
TP204	0.4 – 0.55	Made Ground	Gravel of asphalt
TP206	0.45 – 0.8	Made Ground	Rare dark grey staining (no odour)
TP207	0.5 – 1.1	Head deposits	Rare dark grey staining (no odour)
TP210	0.3 – 0.5	Made Ground	Rare dark grey staining (no odour)
WS201	0.15 – 0.5 (terminated at obstruction)	Made Ground	Rare clinker and asphalt.

Table 5.2: Visual and Olfactory Evidence of Contamination in Logs

5.3.8. Locations BH202, TP201, TP205, TP208, TP209, WS202, WS203, WS204, WS205, WS206 and WS207 had no observations of contamination except for glass, brick and concrete gravel. TP 201 and TP203 were not progressed due to access and were swapped for hand dug pits, reference HP203 and HP204, which did not show evidence of contamination. It is not known if the dark grey staining is indicative of contamination or naturally occurring staining.

5.3.9. With respect to Table 4.2 and 4.4, the ground investigation presented in this section provides additional investigation data satisfying the requirement to investigate the large area in the centre of the site which was previously un-investigated.

5.3.10. The deep boreholes progressed has provided data regarding the potential presence of a vertical pathway from shallow groundwater to the Principal Aquifer at depth.

5.3.11. The investigation locations previously progressed by WYG are considered to have adequately investigated the known sources of contamination previously identified.

6.0 GENERIC QUANTITATIVE RISK ASSESSMENT

6.1. Assessment Framework

6.1.1. The data obtained by the 2017 WYG investigation has been incorporated with the data obtained in the 2018 investigation to present an updated Generic Quantitative Risk Assessment.

6.1.2. Subsequent to the identification and quantification of contaminant species in soils, waters and gases, it is necessary to select a method for assessing their significance in view of the current and proposed future use of the land. The initial assessment comprises comparison of identified contaminant levels to generic screening values that have been prepared to assess the risk to human, controlled water and gas risk receptors. The guidance used to provide this initial screening is listed in Table 6.1.

6.1.3. With respect to Human Health Risk Assessment the screening values for a residential with plant uptake end use as defined in Environment Agency Guidance SR3[1] have been selected based upon the proposed residential development. The site has been assessed in it's entirely (both the residential part and the commercial part) to remain consistent with the previously presented report.

6.1.4. The assessment assumes a Soil Organic Matter (SOM) content of 1% based on average site derived SOM data from the Made Ground of 0.5%.

6.1.5. Controlled Water Risk Assessment has been undertaken using as available Environmental Quality Standards (EQS) for the protection of aquatic life due to the site's location in proximity to the River Lavant.

6.1.6. The depth of London Clay (at least 17.5m in thickness) overlying the Principal Aquifer at depth is considered to be of a sufficient thickness to sever any potential pathway of shallow groundwater contamination to reach the sensitive receptor. Therefore further assessment with regard to hydrogeological receptors has not been conducted.

6.1.7. The specific legislation and/or guidance that dictate the water quality standards adopted are contaminant specific and these are referenced in the Summary of Water Analysis table. The water quality standards have been chosen in accordance with section 4.2 of the Environment Agency's Remedial Targets Methodology as informed by the Environment Agency's Groundwater Protection Guides (2017), and documents listed in Table 6.1[2].

[1] Updated Technical Background to the CLEA Model, Science Report SC050021/SR3
[2] https://www.gov.uk/government/collections/groundwater-protection

6.1.8. For further detailed information on the current Regulations and selection of appropriate threshold values, please refer to the rear of this report text.

	Key Guidance
Soil	LQM/CIEH S4ULs for Human Health Risk Assessment.*
	Defra Development of Category 4 Screening Levels Main Report and associated documents
	Environment Agency CLEA Version 1.06 software. Environment Agency Science Reports SC050021 SR2/SR3
	Generic Assessment Criteria based upon Environment Agency CLEA UK Beta Version 1.0.
Water	EA Groundwater Protection Guides, March 2017.
	The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
	Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations 2015
	EC and UK Drinking Water Standards.
	WHO Drinking Water Standards.
	Background Water Quality.
Gas	CIRIA C748, 'Guidance on the use of plastic membranes as VOC vapour barriers'.
	CIRIA C735, 'Good practice on the testing and verification of protection systems for buildings against hazardous ground gases'.
	BS 8576:2013, 'Guidance on investigations for ground gas – permanent gases and VOCs'
	CIRIA Report C665, 'Assessing Risks Posed by Hazardous Ground Gases to Buildings'
	CIRIA Report C682, 'VOCs Handbook: investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination'
	British Standard BS:8485, 2015, 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.
	CIRIA Report 150 'Methane Investigation Strategies'.
	BRE 414 'Protective Measures for Housing on Gas Contaminated Land', 2001.
	The Building Regulations 2000, Approved Document C, Section 2. Updated 2004.
	BR211, 'Radon: Guidance on Protective Measures for New Buildings', 2015.
	Health Protection Agency Publication HPA RPD-033, 2007,' Indicative Atlas of Radon in England and Wales.

Table 6.1: Generic Quantitative Screening Values

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6.2. Soils

6.2.1. The results have been reviewed for evidence of potential zoning across the site and no evidence for zoning has been identified. The supplementary data obtained in 2018 has been combined with the previous data from 2017 and assessed as a single dataset for the statistical assessment.

6.2.2. The assessment has included the upper 1.0m depth of the strata encountered.

6.2.3. The statistics associated with soil analysis are summarised in Table 6.2. The Mean Value (95%ile) and Maximum Value Tests were undertaken on the sample population/s for those parameters exceeding the screening levels. Where the 95%ile exceeds the screening values, these results are highlighted and discussed. The remainder are not considered indicative of significant contamination for the proposed end use.

Contaminant	Units	Exceeding	Max	95th%ile	Tier2Screen
Metals					
Arsenic	mg/kg	0/ 27	32	NC	37 [A]
Boron	mg/kg	0/ 27	3.9	NC	290 [A]
Beryllium	mg/kg	1/ 27	**2.4**	0.79	1.7 [A]
Cadmium	mg/kg	0/ 27	0.7	NC	11 [A]
Chromium	mg/kg	0/ 27	214.1	NC	910 [A]
Copper	mg/kg	0/ 27	167	NC	2400 [A]
Lead	mg/kg	4/ 27	**1088**	**227.13**	200 [B]
Mercury	mg/kg	0/ 27	0.9	NC	40 [A]
Nickel	mg/kg	0/ 27	31	NC	130 [A]
Selenium	mg/kg	0/ 27	2	NC	250 [A]
Vanadium	mg/kg	0/ 27	86	NC	410 [A]
Zinc	mg/kg	0/ 27	298	NC	3700 [A]
Total Petroleum Hydrocarbons / banded hydrocarbons					
EPH/TPH >C8-10	mg/kg	0/ 13	10	NC	27 [A]
EPH/TPH >C10-12	mg/kg	0/ 13	12	NC	74 [A]
EPH/TPH >C12-16	mg/kg	1/ 13	**240**	10*	140 [A]
EPH/TPH >C16-21	mg/kg	1/ 13	**1600**	15.16*	260 [A]
EPH/TPH >C21-40	mg/kg	1/ 13	**2600**	92.53*	1100 [A]
Aliphatics >C6-8	mg/kg	0/ 14	0.1	NC	100 [A]
Aliphatics >C8-10	mg/kg	0/ 14	0.2	NC	27 [A]
Aliphatics >C10-12	mg/kg	0/ 14	3	NC	130 [A]
Aliphatics >C12-16	mg/kg	0/ 14	45	NC	1100 [A]
Aliphatics >C16-21	mg/kg	0/ 14	63	NC	65000 [A]
Aliphatics >C21-35	mg/kg	0/ 14	53	NC	65000 [A]
Aliphatics >C35-44	mg/kg	0/ 14	7	NC	65000 [A]
Aromatics >C5-7	mg/kg	0/ 14	0.1	NC	70 [A]
Aromatics >C7-8	mg/kg	0/ 14	0.1	NC	130 [A]
Aromatics >C8-10	mg/kg	0/ 14	0.1	NC	34 [A]
Aromatics >C10-12	mg/kg	0/ 14	0.2	NC	74 [A]
Aromatics >C12-16	mg/kg	0/ 14	12	NC	140 [A]
Aromatics >C16-21	mg/kg	0/ 14	140	NC	260 [A]
Aromatics >C21-35	mg/kg	0/ 14	318	NC	1100 [A]
Aromatics >C35-44	mg/kg	0/ 14	51	NC	1100 [A]
Polycyclic Aromatic Hydrocarbons					
Naphthalene	mg/kg	1/ 27	**2.31**	0.06*	2.3 [A]
Acenaphthylene	mg/kg	0/ 27	3.57	NC	170 [A]
Acenaphthene	mg/kg	0/ 27	23	NC	210 [A]
Fluorene	mg/kg	0/ 27	30	NC	170 [A]
Phenanthrene	mg/kg	1/ 27	**230**	4.22*	95 [A]

Contaminant	Units	Exceeding	Max	95th%ile	Tier2Screen
Anthracene	mg/kg	0/ 27	57	NC	2400 [A]
Fluoranthene	mg/kg	0/ 27	280	NC	280 [A]
Pyrene	mg/kg	0/ 27	180	NC	620 [A]
Benzo (a) anthracene	mg/kg	3/ 27	**130**	2.49*	7.2 [A]
Chrysene	mg/kg	2/ 27	**94**	2.49*	15 [A]
Benzo (b) fluoranthene	mg/kg	6/ 27	**110**	**3.15***	2.6 [A]
Benzo (k) fluoranthene	mg/kg	0/ 27	54	NC	77 [A]
Benzo (a) pyrene	mg/kg	6/ 27	**84**	**2.58***	2.2 [A]
Indeno (1,2,3 - cd) pyrene	mg/kg	1/ 27	**50**	1.42*	27 [A]
Dibenzo (ah) anthracene	mg/kg	6/ 27	**17**	**2.12***	0.24 [A]
Benzo (ghi)perylene	mg/kg	0/ 27	52	NC	320 [A]
Other					
Cyanide	mg/kg	0/ 27	1	NC	18.6 [C]
Phenol	mg/kg	0/ 27	0.1	NC	120 [A]

Table 6.2: Summary of Soil Statistics

Residential with Plant Uptake assuming 1.0 % SOM
A LQM/CIEH Suitable for use Levels (S4UL)
B Defra Category 4 Screening Levels (C4SLs)
C SGV/GAC based on CLEA UK Beta Version at 1%, 2.5% and 5%
NC Not calculated
** Outliers removed*

6.2.4. Table 6.3 records the statistical outliers identified during the assessment of the data.

Contaminant	Hole ID	Concentration (mg/kg)	Tier 2 Screen Value	Depth
Benzo (a) anthracene	BH201	130	7.2 [A]	0.25
Benzo (a) anthracene	BH11	14.64	7.2 [A]	0.3
Benzo (a) anthracene	BH4	8.31	7.2 [A]	0.5
Benzo (a) pyrene	BH201	84	2.2 [A]	0.25
Benzo (a) pyrene	BH11	16.19	2.2 [A]	0.3
Benzo (a) pyrene	BH4	8.1	2.2 [A]	0.5
Benzo (a) pyrene	WS201	3.5	2.2 [A]	0.45
Benzo (a) pyrene	BH5	3.31	2.2 [A]	0.6
Benzo (a) pyrene	HP203	2.6	2.2 [A]	0.15
Benzo (b) fluoranthene	BH201	110	2.6 [A]	0.25
Benzo (b) fluoranthene	BH11	18.65	2.6 [A]	0.3
Benzo (b) fluoranthene	BH4	11.1	2.6 [A]	0.5
Benzo (b) fluoranthene	BH5	4.46	2.6 [A]	0.6

Contaminant	Hole ID	Concentration (mg/kg)	Tier 2 Screen Value	Depth
Benzo (b) fluoranthene	WS201	4.3	2.6 [A]	0.45
Benzo (b) fluoranthene	HP203	3.4	2.6 [A]	0.15
Chrysene	BH201	94	15 [A]	0.25
Chrysene	BH11	15.55	15 [A]	0.3
Chrysene	BH4	7.46	15 [A]	0.5
Indeno (1,2,3 - cd) pyrene	BH201	50	27 [A]	0.25
Naphthalene	BH11	2.31	2.3 [A]	0.3
Naphthalene	WS201	0.26	2.3 [A]	0.45
Phenanthrene	BH201	230	95[A]	0.25
EPH/TPH >C12-16	BH201	240	140 [A]	0.25
EPH/TPH >C12-16	WS201	37	140 [A]	0.45
EPH/TPH >C16-21	BH201	1600	260 [A]	0.25
EPH/TPH >C16-21	WS201	140	260 [A]	0.45
EPH/TPH >C21-40	BH201	2600	1100 [A]	0.25

Table 6.3: List of Statistical Outliers (not included in the 95th%ile calculations)

6.2.5. Table 6.4 below lists the locations and concentrations of the exceedances in the upper 1m of soils on the site.

Contaminant	Hole ID	Concentration (mg/kg)	Tier 2 Screen Value	Depth
Benzo (a) anthracene	BH11	14.64	7.2	0.3
Benzo (a) anthracene	BH201	130	7.2	0.25
Benzo (a) anthracene	BH4	8.31	7.2	0.5
Benzo (a) pyrene	BH11	16.19	2.2	0.3
Benzo (a) pyrene	BH201	84	2.2	0.25
Benzo (a) pyrene	BH4	8.1	2.2	0.5
Benzo (a) pyrene	BH5	3.31	2.2	0.6
Benzo (a) pyrene	HP203	2.6	2.2	0.15
Benzo (a) pyrene	WS201	3.5	2.2	0.45

Contaminant	Hole ID	Concentration (mg/kg)	Tier 2 Screen Value	Depth
Benzo (b) fluoranthene	BH11	18.65	2.6	0.3
Benzo (b) fluoranthene	BH201	110	2.6	0.25
Benzo (b) fluoranthene	BH4	11.1	2.6	0.5
Benzo (b) fluoranthene	BH5	4.46	2.6	0.6
Benzo (b) fluoranthene	HP203	3.4	2.6	0.15
Benzo (b) fluoranthene	WS201	4.3	2.6	0.45
Beryllium	BH14	2.4	1.7	0.3
Chrysene	BH11	15.55	15	0.3
Chrysene	BH201	94	15	0.25
Dibenzo (ah) anthracene	BH11	2.25	0.24	0.3
Dibenzo (ah) anthracene	BH4	1.88	0.24	0.5
Dibenzo (ah) anthracene	BH5	0.61	0.24	0.6
Dibenzo (ah) anthracene	BH201	17	0.24	0.25
Dibenzo (ah) anthracene	HP203	0.35	0.24	0.15
Dibenzo (ah) anthracene	WS201	0.33	0.24	0.45
Indeno (1,2,3 - cd) pyrene	BH201	50	27	0.25
Lead	BH14	1088	200	0.3
Lead	BH5	370	200	0.6
Lead	HP203	950	200	0.5
Lead	HP204	210	200	0.5
Naphthalene	BH11	2.31	2.3	0.3
Phenanthrene	BH201	230	95	0.25
EPH/TPH >C12-16	BH201	240	140	0.25
EPH/TPH >C16-21	BH201	1600	260	0.25
EPH/TPH >C21-40	BH201	2600	1100	0.25

Table 6.4: List of Exceedances of the Screening Criteria (outliers included)

6.2.6. The results shown in Table 6.2 to Table 6.4, include the soils data obtained during both the WYG Investigation in 2017 around the perimeter of the site and the Harrisons 2018 investigation which included investigation locations in the centre of the site.

6.2.7. The two investigations provide good coverage of the site, in a generally non targeted investigation location distribution.

6.2.8. The 95th%ile exceedances of the screening criteria of lead, benzo (b) fluoranthene, benzo (a) pyrene and dibenzo (ah) anthracene, are indicative of a potentially site wide risk to end users based on these concentrations.

6.3. Asbestos

6.3.1. The WYG investigation analysed 27 no. samples for asbestos screening resulting in three detections of asbestos in soils as shown on the first three rows of Table 6.5 below.

6.3.2. The 2018 investigation conducted 25 no. asbestos screens, of which 21 were non detect and four resulted in asbestos detections, as summarised in Table 6.5 below.

Sample	Type	Quantification % wt/wt		
		Gravimetric	PCOM fibres	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
HP 203 at 0.15	Chrysotile Bitumen	-	-	-
HP 201 at 0.2m	Chrysotile Cement	-	-	-
HP201 at 0.5m	Chrysotile	<0.001	<0.001	<0.001
TP206 at 0.3	Chrysotile Cement	-	-	-

Table 6.5: Detections of Asbestos in Soil Testing

6.3.3. The asbestos detections noted above are considered relatively typical of made ground associated with made ground on brownfield sites.

6.3.4. Although it is noted that there are no screening criteria for asbestos fibres in soils, material with asbestos fibres is unlikely to be suitable for inclusion in landscaping or private gardens.

6.3.5. The material is also not likely to be suitable for use as garden topsoil due to its physical composition (anthropogenic inclusions).

6.4. Ground Gas

6.4.1. The WYG 2017 assessment conducted two monitoring rounds where ground gas concentrations were within the boundary of Characteristic Situation 1 as defined by CIRA C665.

6.4.2. An additional 4 ground gas monitoring visits were conducted. Where possible this included monitoring of the WYG installed exploratory locations. Only supplementary monitoring rounds (those undertaken in 2018) have been assessed in this Section.

6.4.3. The notable pre-purge results, where carbon dioxide exceeded 1.5%, methane 1% and/or oxygen fell below 18%, are summarised in Table 6.6.

Borehole	Date	Gas Concentration (%)			Flow Rate (l/hr)
		CO_2	CH_4	O_2	
BH4	30/05/18	4.8	0.2	16.7	0.0
BH7	30/05/18	0.1	5.0	10.3	4.2 (still dropping on the monitoring records, therefore considered erroneous)
WS202	30/05/18	7.4	0.3	12.9	-0.3 (record did not level out, peak -8.7 reducing to -0.3 over 3 minutes)
BH202	31/05/18	0.7	0.1	17.1	0.2
WS205	31/05/18	0.0	0.1	11.9	-0.3
BH7	21/06/18	13.3	5.6	0.0	0.0
BH11	21/06/18	2.5	0.0	15.0	0.0
WS202	21/06/18	15	7	3.6	0.0
BH201	21/06/18	2.6	0.0	14	-0.1
WS205	21/06/18	0.0	0.0	7.5	0.3
WS204	21/06/18	0.0	0.0	12.3	0.0
BH4	21/06/18	3.45	0.0	18.4	0.0
BH1	26/06/18	2.2	1.2	18.2	0.0
BH4	26/06/18	2.8	0.0	18.5	0.0
BH7	26/06/18	3.5	0.8	15.5	0.0
BH11	26/06/18	4.7	0.0	15.2	0.0
BH201	26/06/18	3.2	0.0	15.1	0.0
WS202	26/06/18	14.4	13.6	0.8	0.1
WS204	26/06/18	0.0	0.0	16.4	0.0
WS205	26/06/18	0.0	0.0	15.7	-0.1
BH11	07/09/18	0.0	2.5	17.3	0.0
BH201	07/09/18	0.0	0.0	17.4	0.0
WS202	07/09/18	8.6	11.4	1.6	0.2

Table 6.6: Summary Gas Concentrations and Flow Rates

*All percentage figures are by measurement of volume. Bracketed figures are post purge. *Gas sample obtained. '-' Results do not exceed thresholds. 'n/r' Positive flow not recorded*

6.4.4. BH202 was not monitored on the final 2 visits due to the well chamber being flooded. In addition a number of ground gas records are recorded for only 3 minutes, where concentrations of gasses have not levelled out.

6.4.5. Peak concentrations of carbon dioxide and methane were generally found in WS202. Where the highest carbon dioxide concentration was 15% and peak methane was 13.6%. The highest flow was 0.3 l/hr (although a peak of 8.7 l/hr was recorded on 30/05/18 visit, however this decreased over the monitoring period to 0.3 l/hr, therefore the higher flow rate is considered erroneous).

6.4.6. Based on the worst case from WS202 the Gas Screening Value for this location is 0.0342 which is below the limit for Characteristic Situation 1 (CS1), indicative of a very low risk where gas protection measures are not required.

6.4.7. It is noted in BS8485:2015 that where methane exceeds 1% and carbon dioxide exceeds 5% increasing the Characteristic Situation to Characteristic Situation 2 should be considered. When the specific layout & construction of the development is known, this should be reviewed.

6.4.8. Based on the elevated instance of carbon dioxide and methane, the results should be reviewed with regard to the detailed layout with the consideration of whether the Characteristic Situation should be increased to Situation 2 where gas protection would be required.

6.5. Controlled Waters – Principal Aquifer Chalk at depth

6.5.1. The stratum encountered during the ground investigation has been summarised in Table 5.1. This demonstrated that there is in effect a barrier of in excess of around low permeability London Clay in excess of 9 m below the centre of the site.

6.5.2. In the western car park, it is considered that the Bognor Sand Member is present from around 4.5m bgl to 11.5m bgl where brown coarse sands are present. Below this strata are greenish grey sandy clays, considered to be the London Clay Formation and relatively impermeable.

6.5.3. It is considered that sufficient low permeability deposits of the London Clay have been proven during this ground investigation to effectively sever the pathway between the contamination encountered in made ground and the Principal Aquifer & Subsurface Source Protection Zone 1 at depth.

6.5.4. Given that the Principal Aquifer has not been encountered during the ground investigation, screening of sample test results has not been conducted.

6.6. Controlled Waters - Surface Waters

6.6.1. The site is situated in close proximity to the River Lavant to the south east of the site. The potential pollutant linkage between the site and the River Lavant is shown diagrammatically on Figure 5.

6.6.2. The topographical level of the river bed of the River Lavant is 15.82m AOD compared to groundwater levels recorded in BH5 and BH14 at 16.67 and 16.23 m AOD, respectively (measured 20/02/17). The hydraulic gradient between BH5 and the river bed is $8.9x10^{-3}$.

6.6.3. Based on an assessment of the topographical levels of the river bed and groundwater levels, a conservative assumption would be that there is hydraulic continuity between shallow groundwater and the river. Therefore there is a theoretical active pollutant linkage.

6.6.4. However it is considered unlikely that there is significant flow between shallow groundwater and the River Lavant considering that the Culvert is a concrete pipe/ box culvert, and this section of the River Lavant is channelised.

6.6.5. Surface water testing conducted by WYG in 2017 did not note any exceedances of EQS criteria in samples obtained directly from the River Lavant. To date, there has been no demonstrable impact to the River Lavant.

6.6.6. Generally, visual observations of the soils across the site are limited to rare instances of clinker and asphalt gravel. With the exception of TP202 (in the south east of the site) conducted in 2018 which recorded hydrocarbon odours between 1.2m and 2.5m bgl.

6.6.7. The WYG report conducted leachate preparations on three samples of made ground, which identified minor exceedances of the EQS of contaminants of fluoranthene, from all three leachate preparation locations (BH1 at 1.5m, BH5 at 0.6m and BH14 at 0.3m). Benzo(a)pyrene, benzo(ghi)perylene, benzo(k)fluoranthene and benzo(b)fluoranthene only exceeded the EQS criteria at BH5 at 0.6m bgl.

6.6.8. Due to the minimal depth of Made Ground and the distance of BH1 from the River Lavant, it is considered unlikely that the contamination identified in this location presents a significant risk of contamination to controlled waters.

6.6.9. The log from BH5 does not record any visual or olfactory evidence of hydrocarbon contamination, although instances of asphalt in the log were noted. Shallow soils testing from that location (0.2 – 0.6m bgl) had detections of total polycyclic aromatic hydrocarbons (total 46.6 mg/kg) and TPH (410 mg/kg). However, hydrocarbon testing from 1.3m bgl returned below detection for TPH and PAHs. Based on this, it is considered that the detections of hydrocarbon contamination in the shallow soils is likely owed to the presence of asphalt gravel in the sample rather than leachable contamination.

6.6.10. Given that asphalt gravel in samples across the site is generally limited, it is considered unlikely that significant contamination of controlled waters is likely to occur from this potential source.

6.6.11. The location of BH14 also does not record any visual or olfactory evidence of contamination and therefore it is not considered likely that the exceedances of leachate criteria are indicative of a significant risk to the River Lavant. It is considered likely that the detections of PAHs result from a fragment of unrecorded asphalt/clinker in the sample.

6.6.12. Soils results that were found tested in BH5 and BH 14 are not indicative of significant hydrocarbon source. It is possible however that the concentrations of PAHs identified in BH5 are indicative of a hydrocarbon source locally.

6.6.13. TP202 was progressed with the objective of investigating the potential for a hydrocarbon contamination source in proximity to BH5. The exploratory hole did encounter visual and olfactory evidence of contamination between 1.2 and 2.5m bgl.

6.6.14. It is considered that the investigation data currently available is indicative that there may be a risk to controlled waters from hydrocarbon contamination in the south east corner of the site. This will be investigated and remediated on a precautionary basis via contaminant source removal & ongoing validation monitoring. This is discussed further in Section 9.

7.0 REVISED CONCEPTUAL SITE MODEL

7.1.1. Guidance for contaminated land advocates the assessment of risk by determining the presence of pollutant linkages and weighting the likelihood of harm occurring with the potential severity of that harm. The framework is set out in various publications by the DETR, Environment Agency, Institute for Environment and Health, NHBC and CIRIA.

7.1.2. Tables 4.2 - 4.3 indicate the potential contaminants, pollutant linkages and receptors that have been considered at the site informed by the WYG investigation and Generic Quantitative Risk Assessment in 2017. Identified pollutant linkages and areas of poor coverage were investigated in 2018 by CampbellReith.

7.1.3. This report provides an updated Generic Quantitative Risk Assessment (for human health, controlled waters and gas) a qualitative risk assessment for each receptor where relevant. Where pollutant linkages did not require further investigation, the previous conclusions are presented in this section.

7.1.4. For the purpose of this assessment, the descriptions of risk presented in Table 4.1 have been used which take into account the magnitude of the source contamination identified, likelihood of exposure via a pathway and significance of harm likely to result on the given receptor. The tables below summarise the identified risks.

Pathway	Risk	Comment
Ingestion of soil/dust	Low	Redevelopment or maintainance of the site may involve ground workers coming into contact with the underlying soils and water. Normal Health and Safety precautions associated with a site where potential contamination may exist (of the levels identified), will mitigate the general risk. The contractor should be cognisant of the detectinos of asbestos in soils presented in this report and determine adequate mitgiation measures for the construction phase. There is a potential risk if previously unforseen contamination is later found to be present.
Inhalation of soil/dust	Low/ Moderate*	
Dermal contact with soil/dust/water	Low	
Inhalation of vapour from soil/dust	Low	
Inhalation of vapour from groundwater	Low	
Migration of soil gases to confined spaces	Low	

Table 7.1: Groundworkers (Assuming Basic PPE)*

** Separate assessments are required in relation to asbestos risk.*

Pathway	Risk	Comment
Inhalation of dust	High	Exceedances of the screening criteria for residential use by the 95%ile was recorded for the following contaminants; lead, benzo(b)fluranthene, benzo(a)pyrene and dibenzo (ah) anthracene. Combined with the detections of asbestos in made ground soils it is considered that a cover system is required. A watching brief maintained throughout groundworks. There is a potential risk if previously unforeseen contamination is later found to be present. Although the ground gas monitoring conducted does not require ground gas protection measures, the results should be reassessed with regard to the elevated carbon dioxide and methane readings during monitoring and in relation to the detailed layout & construction.
Ingestion of soil/dust	High	
Dermal contact with soil/dust/water	Moderate	
Consumption of vegetables/plants	High	
Inhalation of vapour from soil/dust	Low	
Inhalation of vapour from groundwater	Low	
Migration of soil gases to confined spaces/structure	Low / moderate	
Movement of contaminants to engineered structures (e.g. water pipes)	Moderate	
Uptake by flora/fauna	Very Low	

Table 7.2: End Users during Occupation

Pathway	Risk	Comment
Migration of water borne contaminants from site to surface waters	Moderate	A potential risk to the River Lavant to the south east of the site has been identified. Although it has been shown that no impact has occurred, further investigation and localised remediation is considered appropriate to mitigate this risk.
Migration of water borne contamination from off site	Very Low	Risks from off site sources are considered very low due to the absence of significant sources. Bordering land use to the south is potential source but is down gradient therefore is unlikely to progress towards the site if present.
Migration of contamination from surface and/or subsurface to groundwater	Very Low	Risk to groundwater is considered very low because the pathway from shallow groundwater to the aquifer is not considered active. Should piling be proposed, a piling risk assessment should be conducted to assess the potential risk of this.

Table 7.3: Controlled Waters

Pathway	Risk	Comment
Movement of contaminants to engineered structures (e.g. water pipes)	Moderate	Consideration will be required with respect to potable supply pipework due to the presence of Made Ground which has been shown to contain hydrocarbons. Liaison with the water supply provider will be required to determine if remedial actions are required.
Migration and accumulation of flammable gases beneath the building footprint.	Low	Minimal sources of ground gas are present and monitoring did not identify high gas flows.

Table 7.4: Buildings

Pathway	Risk	Comment
Dermal contact with soil/dust/water	Low	Off site receptors are generally low sensitivity. Construction phase activities should limit short term potential effects from dust, noise, vibration etc.
Inhalation/ingestion of dust	Low	
Inhalation of vapour from soil/dust	Low	
Inhalation of vapour from groundwater	Low	
Migration of soil gases to confined spaces/structure	Low	
Movement of contaminants to engineered structures (e.g. water pipes)	Low	

Table 7.5: Offsite Human Health Receptors

8.0 CONCLUSIONS

8.1. Summary of Sensitivity

8.1.1. The site is considered to lie in area of **Low/ Moderate** environmental sensitivity with respect to Hydrogeology due to the proven depth of London Clay overlying the principal aquifer chalk.

8.1.2. The site is considered to lie in a **High** environmental sensitivity with respect to Hydrology due to the River Lavant close to the south east of the site. The proposed residential with gardens development is considered to be of **High** end user sensitivity. The proposed commercial area has been assessed as residential use for conservatism.

8.2. Summary of Contamination

8.2.1. The desk study and subsequent two phases of site investigation and assessment has identified the following key contamination issues at the site:

- **Soils:** Shallow soils in made ground are considered to present a potential risk to end users, where remediation measures comprising a cover system of validated soils is recommended.
- **Ground gas:** Peaks of hazardous ground gas were encountered during monitoring were encountered, however the results indicated that the site is characteristic situation 1 where gas protection is not required. The concentrations of methane and carbon dioxide require consideration as to whether areas of the site should be increased to Characteristic Situation 2 when assessed as part of Reserved Matters Application for the residential area.
- **Groundwater:** It has been shown that in effect no significant pathway is present to the principal aquifers at depth therefore no further consideration is required, unless piling is proposed, at which point a piling risk assessment would be required.
- **Surface Waters**: The River Lavant is close to the south east of the site. Exceedances of the EQS's have been identified in leachate preparations and shallow groundwater samples. No identifiable impact to the River Lavant has been observed to date, however it is considered that there is a theoretical pollutant linkage between shallow groundwater and the River Lavant. Therefore localised remediation by way of source removal and validation investigation is recommended, the details of which is set out in this report.

8.3. Summary of Recommendations

8.3.1. The site investigation commissioned by CampbellReith incorporated contamination testing of soil and monitoring of groundwater and ground gas across the site. The site is considered to present generally **Moderate risk** in relation to contamination issues.

8.3.2. The risks requiring remediation are:

- Human health exposure to shallow soils
- Potential impact to surface water via shallow groundwater seepage into the River

8.3.3. The remediation associated with the risks identified above are discussed in Section 9.

8.3.4. A number of issues will require review when the detailed proposed development layout and construction methods are known.

- Ground gas concentrations
- Potential requirement for protective pipework due to hydrocarbons in soils
- Construction phase methodology for prevention of construction worker risk

Ground gas

8.3.5. Although the ground gas monitoring results were not indicative of a significant risk requiring ground gas protection measures, however elevated concentrations of carbon dioxide and methane were detected during monitoring which indicate a requirement to consider increasing the characteristic situation from 1 to 2. Local monitoring results should be assessed in due course in relation to the layout and construction details of the proposed development should be compared to the ground gas monitoring results presented here.

Potential requirement for protective pipework

8.3.6. The presence of elevated TPH and PAH concentrations in the soil indicates a possible need for protection of public water supply pipework, such as the use of organic resistant pipework. The infrastructure designer should assess requirements for pipework with respect to soil contamination and consult statutory utility companies and relevant guidance as necessary. Guidance on this topic is presented in UKWIR Report 'Publication UKWIR Report Ref 10/WM/03/21: Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites - Final Project Report, as amended by the Contaminated Land Assessment Guidance (Water UK, January 2014) .

Risks to construction workers

8.3.7. Groundworkers should be made aware of these results with regard to shallow soil contamination and asbestos in soils. Suitable mitigation measures to prevent worker exposure and environmental release of asbestos fibres should be implemented.

8.3.8. The Contractor should prepare risk assessments and method statements in view of the identified and foreseeable ground conditions and include these within the Health and Safety Plan: for example, these should consider worker protection from skin contact, ingestion and inhalation of contaminants, asbestos in soils and ground gas. In order to achieve satisfactory control, CampbellReith recommend that Health and Safety provisions in accordance with HSE Publication HS(G) 66 and CIRIA Report 132 are considered. The Contractor must also control matters such as any contracted CDM responsibilities.

8.3.9. In relation to presence of asbestos in soils, the Contractor should formulate their working arrangements in view of the requirements of the Control of Asbestos Regulations (2012) and the associated ACoP (L143). Additional interpretation on the application of these regulations is presented in publications prepared by CL:AIRE and the Joint Industry Working Group (CAR-SOIL™ Control of Asbestos Regulations 2012, Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials, 2016; and the associated JIWG decision support tool, 2017). Additional guidance is provided in CIRIA C765, Asbestos in Soil and Made Ground Good Practice Site Guide, 2017.

9.0 OUTLINE REMEDIATION STRATEGY

9.1.1. The following section summarises the required outline remediation measures in order to mitigate the identified pollutant linkages. The contamination levels encountered on the site do not warrant a detailed options appraisal of the potential remediation options available.

9.2. Approvals

9.2.1. Portsmouth water require consultation prior to installation of any groundwater sampling or remediation locations in order to agree what pollution prevention and mitigation measures are required to be applied.

9.3. Human health exposure to shallow soils - Cover System

9.3.1. Shallow made ground soils have been identified as unsuitable for use in a residential with plant uptake proposed end use. Therefore a validated cover system is required in areas of soft landscaping.

9.3.2. The depths and validation criteria will depend upon the location and proposed use of the specific landscaping area. When the detailed layout is determined, the screening criteria and depth of the cover system should be agreed with the Local Planning Authority in a Detailed Remediation Strategy.

9.3.3. The electrical substation is understood to be proposed to be retained, however, should the electrical substation be moved, it is likely that some localised contamination will be present close to its location which will required investigation and potential remediation.

9.3.4. Typical validated cover system (topsoil/subsoil) depths should be 300mm for communal areas and 600mm for private gardens.

9.3.5. Screening criteria should be the relevant S4ULs/ C4SLs for the proposed use. Imported soils should be free from asbestos in soils, validated by visual inspections and laboratory screens.

9.4. Surface water risk from shallow groundwater - Source Removal and Monitoring

9.4.1. The groundwater on the site may be in hydraulic conductivity with the River Lavant, however the River Lavant is channelised with a concrete base and engineered banks. Furthermore no impact to the River Lavant has been detected. However hydrocarbon odorous soils have been identified close to the south eastern corner of the site. It is considered that this material may pose a theoretical risk to the water quality of the river and need to be remediated.

9.4.2. As part of the slab removal works, the site has been split into 50m by 50m validation grid, where visual inspections of the surface are required.

9.4.3. It is recommended that the known visually impacted soils should be remediated, such that they no longer present a risk of leaching hydrocarbons into shallow ground. Furthermore it is recommended that groundwater monitoring wells are installed between the area of known impact and the River Lavant as an additional validation measure.

9.4.4. This remediation strategy is a combination of source removal and monitoring. Which is intended to either, demonstrate that the identified contamination is not mobile or if it is shown to be

mobile, then the objective of the longer term monitoring is to assess the extent to which natural attenuation is occurring.

9.4.5. The technique of source removal (including target concentrations) will be determined by the enabling works contractor. It may be the case that the impacted soils on the site may be suitable for bioremediation or chemical remediation.

9.4.6. The extent of the source removal and the requirements of the monitoring regime should be agreed with the Local Planning Authority and Portsmouth Water Ltd.

9.5. Unforeseen Contamination – Watching brief during slab removal

9.5.1. Although the existing ground investigation has provided good coverage of the site there may be localised instances of previously unforeseen contamination between exploratory hole locations. A watching brief should be conducted during slab removal recording observations on a grid basis as shown on Figure 6 (Drawing reference: 12663-CRH-CI-XX-DR-C-5160_P3), including supplementary investigation and assessment where required. Should significant contamination be encountered it should be assessed by a suitably qualified environmental consultant and the assessment findings should be agreed by the Local Planning Authority and Portsmouth Water.

9.5.2. Should unforeseen tanks be encountered, they should be assessed and removed in accordance with an appropriate tank removal specification and the appropriate Environment Agency guidelines. Records and assessments (if required) should be submitted to the local authority as part of the verification report.

9.5.3. It is known that a former above ground diesel tank was located west of the substation. Although no contamination has been observed in relation to this, it is understood that below ground pipework remains in place which may have caused localised contamination requiring remediation. The remediation requirements for this are considered to be encompassed by the watching brief requirements and the requirement to remove visually contaminated material required in Section 9.4.

9.6. Remediation and Verification Control Documents

9.6.1. Following on from the recommendations made herein, a detailed remediation strategy / specification is required which sets out in detail the works proposed to adequately mitigate the risks identified. The Specification should detail necessary requirement for inspections/ record keeping/ actions for unforeseen contamination/ detail the requirements for the control of imported material and waste management. It should also include the records required for inclusion within a verification report.

9.6.2. The Specification will require submission to the Local Authority for review and approval as part of the planning process, to fulfil the requirements of the anticipated land quality planning condition. Additional discussions may be required with the NHBC and/or Building Control, such matters are not detailed herein. Once approved it will be the Contractor's obligation to fulfil the agreed requirements of the Specification.

ENVIRONMENTAL RISK ASSESSMENT SUPPORTING INFORMATION

Soil Screening Values

The Environment Agency has published non statutory technical guidance for Regulators and their advisors to assess the chronic risk posed to human health from land contamination, known as the Contaminated Land Exposure Assessment (CLEA) Framework.

The CLEA Framework documents and associated risk assessment model are subject to ongoing technical review. In July 2008 guidance documents CLR7 to 10, which previously underpinned the CLEA Framework, were withdrawn. In January 2009 the Environment Agency published CLEA V1.04 risk assessment software and associated guidance documents[3] as a replacement to the previous CLEA UK Beta Version and documents CLR 7 to 10. Further revisions were made in September 2009 to CLEA V1.05 and October 2009 to CLEA 1.06 risk assessment software.

Soil Guideline Values (SGVs) were produced by Defra/EA and Generic Assessment Criteria (GACs) were produced by CampbellReith and others. These were based on the CLEA model and supporting guidance (SR2 and SR3) and where based on a minimal/tolerable level of risk.

In December 2014 DEFRA released final versions of the C4SLs (Category 4 Screening Levels) for 6 No. contaminants (As, benzene, BaP, Cd, Cr VI and Pb) together with a Policy Companion Document and an Erratum. These represent contaminant soil concentrations which present an acceptable (Low) level of risk, within the context of Part 2A, i.e. they are representative of Category 4 sites. In the Contaminated Land Statutory Guidance (April 2012), sites under Part 2A assessments are categorised 1 - 4, with Category 1 being definitely Part 2A and Category 4 definitely not Part 2A ('where there is no risk or the level of risk posed is low').

The C4SLs were produced using the CLEA model and follow the general approach of SR3, although, changes were made to exposure parameters and to the toxicological basis of the assessments. The C4SLs are based on a low level of toxicological concern (LLTC) and are, by definition, less conservative than Health Criteria Values (HCVs) which are the basis for assessments defined in SR2 and used in the generation of SGVs and GACs. They are, therefore, indicative of a low level of risk.

Since their release, DEFRA have confirmed that C4SLs can be used in the planning regime and DCLG (Department for Communities and Local Government) amended Planning Practice Guidance (PPG) on Land Affected by Contamination (12 June 2014)[4] which stated that C4SLs provide a simple test for deciding when land is suitable for use and definitely not contaminated land'. On 03 September 2014 the Secretary for the Environment, Lord de Mauley, issued a letter (attached) to all Local Authorities which references DCLG's PPG and confirms that C4SLs could be used in planning and provide a simple test for establishing when sites are suitable for use.

LQM/CIEH issued S4ULs in December 2014 for 89 contaminants (metals, BTEX, banded TPH, speciated PAH, chlorinated solvents, phenols, chlorophenols, chlorobenzenes, pesticides and a number of miscellaneous others). The S4ULs have generally adopted the revisions to the exposure modelling that were developed in the production of the C4SLs. Critically, however, they are based on HCVs to produce concentrations which are indicative of a minimal/tolerable level of risk.

S4ULs are therefore used as the preliminary stage of soil assessments since they are indicative of minimal/tolerable level of risk. If these are exceeded then the C4SLs are used (if available) to determine if the risk could be described as low.

Where CLEA compliant S4ULs or C4SLs are not available reference is made to Generic Assessment Criteria (GAC) derived using the CLEA UK model (beta version). These are currently used for cyanide. Where referred to, the non-compliant standing of these values is considered.

[3] Environment Agency Report Ref: SC050021/SR2 - *Human Health Toxicological Assessment of Contaminants in Soil.* January 2009. Environment Agency Report Ref: SC050021/SR3 – *Updated background to the CLEA model.* January 2009.
[4] http://planningguidance.planningportal.gov.uk/blog/guidance/land-affected-by-contamination/land-affected-by-contamination-guidance/

Selection of Appropriate [Tier 2] Soil Screening Values

The CLEA model is based upon defined exposure scenarios and six generic land uses have been established for the C4SLs and S4ULs. These set out a discrete set of circumstances where exposure may occur, including a source, the pathways, and the exposed population.

The three generic land use scenarios used in the development of SGVs are:

- **commercial/Industrial;**
- **allotments; and,**
- **residential with plant uptake,**
- **residential without plant uptake,**
- **public open space (residential)**
- **public open space (parks)**

It is noted that the CLEA screening values are generic and not always applicable. Where the CLEA conceptual model is not appropriate it will be necessary to develop site specific Detailed Quantitative Risk Assessment screening values as a further stage of assessment.

It is noted that the CLEA model does not consider risks from contaminated waters beneath the site to human health and the model also assumes that no free product is present. Should such conditions exist at the subject site the requirement for application of an alternative risk assessment model should be assessed. Alternatively, construction workers are potentially exposed to acute risk and therefore require separate consideration.

Statistical Analysis of Soil Analytical Results

Statistical analysis of soil based analytical results has been undertaken in accordance with CL:AIRE Guidance on Comparing Soil Contamination Data with a Critical Concentration (May 2008). The use of the Mean Value Test and Maximum Value Test is still considered appropriate for site assessments. Although the guidance advocates use of the one - sample t test, this is a variation of the mean value test and establishes the confidence level at which the assessor can determine whether a particular screening level has/has not been succeeded. The mean value test used herein is set at the 95th percentile confidence limit in order to be risk conservative.

The Maximum Value Test is a statistical tool that is used to identify outlier values from a numerical distribution of results for a given determinant. These outlier values can be excluded and considered separately, and the remaining values are then used to calculate upper bound 95th percentile values ($95^{\%ile}$) (Mean Value Test) for comparison with the screening values.

The results are reviewed prior to any statistical analysis in order to determine if zoning of the soils is apparent and hence whether the site requires to be divided into averaging areas. Additional tables are presented where appropriate to reflect distinct ground characteristics relevant to the conceptual model.

Water Screening Values

This assessment considers potential risks to controlled waters (groundwater and surface waters) in relation to risks from any historical contamination. The most stringent test is that defined for Contaminated Land under Part 2A of the Environmental Protection Act, 1990. However, it should be recognised that a wider evaluation of risk is considered within the planning regime and CLR 11.

The Environment Agency has a wider policy agenda for the protection of controlled waters that will impinge upon judgements in relation to land contamination issues. This includes those for the Water Framework Directive and Groundwater Directive and wider legislation for both groundwater, surface water and associated elements (such as fisheries)[5].

The results of water analysis have been compared to screening values selected to assess the potential risk to the identified controlled water receptors in the Conceptual Model. The specific standards utilised for this purpose are considered in the assessment table footnotes and typically comprise: Environmental Quality Standards for the protection of aquatic life; Surface Water Standards; EC, UK and WHO Drinking Water Standards; or Background water quality (where no applicable standard exists).

The initial assessment considers the sensitivity of the receptor in the selection of the screening value. Advice for this purpose has been obtained principally from Environment Agency Technical Advice to Third Parties on Pollution of Controlled Waters for Part 2A of the Environmental Protection Act 1990, No 07/02, EA, 2002 (INFO-RA2-3e), as informed by the EA's GP3.

Where a viable pollutant linkage is considered to be present and the screening criteria exceeded, a Qualitative Risk Assessment is presented with associated recommendations. Depending on the specific objectives, policy and practice of the Environment Agency, discussion of water screening values may be subsequently required.

Definitions of Consequence, Probability and Risk

The following classification has been taken from Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66: 2008 Volume 1 (Environment Agency, NHBC and CIEH.

The key to the classification is that the designation of risk is based upon the consideration of both:

a) **the magnitude of the potential consequence (i.e. severity).**

[takes into account both the potential severity of the hazard and the sensitivity of the receptor]

b) **the magnitude of probability (i.e. likelihood).**
[takes into account both the presence of the hazard and receptor and the integrity of the pathway]

[5] Refer to Environment Agency Publications for Groundwater Protection Policy and Practice (GP3)

Classification of Consequence

Classification	Definition	Examples
Severe	Highly elevated concentrations **likely** to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. Equivalent to EA **Category 1** pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. Catastrophic damage to crops, buildings or property.	Significant harm to humans is defined in circular 01.2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of List I and II substances present in groundwater close to small potable abstraction (high sensitivity). Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).
Medium	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. Equivalent to **EA Category 2** pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.	Significant harm to humans is defined in circular 01/2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Damage to building rendering it unsafe to occupy e.g. foundation damage resulting in instability. Ingress of contaminants through plastic potable water pipes.
Mild	Exposure to human health **unlikely** to lead to "significant harm". Equivalent to **EA Category 3** pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce. Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population.	Exposure could lead to slight short-term effects (e.g. mild skin rash). Surface spalling of concrete.

Classification	Definition	Examples
	Minor damage to crops, buildings or property.	
Minor	No measurable effect on humans. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structures and services.	The loss of plants in a landscaping scheme. Discoloration of concrete.

Classification of Probability

Classification	Definition	Examples
High likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.	*a) Elevated concentrations of toxic contaminants are present in soils in the top 0.5m in a residential garden.* *b) Ground/groundwater contamination could be present from chemical works, containing a number of USTs, having been in operation on the same site for over 50 years.*
Likely	There is pollutant linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.	*a) Elevated concentrations of toxic contaminants are present in soils at depths of 0.5-1.0m in a residential garden, or the top 0.5m in public open space.* *b) Ground/groundwater contamination could be present from an industrial site containing a UST present between 1970 and 1990. The tank is known to be single skin. There is no evidence of leakage although there are no records of integrity tests.*
Low likelihood	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.	*a) Elevated concentrations of toxic contaminants are present in soils at depths >1m in a residential garden, or 0.5-1.0m in public open space.* *b) Ground/groundwater contamination could be present on a light industrial unit constructed in the 1990s containing a UST in operation over the last 10 years – the tank is double skinned but there is no integrity testing or evidence of leakage.*
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.	*a) Elevated concentrations of toxic contaminants are present below hardstanding.* *b) Light industrial units <10 yrs old containing a double-skinned UST with annual integrity testing results available.*

Note: A pollution linkage must first be established before probability is classified. If there is no pollution linkage then there is no potential risk. If there is no pollution linkage then there is no need to apply tests for probability and consequence.

For example if there is surface contamination and a principal aquifer is present at depth, but this principal aquifer is overlain by an aquiclude of significant thickness then there is no pollution linkage and the risks to the principal aquifer are not assessed. The report should identify both the source and the receptor but state that because there is no linkage there are no potential risks.

Description of the classified risks

Very high risk
There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without remediation action OR there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.

High risk
Harm is likely to arise to a designated receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.

Moderate risk
It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.

Low risk
It is possible that harm could arise to a designated receptor from identified hazard, but it is likely at worst, that this harm if realised would normally be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.

Very low risk
It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that the harm if realised would normally be mild or minor.

No potential risk
There is no potential risk if no pollution linkage has been established.

LIMITATIONS

Environmental and Geotechnical Interpretative Reports

1. This report provides available factual data for the site obtained only from the sources described in the text and related to the site on the basis of the location information provided by the client.
2. Where any data or information supplied by the client or other external source, including that from previous studies, has been used, it has been assumed that the information is correct. No responsibility can be accepted by CampbellReith for inaccuracies within this data or information. In relation to historic maps the accuracy of maps cannot be guaranteed and it should be recognized that different conditions on site may have existed between and subsequent to the various map surveys.
3. This report is limited to those aspects of historical land use and enquiries related to environmental matters reported on and no liability is accepted for any other aspects. The opinions expressed cannot be absolute due to the limit of time and resources implicit within the agreed brief and the possibility of unrecorded previous uses of the site and adjacent land.
4. The material encountered and samples obtained during on-site investigations represent only a small proportion of the materials present on the site. There may be other conditions prevailing at the site which have not been revealed and which have therefore not been taken into account in this report. These risks can be minimised and reduced by additional investigations. If significant variations become evident, additional specialist advice should be sought to assess the implications of these few findings.
5. The generalised soil conditions described in the text are intended to convey trends in subsurface conditions. The boundaries between strata are approximate and have been developed on interpretations of the exploration locations and samples collected.
6. Water level and gas readings have been taken at times and under conditions stated on the exploration logs. It must be noted that fluctuations in the level of groundwater or gas may occur due to a variety of factors which may differ from those prevailing at the time the measurements were taken.
7. Please note that CampbellReith cannot accept any liability for observations or opinions expressed regarding the absence or presence of asbestos or on any product or waste that may contain asbestos. We recommend that an asbestos specialist, with appropriate professional indemnity insurance, is employed directly by the client in every case where asbestos may be present on the site or within the buildings or installations. Any comments made in this report with respect to asbestos, or asbestos containing materials, are only included to assist the client with the initial appraisal of the project and should not be relied upon in any way.
8. The findings and opinions expressed are relevant to those dates of the reported site work and should not be relied upon to represent conditions at substantially later dates.
9. This report is produced solely for the benefit of the client, and no liability is accepted for any reliance placed upon it by any other party unless specifically agreed in writing.

Appendix A: Figures

Figure 1: Site Location

Figure 2: Annotated Site Layout

Figure 3: Ground investigation plan

Figure 4: Proposed Development Plan

Figure 5: Surface Water Conceptual Site Model

Figure 6: Phase 2 Enabling Works Existing Ground Investigation & watching brief plan (Drawing reference - 12663-CRH-CI-XX-DR-C-5160_P3)



Colt International

Client: Homes England

Figure 1:
Site Location Plan

Scale:	1:15000@A4
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Contains Ordnance Survey data	© Crown copyright and database right 2019.
Job Number:	12663
Drawn by - Checked by:	RP - DM
Drg No - Status/Revision:	GIS006 - A
File location:	N:/12500 - 12749/12663 R - Colt International/Project_Workspaces/LQS (pdf in Outputs)
Date (Revision History):	05/02/2019 (A, First Issue, 05/02/19, RP)

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Figure 2:
Site Layout

Scale: 1:1000@A3
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Job Number: 12663
Drawn by - Checked by: RP - DM
Drg No - Status/Revision: GIS007 - A
File location: N:/12500 - 12749/12663 R - Colt International/Project_Workspaces/LQS (pdf in Outputs)
Date (Revision History): 05/02/2019 (A, First Issue, 05/02/19, RP)

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Colt International

Client: Homes England

Figure 3:
Ground Investigation Plan

Scale: 1:1000@A3
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P Stubbington Land Surveys Ltd Topo Suvey, dwg no 7558.01 (Dec 2014)
Job Number: 12663
Drawn by - Checked by: RP - DM
Drg No - Status/Revision: GIS008 - A
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Colt International

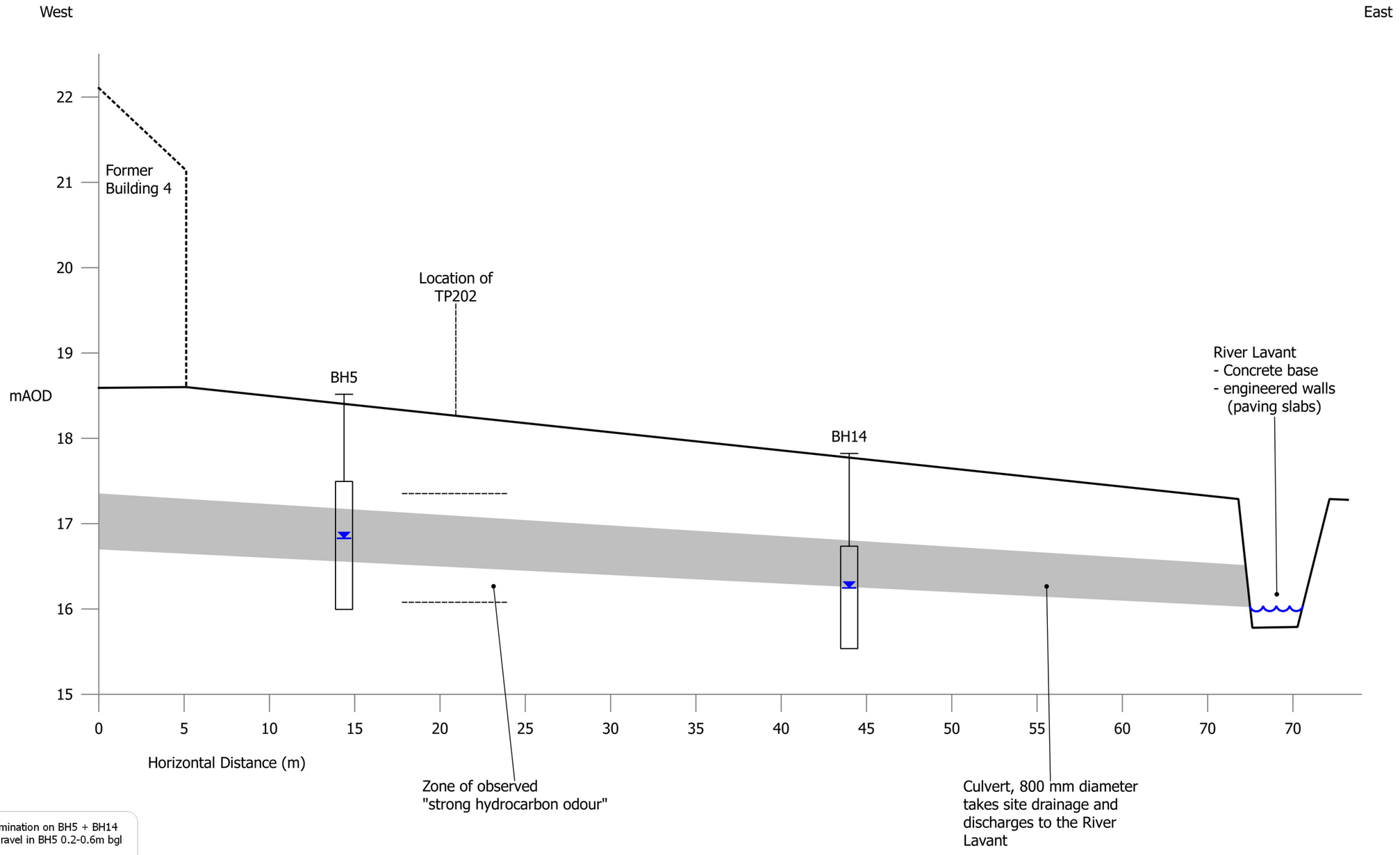
Client: Homes England

Figure 4:
Proposed Development Plan

Scale: 1:1000@A3
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WYG Illustrative Masterplan, drg no A090070-182[ST1]31 revA
Job Number: 12663
Drawn by - Checked by: RP - DM
Drg No - Status/Revision: GIS009 - A
File location: N:/12500 - 12749/12663 R - Colt International/Project_Workspaces/LQS (pdf in Outputs)
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No observation of contamination on BH5 + BH14 logs except for tarmac gravel in BH5 0.2-0.6m bgl

Observed local groundwater level

Windowless sample location
Response Zone

Note - Exagerated vertical scale

Colt International

Client: Homes England

Figure 5:
Surface Water Conceptual Site Model

Scale: NTS
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NOTES

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3. Read this drawing with all Architect's, Service Engineer's and CampbellReith's relevant details, specifications and drawings.
4. All work is to be done in accordance with the relevant specifications issued by CampbellReith, British Standard Codes of Practice, Statutory Requirements and the Contract Documents.
5. Drawing Status:

   P: PRELIMINARY Evolving drawings for approvals, tenders, billings etc.

   C: CONSTRUCTION Fully developed drawings issued under instructions for construction.
6. **ONLY STATUS C DRAWINGS TO BE USED FOR CONSTRUCTION.**
7. Suitability Code:

   Work in Progress
   SO - Work in Progress
   Shared (Non-Contractual)
   S1 - For Coordination, S2 - For Information, S3 - For Internal Review and Comment, S4 - For Construction Approval.
   Documentation (For Contractors Purposes)
   D1 - For Costing, D2 - For Tender, D3 - For Contractor Design, D4 - For Manufacture/Procurment.
   Construction
   A - For Construction, B - For Construction but With Comments (i.e. areas in abeyance), C - Comprehensive Revisions Required.

BH201
WS207
WS203
TP211
BH1
WS202
TP208
TP210
HP201
BH11
WS201
BH4
TP207
TP206
HP202
TP209
RESIDENTIAL DEVELOPMENT AREA
BH202
WS206
TP205
BH202A
EMPLOYMENT DEVELOPMENT AREA
WS204
TP204
WS205
HP204
BH7
TP202
HP203
Church of St Alban
Vicarage
WORTHY COURT
Kilwood Green
STANFORD COURT
DEANE COURT
BARTONS ROAD
Stones
Posts
Shelter
SWAY COURT
NEW LANE
El Sub Sta
Factory
27.1m

NOTE:
UTILITIES/SERVICES SURVEY INFORMATION TAKEN FROM MK SURVEYS DRAWING 24301 R2.DWG.
UTILITIES/SERVICES ARE SHOWN FOR THE CONTRACTOR'S INFORMATON ONLY. FOR FURTHER INFORMATION THE CONTRACTOR IS TO REFER TO MK SURVEYS DRAWING. THE CONSTRAINTS PLAN SHOULD NOT BE USED AS THE SOLE MEANS OF LOCATING SERVICES PRIOR TO COMMENCING SITE WORKS.
IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE AND CONFIRM ALL SERVICES PRIOR TO COMMENCING SITE WORKS.

PRIOR TO COMMENCING SITE WORKS THE CONTRACTOR MUST LIAISE WITH ALL ADJACENT PROPERTY OWNERS/TENANTS. THE CONTRACTOR MUST ADVISE ALL ADJACENT PROPERTY OWNERS/TENANTS OF THE DAYS WHEN ALL PRINCIPAL ENABLING WORKS ACTIVITIES WILL TAKE PLACE AND THE ANTICIPATED DURATION OF EACH ACTIVITY. THE CONTRACTOR IS TO NOTE THAT A NUMBER OF THE ADJACENT PROPERTIES ARE LIKELY TO BE PARTICULARLY SENSITIVE TO DUST, NOISE AND VIBRATION.

'WATCHING BRIEF REQUIRED DURING SLAB REMOVAL AND ALL BELOW GROUND WORKS WITH REGARD TO POTENTIAL ASBESTOS CONTAINING MATERIAL BELOW SLABS AND GROSS CONTAMINATION AND GROUNDWATER.'
RECORDS REQUIRED - VISUAL DESCRIPTION AND PHOTOGRAPHIC RECORDS BASED ON THE GRID SHOWN DR-C-5160

TP202 - 'STRONG HYDROCARBON ODOUR' RECORDED BETWEEN 1.2 - 2.5m+ BGL
REQUIRES FURTHER INVESTIGATION AND RISK ASSESSMENT WITH REGARD TO CONTROLLED WATERS RISK. SUBSEQUENT REMEDIATION MAY BE REQUIRED.

GROUND INVESTIGATION REPORTS:

COLT INTERNATIONAL, PHASE 1 GEO-ENVIRONMENTAL ASSESSMENT, WYG, NOVEMBER 2016.

COLT INTERNATIONAL, GROUND INVESTIGATION AND ASSESSMENT, WYG APRIL 2017.

COLT INTERNATIONAL, GROUND INVESTIGATION FACTUAL REPORT GL20590, HARRSONS, OCTOBER 2018.

REV	DESCRIPTION	DATE	BY
P3	ISSUED FOR TENDER	16.01.19	MB
P2	ISSUED FOR COMMENT	04.12.18	MW
P1	ISSUED FOR COMMENT	15.11.18	MW

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CLIENT
HOMES ENGLAND

JOB TITLE
FORMER COLT INTERNATIONAL

PHASE 2 ENABLING WORKS EXISTING GROUND INVESTIGATION

DRAWN BY	DATE MADE	SCALE @ A1	C1 CHECKED	SUITABILITY	CR PROJECT
MW	NOV'17	1:500	CRH	D1	12663

PROJECT No.	ISSUER	AREA	LEVEL	TYPE	ROLE	NUMBER	REV
12663	CRH	CI	XX	DR	C	5160	P3

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Appendix B: Site Photographs



Image 1: River Lavant where it passes under New Lane



Image 2: River Lavant banks upstream of the outfall

Project: Former Colt International Premesis, Havant
Project number: 12663
Client: Homes England

Site Images 1 - 2

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Image 3: Monsoon drain outfall to the River Lavant



Image 4: Monsoon drain downstream of the outfall

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Site Images 3 - 4

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Appendix C: Site Investigation Information

Ground Investigation Factual Report, Colt International Havant

Harrisons Group Environmental Ltd

September 2018 [3]

Document: Ground Investigation Factual Report

Project: Colt International, Havant

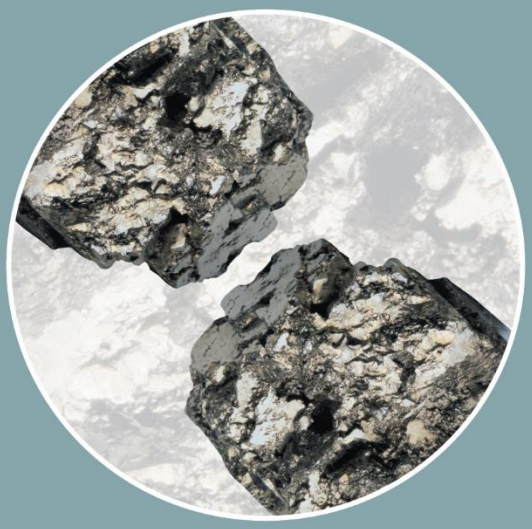
Reference No.: GL20590

Date: October 2018

Prepared for: Hughes & Salvidge Limited

Engineer: Campbell Reith Hill LLP

harrisongeotechnical
ENGINEERING



A division of Harrison Group Environmental Limited

HARRISON GROUP ENVIRONMENTAL LIMITED

Document: **Ground Investigation Factual Report**

Project: **Colt International, Havant**

Reference No.: **GL20590**

Date: **October 2018**

Prepared For: **Hughes & Salvidge Ltd**

Engineer: **Campbell Reith Hill LLP**

REPORT STATUS:

		INIT SIGN COMMENTS DATE	INIT SIGN COMMENTS DATE	INIT SIGN COMMENTS DATE	INIT SIGN COMMENTS DATE
		INIT SIGN COMMENTS DATE	INIT SIGN COMMENTS DATE	INIT SIGN COMMENTS DATE	INIT SIGN COMMENTS DATE
FINAL	REV 0	INIT IR SIGN  COMMENTS DATE 26/10/18	INIT GP SIGN  COMMENTS DATE 26/10/18	INIT IR SIGN  COMMENTS DATE 26/10/18	INIT GP SIGN  COMMENTS DATE 26/10/18
DRAFT	REV 0	INIT IR SIGN  COMMENTS DATE 21/09/18	INIT GP SIGN  COMMENTS DATE 25/09/18	INIT IR SIGN  COMMENTS DATE 21/09/18	INIT GP SIGN  COMMENTS DATE 25/09/18
Revision	**Comments**	**Prepared By**	**Approved By**	**Issued By**	**Audited By**

This sheet to be kept on PSI / Report file.
Auditors to insert their comments on the table, to annotate the report itself or provide comments on a separate sheet. (Please state which)
For final reports a hard copy of the signed off form will be kept on the appropriate QA file.

CONTENTS

FOREWORD

1.0 TERMS OF REFERENCE AND INTRODUCTION 1

2.0 LOCATION AND DESCRIPTION OF SITE 1

3.0 EXPECTED GEOLOGY 1

4.0 FIELDWORK 2

4.1 Cable Percussive Boreholes 2

4.2 Dynamic Continuous Sample Holes 3

4.3 Hand Excavated Trial Pits 3

4.4 Machine Excavated Trial Pits 3

4.5 Installations 3

4.6 Surveying 4

4.7 Gas and Groundwater Monitoring 4

5.0 GEOTECHNICAL TESTING 5

5.1 In-situ Testing 5

5.2 Geotechnical Laboratory Testing 5

6.0 CONTAMINATION TESTING 7

6.1 Environmental Laboratory Testing 7

REFERENCES

APPENDICES

FOREWORD

General Conditions Relating To Site Investigation

This investigation has been devised to generally comply with the relevant principles and requirements of BS10175:2001+A1:2013 “Investigation of potentially contaminated sites - Code of practice” and where directed by the principles and application rules of Eurocode 7 (EC7 – Part 1 and Part 2). The recommendations made and opinions expressed in this report are based on the information obtained from the sources described using a methodology intended to provide reasonable consistency and robustness.

The opinions expressed in this report are based on the ground conditions revealed by the site works, together with an assessment of the site and of laboratory test results. Whilst opinions may be expressed relating to sub-soil conditions in parts of the site not investigated, for example between exploratory positions, these are only for guidance and no liability can be accepted for their accuracy.

Boring, sampling and field test procedures are undertaken in accordance with BS5930:2015 "Code of Practice for Site Investigations". Likewise in-situ and laboratory testing complies with B.S.1377, "Methods of Tests for Soils for Civil Engineering Purposes", unless stated otherwise in the text.

The groundwater conditions entered on the boring records are those observed at the time of investigation. The normal rate of boring usually does not permit the recording of an equilibrium water level for any one water strike. Moreover, groundwater levels are subject to seasonal variation or changes in local drainage conditions.

Some items of the investigation have been provided by third parties and whilst Harrison Group have no reason to doubt the accuracy, the items relied on have not been verified. No responsibility can be accepted for errors within third party items presented in this report.

This report is produced for the benefit of the client alone. No responsibility can be accepted for any consequences of this information being passed to a third party who may act upon its contents/recommendations.

FACTUAL REPORT

ON A

GROUND INVESTIGATION

COLT INTERNATIONAL, HAVANT

1.0 TERMS OF REFERENCE AND INTRODUCTION

The work covered by this report was undertaken on behalf of Hughes & Salvidge Ltd by Harrison Group Environmental Ltd (HGE). The work was undertaken in accordance with the relevant contract documentation and Harrison Group quote (Ref: GL20590) and subsequent correspondence. Campbell Reith Hill LLP (CampbellReith) acted as Engineer.

The purpose of the investigation was to provide factual geotechnical and geo-environmental data from the fieldwork and subsequent laboratory testing which will be used to assist with the design for the development of the site.

This report presents the results of the fieldwork, associated laboratory testing and post fieldwork monitoring.

2.0 LOCATION AND DESCRIPTION OF SITE

The site is located on New Lane, Hampshire PO9 2LY and centred on National Grid Reference 472610, 108010 and is approximately between 16 and 26m AOD

The site was previously occupied by Colt International which constituted a factory, warehouse and office buildings with associated hard standing carpark and access roads. At the time of the investigation the site was being demolished. The majority of the warehouse had been demolished with only part of the north western roof remaining. During the investigation the five storey office building was also being demolished.

The local topography (which sloped to the southeast) was accommodated by a retaining wall on the north west boundary and an embankment running across the site. This level change separated a higher car parking area in the west from the warehouse and factory floor level in the east.

The site was bounded to the north by Bartons Road, to the east by New Lane and to the west by Martins Road. The southern boundary is formed by Marsh Plant hire and several smaller commercial units.

A site location plan GL20590-DR001 is presented in Appendix A.

3.0 EXPECTED GEOLOGY

The site was expected to be underlain by superficial deposits, comprising of Head Deposits with the central portion of the site described as horizons of clay, silt, sand and gravel. The eastern portion is described as a clayey gravel. The superficial deposits are absent from the west.

Underlying the superficial deposits the solid geology of London Clay over Lambeth Group was expected.

4.0 FIELDWORK

The scope of the site works was generally in accordance with that proposed by CampbellReith and comprised the following:

- Surveying of the exploratory locations (carried out by Midland Survey Ltd)
- Cable Percussive Boreholes (2 No. to maximum depth of 17.50mbgl)
- Dynamic Continuous Sample Holes (7 No. to maximum depth of 5.45mbgl)
- Hand excavated Trial Pits (4 No. to maximum depth of 1.00mbgl)
- Machine excavated Trial Pits (9 No. to maximum depth of 3.10mbgl)
- Gas and groundwater monitoring of both newly installed and historic installations (4 No. rounds to date)
- Installation of down the borehole sondes (6 No.) to record variation in near surface groundwater levels over a 12 month period. This work is ongoing and elements will be reported under separate cover.

The intrusive fieldwork was carried out by HGE between the 21st and 23rd May 2018 and between the 4th and 6th June 2018. All exploratory locations are detailed on the appended drawing GL20590-DR002 presented in Appendix A.

In addition to consulting all available service plans, lifting all available covers and prior to intrusive activities taking place, service clearance was carried out using Ground Penetrating Radar (GPR). Service inspection pits were also dug at borehole locations to clear near surface utilities.

The sampling strategy was designed by CampbellReith and took into account local site constraints, but included reference to topography of the site, the geology encountered, including made ground and the development proposals.

Prior to intrusive activities taking place, an explosive ordnance briefing and surface scan of the exploratory locations was carried out by MACC International. A magnetometer survey was undertaken in all exploratory holes penetrating greater than 1.20m.

RP Archelogy provided a watching brief of the site works in the area of the western car park. This was part of a pre planning application and was intended to assess levels of made ground and the potential for archaeology.

During and immediately following completion of the fieldwork geotechnical samples were transported to Harrison Group's Laboratory in Norwich via in house transportation where, upon arrival, they were logged into a sample management system. Following receipt of the CampbellReith geotechnical schedules, certain geotechnical samples were subsequently dispatched to laboratory subcontractors via courier.

Environmental samples were dispatched to the nominated chemical testing laboratory using cool boxes and refrigerant blocks. Chain of Custody (CoC) Sheets were prepared, copies of which accompanied the samples.

4.1 Cable Percussive Boreholes

2 No. cable percussive boreholes, BH201 and BH202A, were required in order to sample, test and log the sub-soils underlying the site. The boreholes were progressed using 200mm and 150mm diameter casing to a maximum depth of 17.50mbgl.

BH202 was terminated within the starter pit due to encountering groundwater. The position was moved to BH202A.

Upon completion, all three boreholes were installed with gas and groundwater monitoring wells (50mm diameter), as summarised in Table 4.5.

A detailed description of all the strata encountered, position and types of samples and in-situ tests taken, along with any groundwater observations made at the time of drilling are included on the borehole logs presented in Appendix B.

4.2 Dynamic Continuous Sample Holes

7 No. dynamic continuous sampler (window sample) holes, WS201 through to WS207, were progressed to a maximum depth of 5.45mbgl.

WS201 was terminated at 0.50mbgl due to encountering a brick wall. WS207 was terminated at 0.50mbgl due to encountering an obstruction.

Upon completion four holes, WS202, WS204, WS205 and WS206, were installed with 50mm gas and groundwater monitoring wells, as summarised in Table 4.5.

A detailed description of all the strata encountered, position and types of samples and in-situ tests taken, along with any groundwater observations made at the time of drilling are included on the borehole logs presented in Appendix B.

4.3 Hand Excavated Trial Pits

4 No. inspection pits HP201, HP202, HP203 and HP204 were hand dug to a maximum depth of 1.00mbgl.

HP203 and HP204 replaced TP201 and TP203 respectively due to access constraints.

HP201 terminated at 0.40mbgl due to encountering a service. HP202 and HP 204 terminated at 0.60mbgl and 0.80mbgl respectively due to encountering an obstruction.

Upon completion these trial pits were backfilled with spoil arising from the digging process. Details of the test results detailed descriptions of the strata encountered; position and types of samples taken and any groundwater observations made at the time of excavating are included on the relevant record sheets presented in Appendix B.

4.4 Machine Excavated Trial Pits

9 No. machine excavated trial pits, TP202 and TP204-TP211, were excavated to a maximum depth of 3.10mbgl in order to sample, test and log the subsoils underlying the site. They were excavated using an 8 Tonne 360° Excavator.

TP207 was terminated at 1.10mbgl due to encountering a service. TP211 was terminated at 2.00mbgl due to encountering a service.

A detailed description of all the strata encountered, position and types of samples taken, tests performed; along with any groundwater observations made at the time of excavation are included on the trial pit logs presented in Appendix B.

4.5 Installations

The cable percussive boreholes and 4 No. of the dynamic continuous sample holes were installed with standpipes for monitoring the gas and groundwater within the soils encountered.

Table 4.5 below summarises these installations.

Monitoring Point I.D	Diameter of Installation (mm)	Base Depth of Installation (mbgl)	Response Zone (mbgl)	
			Top	Base
BH201	50	12.00	5.00	12.00
BH202A	50	12.00	4.00	12.00
WS202	50	2.60	1.00	2.60
WS204	50	3.90	0.90	3.90
WS205	50	2.80	0.80	2.80
WS206	50	2.00	1.00	2.00

Table 4.5: Summary of Gas and Groundwater Installations.

Detailed descriptions of the installations and their corresponding backfill materials are included on the relevant exploratory hole logs presented in Appendix B.

4.6 Surveying

Exploratory locations were surveyed whilst undertaking a utility clearance survey upon commencement of each stage of site works, 21st May and 4th June 2018 respectively, to establish co-ordinates and levels.

The locations are presented on the exploratory location plan GL20590-DR002 presented in Appendix A. Co-ordinates and levels are detailed on the relevant logs presented in Appendix B.

4.7 Gas and Groundwater Monitoring

Four rounds of gas and groundwater monitoring have been undertaken on HGE borehole installations together with a number of historic borehole locations on the following dates:

- Round 1 – 30th May 2018
- Round 2 – 21st June 2018
- Round 3 – 26th June 2018
- Round 4 – 7th September 2018

The results of the water strikes encountered during the intrusive works are detailed on the relevant logs presented in Appendix B. The standing groundwater water levels from the subsequent monitoring rounds detailed above are presented in Appendix C.

The borehole installations were developed on the 30th May 2018 utilising a submersible Whale Purger Pump and/or a Waterra PP1 pump in general accordance with BS ISO 14686 (2003).

Ground water samples from the installations were collected as part of the monitoring round on the 21st June 2018. Four rounds of gas monitoring were also undertaken on the above dates (undertaken prior to groundwater monitoring and sampling). Concentrations of oxygen, methane, carbon dioxide, carbon monoxide and hydrogen sulphide were measured using a GA5000 land gas analyser. Concentrations of volatile organic compounds (VOCs) were monitored using a Tiger particle ionisation detector (PID). The results are presented in Appendix C.

At the request of the engineer Rugged TROLL 100 Data Loggers were placed at the base of historical 50mm monitoring installations in BH1, BH4, BH7 and BH11 and in HGE borehole installations

WS204 and WS207 to establish seasonal variation of the groundwater table over a 12 month period. The Data Loggers were placed in installed on the 26th June 2018 with the first set of readings downloaded on the 7th September.

The Data Loggers were set to record temperature, pressure and depth every 30 minutes. Barometric data was then used to correct and calculate accurate pressure head readings.

The results have been provided to the engineer in excel format and are presented in graphical format in Appendix C.

5.0 GEOTECHNICAL TESTING

Use of the laboratory and field tests presented below to establish geotechnical parameters should be carried out in accordance with BS EN 1997-2 Eurocode Part 2.

5.1 In-situ Testing

In-situ testing was undertaken for geotechnical purposes and samples were obtained for appropriate laboratory analysis. Site based geotechnical testing is presented in the Appendix B and summarised below (Table 5.1).

Test Type and Reference	Number	Comments / Limitations
Standard penetration test (BS EN ISO 22476-3:2005)	28	Standard Penetration Tests (SPTs) display a degree of scatter, with some elevated values likely to be due to encountering bricks, gravels and cobbles within the made ground or encountering water strikes. Non calibrated SPT hammers can result in a wide variance between reported results. It should be noted we report raw SPT N values rather than corrected $N_{(60)}$ values. However, calibration certificates are provided in Appendix B so as to enable $N_{(60)}$ values to be calculated if required.
Pocket Penetrometer	10	The Pocket penetrometer provides an estimate of unconfined compressive strength. Such data can be used to provide an estimate of undrained shear strength, but due to operational reasons, it should be noted that the equipment is far less precise than other tests methods, especially when undertaken on samples obtained from dynamic sampling equipment. Such testing equipment is not considered sufficiently robust to enable the undrained shear strength to be determined in an absolute sense for using in bearing resistance calculations, but can provide information on relative strength which can act to assist as a secondary source of data (to supplement moisture content data) in the assessment of desiccation.

Table 5.1: Summary of In Situ Geotechnical Testing

The cable percussive borehole SPT Hammer Test Report (SPT Hammer Ref: SI03/64%) and dynamic continuous sampler SPT Hammer Test Reports (SPT Hammer Ref: 382709/88%) are presented in Appendix E.

5.2 Geotechnical Laboratory Testing

Geotechnical laboratory testing scheduled by CampbellReith on selected soil samples recovered from the exploratory holes, was carried out to identify the physical characteristics of the soils encountered.

The results of this work are presented in Appendix D and are summarised overleaf (Table 5.2). Any restrictions in the testing schedule were notified by the laboratory, details of which are provided in the appended data sheet.

Test Type and Reference (BS 1377: 1990 unless stated)	No of tests	Results (Range)	Comments / Limitations
Water Content (BS EN ISO 17892-1 : 2014)	37	8.9 - 36%	Determinations on disturbed samples, including those obtained from dynamic continuous sampler boreholes may not be wholly representative due to disturbance arising from the sampling process.
Liquid Limit (Part 2:5)	17	35 - 77%	Only material passing a 425micron sieve is utilised. Therefore, the results may not be wholly representative of in-situ material. BH201 at 1.50m and WS205 at 1.50m – Insufficient sample after preparation.
Plastic Limit (Part 2:5)	17	14 - 20%	
Particle size distribution - wet sieving (Part 2:9.3)	6	n/a	The recovery of an adequate mass of coarse grained soils for particle distribution analysis can be difficult in boreholes. In obtaining such samples from cable tool boreholes it should also be noted that some loss of fine material generally occurs due to the nature of the sampling process.
Undrained strength of a single 100mm diameter specimen in triaxial compression without measurement of pore water pressure (Part 7:1990:8.0)	8	61 - 291 kPa	The test should be performed on an undisturbed sample. Sample disturbance may occur during the sampling and extraction process, especially in soft soils. Sample requirement normally 2:1 height: diameter ratio as single multistage or multiple samples. Difficulty in sampling (stiff or very soft soils) may mean insufficient sample. Maximum particle size 20mm. BH201 at 15m - Unable to prepare test specimen of suitable length. Determinations of undrained shear strength can be affected by sample disturbance. Whilst this is reduced by the use of UT100 sampling equipment, this cannot be fully eliminated and will require due consideration in appraising the results, especially where an elevated number of blows were required to retrieve the sample. Determinations of undrained shear strength can also be affected by the presence of fissures. Whilst this is reduced by the application of a suitable confining pressure in the test, low strength values can still occur due to these features.
Organic Matter	7	0.2 - 1.1%	-
Water Soluble Sulphate,	22	0.0066 - 1.1 g/l	-
pH	22	6.5 - 8.4	-
Acid Soluble Sulphate (Total)	17	0.015 - 0.298%	-
Sulphur (total)	17	0.006 - 4.73%	-
Magnesium (Water Soluble)	2	5.2 - 37 mg/kg	-
W/S Chloride in 2:1	2	7.8 - 22 mg/l	-
W/S Nitrate in 2:1	2	<2.0 - 6.3 mg/l	-

Table 5.2: Summary of Geotechnical Laboratory Testing

6.0 CONTAMINATION TESTING

6.1 Environmental Laboratory Testing

Environmental laboratory testing was scheduled by CampbellReith on selected soil and groundwater samples recovered from the exploratory holes to identify the chemical characteristics. HGE sampled the groundwater and dispatched samples to the laboratory directly.

The type and quantity of environmental laboratory testing required for this job is summarised below (Table 6.1). The results are presented in Appendix D.

Test Type	No. Of Tests
Soil	
s1.3 - Asbestos in soil (screening)	24
s1.4 - Total Organic Carbon	3
s1.6 - As, Cd, Cr, Ni, Pb, Hg, Se, Cu, Zn, Moisture content, PAHs USEPA 16, GRO (C6-C10), EPH Banded (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, >C21) Sulphate, (total), Sulphide, Phenols Monohydric (Total of Phenol + Cresol + Xylenol), Cyanide (total), pH)	24
s1.7 - TPH – CWG (C5-40) Aliphatic/Aromatic Split (with CWG banding), Ali C5-6,>6-8,>8-10,>10-12,>12-16,>16-35,>35-44, Aro - >C6-7,>7-8,>8-10,>C10-12,>12-16,>16-21,>21-35, >35-44	2
s1.9 - Identification of Asbestos in bulk materials by PLM - Stage 1 Present / Absent	1
s1.11 - Soil - Screening, identification and quantification - Stage 2 LOD 0.001%	1
s1.12 - Soil Leachate preparation (specific determinants specified as water)	3
Water	
w1.1 - As, Cd, Cr, Cu, Ni, Zn, Pb, Hg, B, Se, Hex Chromium, Total Cyanide, Free Cyanide, Soluble Sulphate, Sulphide, Free Sulphur, Speciated (16) PAHs, Phenols, Thiocyanate, Total TPH, pH	7
w1.5 - TPH CWG (C5-35) based on TNRCC method 1006	3
w1.6 - Petrol Range Organics	4
w1.7 - BTEX by GC-MS (Modified US EPA 8150)	1

Table 6.1: Summary of Environmental Testing

Report Compiled by:



Iain Reid BSc (Hons) MSc FGS
Graduate Geotechnical Engineer

Report Checked by:



Glenn Pursey BSc (Hons) FGS
Senior Geotechnical Engineer

REFERENCES

BSI British Standard, BS5930:2015 "Code of Practice for Site Investigations".

BSI British Standard, BS1377:2016, "Methods of Test for Soils for Civil Engineering Purposes".

BS EN ISO 17892-1: 2014 Geotechnical investigation and testing. Laboratory testing of soil. Determination of water content.

BS EN 1997-1 Eurocode 7 Part 1 "General Rules"

BS EN 1997-2 Eurocode 7 Part 2 "Ground Investigation and Testing"

BS EN ISO 22475-1:2006 & 22475-2/3:2011 Geotechnical investigation and testing. Sampling methods and groundwater measurements.

BS EN ISO 22476:2005+A1:2011 Geotechnical investigation and testing. Various.

BS EN ISO 14688-2:2004 Geotechnical investigation and testing. Identification and classification of soil. Principles for a classification.

BRE Special Digest 1:2005 Concrete in Aggressive Ground.

LIST OF APPENDICES

APPENDIX A: DRAWINGS

Site Definition Plan – (GL20590 – DR001)

Exploratory Location Plan – (GL20590 – DR002)

APPENDIX B: EXPLORATORY HOLE RECORDS

Data Sheet: Site Investigation Methods

Key to Site Investigation Records

Cable Percussive Borehole Records

Window Sample Records

Hand Pit Records

Trial Pit Records

Trial Pit Plates

APPENDIX C: GAS & GROUNDWATER MONITORING RECORDS

Gas & Groundwater	Round 1 – 30th May 2018
	Round 2 – 21st June 2018
	Round 3 – 26th June 2018
	Round 4 – 7th September 2018
Datalogger Plots	Round 1 – 26th June to 7th September 2018

APPENDIX D: LABORATORY TESTING

Geotechnical Laboratory Test Results

GL20590-01 Summary of Restricted Test

GL20590-01 Test Report Transmittal

18-90925-1

Chemical Laboratory Test Results

18-87090-1

18-89320-1

18-90472-1

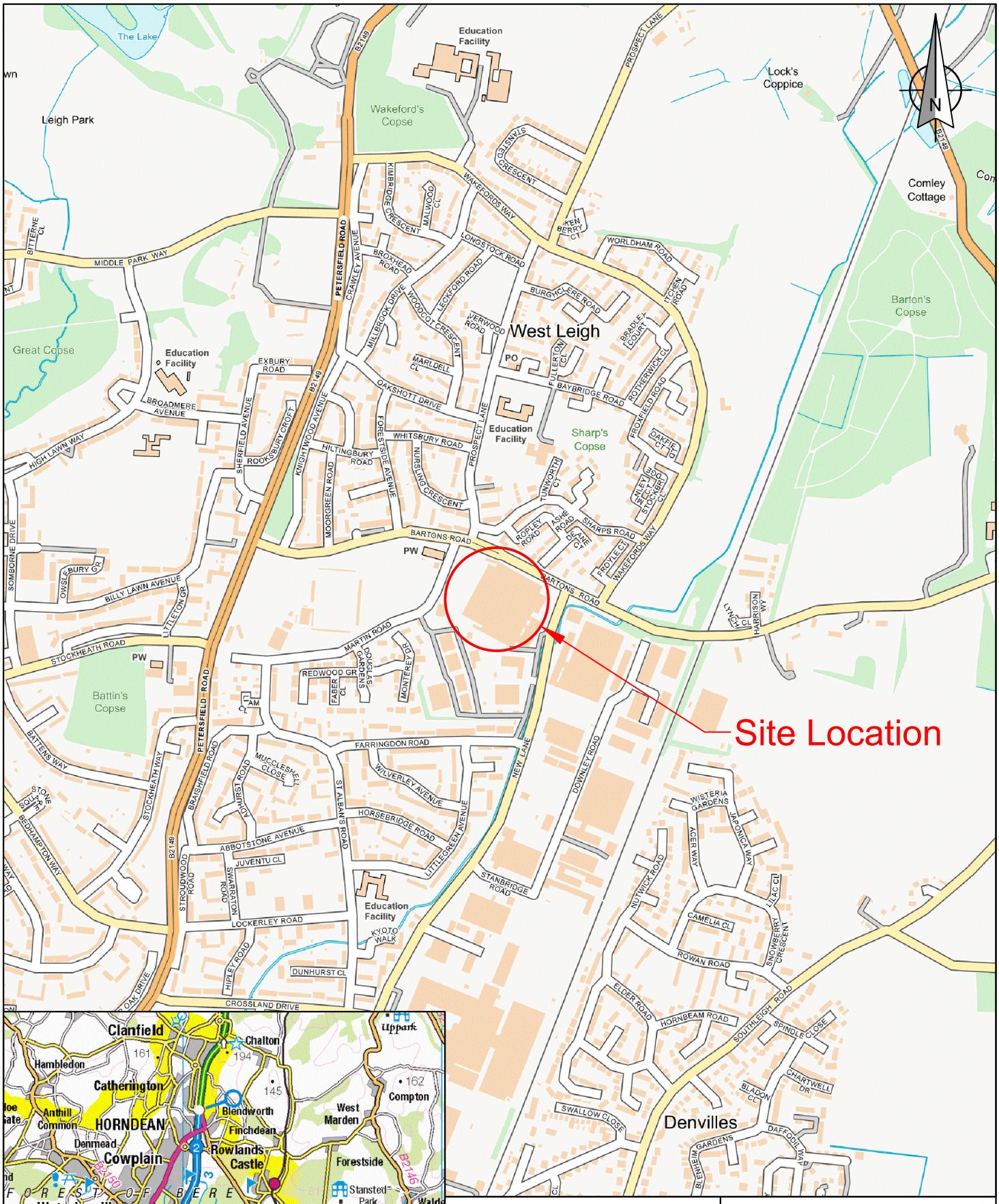
APPENDIX E: RIG CERTIFICATES

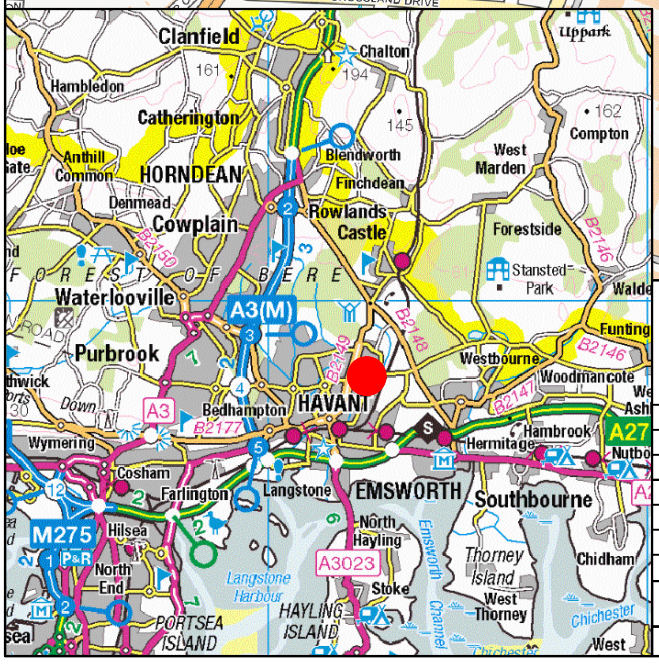
SPT Hammer Certificates

APPENDIX A

DRAWINGS

FM-Hn-D-104 Rev B N:\Norwich Projects\London Jobs\20000 Jobs\GL20590\Drawings\CAD Files\GL20590 – DR001.dwg





Client : Hughes & Salvidge Limited	
Project : Colt International, Havant	
Job No : GL20590	Date : June 2018
Drawing No : GL20590 - DR001	
Scale : 1:10000 @ A4	
Drawn by : CS	Checked by : GP
Eastings : 472600	Northings : 108013

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ISOQAR REGISTERED 0026
UKAS MANAGEMENT SYSTEMS
UKAS TESTING 4031

Certificate Number 5933
ISO 9001, ISO 14001

FM-Hn-D-101 Rev B N:\Norwich\Projects\London jobs\20000 Jobs\GL20590\Drawings\CAD Files\GL20590 - DR002.dwg



Key :

BH201	Cable Percussive Borehole
WS201	Dynamic Continuous Sampling Borehole
HP201	Hand Excavated Trial Pit
TP202	Machine Excavated Trial Pit
BH1	Historic Cable Percussive Borehole

Notes :

Client : Hughes & Salvidge Limited

Project : Colt International, Havant

Job No : GL20590 Date : June 2018

Drawing Title : Fieldwork Location Plan

Drawing No : GL20590 - DR002

Scale : 1:1000 @ A3

Drawn by : CS Checked by : GP

Eastings : 472600 Northings : 108013

Revision history

Rev	Date	Revision Data

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ISOQAR REGISTERED 0026 UKAS MANAGEMENT SYSTEMS UKAS TESTING 4031

Certificate Number 5933
ISO 9001, ISO 14001

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APPENDIX B

EXPLORATORY HOLE RECORDS

DATASHEET: SITE INVESTIGATION METHODS

This datasheet provides basic details of the methods employed during the undertaking of site investigations. Detailed method statements may be provided if requested or further information may be obtained from the relevant British Standards or other quoted publications. Investigations are generally carried out in accordance with BS 5930:2015, "Code of practice for ground investigations", BS 10175:2011+A1:2013, "Investigation of potentially contaminated sites – Code of Practice, and BS EN ISO 1997-2:2007, "Eurocode 7 – Geotechnical design – Part 2: Ground investigation and testing".

Prior to any excavation being undertaken, service plans are obtained and/or a service tracing team may be employed to locate and mark up service locations. A surface sweep using a cable avoidance tool (CAT) is undertaken, in order to avoid services and service inspection pits are generally hand excavated prior to commencing work with any mechanical plant.

CABLE PERCUSSIVE BOREHOLES

The cable percussive borehole drilling rig may be towed by a 4x4 pick up or similar vehicle, and is capable of forming cased boreholes to depths of up to 50m. The hole may be formed at diameters from 300mm down to the more typical 150mm, with disturbed samples obtained direct from the drilling tools. The equipment requires a minimum 2m access width, and the rig itself is 6m long (11m including tow). A rough 3m x 5m base area is required for drilling, but each site should be considered on specifics.

The technique can penetrate dense made ground, rubble and concrete or weathered rock/thin bands of rock using a chisel. However, in some cases these materials can form obstructions.

Sampling is generally carried out in accordance with BS EN ISO 22475-1:2006, "Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 – Technical principles for execution". A variety of disturbed samples can be obtained for both geotechnical and environmental purposes and undisturbed samples including U100 (thick walled OS-TK/W), UT100 (thin walled OS-T/W) and piston samples (PS-T/W) may be obtained. Standard in-situ testing may include Standard or Cone Penetration Tests (SPT/CPT) to BS EN ISO 22476-3:2005+A1:2011, "Geotechnical investigation and testing – Field testing – Part 3 – Standard penetration test"; vane testing in accordance with BS 1377-9:1990, "Methods of test for soils for civil engineering purposes" and permeability testing in accordance with BS EN ISO 22282-1-6:2012, Geotechnical investigation and testing – Geohydraulic testing – Parts 1 to 6.

Instrumentation/standpipes/monitoring wells can be installed, otherwise the borehole would be backfilled with spoil, or where instructed bentonite, concrete or sand may be used. Excess spoil is either removed from site or left in a tidy heap nearby.

In wet drilling conditions (beneath groundwater level) or where water needs to be added to facilitate drilling, the spoil can spread over a wide area through splashing and flow of the spoil from the tools, unless precautions are taken to prevent this. Conversely, the system can be very clean for instance when drilling through dry clay soil.

DYNAMIC CONTINUOUS SAMPLING (WINDOW SAMPLER) BOREHOLES

The window sampler system comprises a series of varying diameter (100mm down to 36mm) steel tubes of either 1m length, and in the case of window (rather than windowless) having a slot or window cut along the side. The tubes are driven into the ground using a light percussive hammer attached to solid rods, and withdrawn by use of a jack. The hammer may be machine mounted (wheeled or tracked) or for restricted access work, hand held. The soil sample is forced up into the tube during the driving, samples being obtained directly through the slot or window, or in the case of windowless, in plastic liners in the steel tube. The sampler generally achieves depths of around 5m in favourable soils. Use of a super heavy tracked rig allows samples to be retrieved in liners to depths of up to 10m in suitable ground conditions.

Sampling can be carried out from the boreholes in accordance with BS EN ISO 22475-1:2006 and SPT testing can be undertaken in accordance with BS EN ISO 22476-3:2005+A1:2011. In addition small diameter standpipes/monitoring wells can be installed to facilitate the sampling and monitoring of gas and groundwater.

MONITORING WELL INSTALLATIONS

All types of boreholes can be fitted with monitoring wells to enable subsequent sampling and monitoring of groundwater and ground gas levels. Monitoring wells are usually of upvc or hdpe material, although steel may also be used in certain circumstances. Various diameters are available from 19mm upwards, depending upon the size of the borehole. 38mm or 50mm diameter wells are the most commonly used. Wells generally have slotted lower sections which may have a geomesh filter and then are surrounded with a filter medium such as single sized gravel. The upper sections are generally solid casing which is usually grouted to produce a seal with the surrounding ground. The top of the well is generally fitted with a removable cap that may include a gas valve to enable future gas monitoring. The installation is usually protected by a lockable cover set in a concrete base. Details of monitoring well installations and associated backfill are given on the relevant borehole records.

GROUNDWATER MONITORING

Groundwater monitoring is undertaken using an electronic dip meter, which records the depth to water in a standpipe or monitoring well. Alternatively, down-hole pressure transducers cab be utilised which can record variations over an extended period, which is particularly useful in monitoring variations due to tidal influences or when undertaking permeability tests or draw down tests or when undertaking soakaway testing. Where a non-aqueous phase liquid (e.g. floating hydrocarbon layer) is present, an interface meter is utilised to measure the thickness.

GROUND GAS MONITORING

Ground gas composition and flow monitoring may be undertaken where monitoring wells have been installed. Both flow (litres per hour) and composition (%) are measured using a portable infra-red multi-gas meter, calibrated for methane, carbon dioxide, carbon monoxide, hydrogen sulphide and oxygen. Records are also taken of atmospheric pressure, and relative pressure. The results are presented in the appendix of the report on the relevant records.

Ground gas monitoring can also be undertaken on a continuous basis using in-situ GasClam instrumentation where specific projects warrant accurate identification and quantification of the ground gas regime.

MACHINE EXCAVATED TRIAL PITS

Machine excavated trial pits are undertaken using a wheeled back-hoe or tracked 360 excavator. The hole is progressed, with the supervising Geotechnical Engineer taking samples and/ or carrying out in-situ testing as appropriate. No access may be made in to unstable/ contaminated pits, or into pits greater than 1.20m deep. Where man access is required, shoring can be provided and installed to maintain stability of the excavation. The trial pits are backfilled in compacted layers, with spoil heaped up in order to allow for future settlement. Pits may be taken to a maximum of 4.50m depth in favourable conditions.

Machine excavated trial pits require relatively large clear working areas in which to be carried out and can cause considerable disturbance to the ground surface.

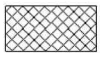
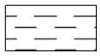
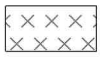
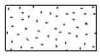
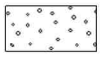
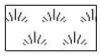
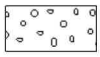
HAND EXCAVATED TRIAL PITS

Hand excavated pits may be undertaken for a variety of reasons, which include service observation pits, obtaining near surface samples, and examining foundations of existing buildings. Pits are excavated using a shovel, postholers and other suitable equipment. Shoring is necessary where pits are to be extended greater than 1.2mbgl and deep excavations may take a considerable time to undertake. Detailed records of hand excavated pits are only normally recorded where foundation depths and detailed information is required.

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Key to Site Investigation Records

Composite Materials, Soils and Lithology

Legend	Code	Description
	101	Topsoil
	102	Made Ground or Fill
	103	Asphalt
	104	Concrete
	201	Clay
	301	Silt
	401	Sand
	501	Gravel
	601	Peat
	701	Cobbles

Legend	Code	Description
	730	Boulders
	801	Mudstone
	802	Siltstone
	803	Sandstone
	804	Limestone or Dolostone
	805	Chalk
	806	Coal
	807	Breccia
	808	Conglomerate
	809	Fine Grained Igneous

Legend	Code	Description
	810	Medium Grained Igneous
	811	Coarse Grained Igneous
	812	Fine Grained Metamorphic
	813	Medium Grained Metamorphic
	814	Coarse Grained Metamorphic
	815	Pyroclastic
	816	Gypsum or Rocksalt
	817	Shale
	998 999	No Recovery Void

NOTE: Composite soil types are represented by combined legends. Each type will have its own code within the AGS data.

Backfill

Legend	Code	Description
	901	Sand Filter
	902 908	Gravel Filter Ballast
	903	Bentonite
	904	Grout
	905	Arisings
	906 912	Concrete Paving Slab
	907	Asphalt
	999	Void

Installations

Legend	Description
	Plain Pipe Slotted Pipe
	Piezometer
	Inclinometer
	Extensometer

Please refer to logs or AGS data for further details on installations and instruments used

Water Observations

Legend	Description
	Water strike
	Standing water level after specified time

Details are provided on each log through the Water Strike table

In-Situ Testing

Prefix	Type	Comments
SPT(S) SPT(C)	Standard Penetration Test (S) Split Spoon (C) Solid Cone	Uncorrected test results at relevant start depth Hammer ID and Energy Ratio reported on log and in relevant AGS fields
HV	In-Situ Vane Test	Undrained shear strength reported in kPa Where at least 3 results obtained at same depth, average value may be reported
PP	In-Situ Hand Penetrometer Test	Undrained shear strength reported in kPa Where at least 3 results obtained at same depth, average value may be reported
PID	On-Site Volatile Headspace Testing by Photo-Ionisation Detector	Screening reported as ppmv Head space testing undertaken as per contract documents
PRM	In-Situ Permeability Test	Permeability (k) reported in m/s Please refer to individual test sheets for data and methodology

For Rotary Boreholes:

T.C.R. Total Core Recovery %

S.C.R. Solid Core Recovery %

R.Q.D. Rock Quality Designation %

Sample Information

Prefix	Type	Comments
D	Small disturbed sample	Nominally 1kg
B	Bulk disturbed sample	Nominally 5kg
LB	Large bulk disturbed sample	Nominally 20kg, for earthworks testing
U	Undisturbed sample - driven tube	For CP, nominally 100mm diameter, 450mm length For WS, nominally 38mm diameter, 100mm length Blows to drive tube and recovery found in remarks
UT	Undisturbed sample - thin walled driven tube	Nominally 100mm diameter, 450mm length Blows to drive tube and recovery found in remarks
P	Pushed piston sample	Nominally 100mm diameter, 1000mm length Recovery found in remarks
C	Core sample	-
AMAL	Amalgamated sample	Details of samples used noted in remarks as well as relevant AGS field
W	Water sample	Not for environmental testing purposes
ES	Environmental soil sample	Multiple containers used where appropriate
EW	Environmental water sample	Multiple containers used where appropriate

AGS

Cable Percussive Borehole Record

BH201

Sheet 1 of 2

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472565.54	N: 108095.60
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 21/05/2018 - 22/05/2018	
	Plant used: Dando 3000 Cable Percussive Rig	SPT Hammer Serial No: SI03 (ER: 64%)	

Geology Description	Legend	Depth (m)	Elevation (maOD) 25.74	Sample / In-Situ Test Information: Type	Depth	Results / Remarks	Date - Depth (m) Casing (Water)	Installation & Backfill
MADE GROUND. ASPHALT.		0.10	25.64					
MADE GROUND. Brown sandy gravelly CLAY with occasional pockets of clayey sand. Gravel is angular to subangular fine to coarse brick, flint, concrete, glass and clinker. Occasional pockets of clayey sandy gravel.		0.90	24.84	ES1 D1 ES2 B1 D2 ES3	0.25 0.50 0.50 0.60 - 0.80 1.00 1.00			
MADE GROUND. Greenish grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine and medium flint and brick. Rare rootlets present.		1.30	24.44	SPT(S) D3	1.50 1.50 - 1.95	N=9 (1,0/1,2,3,3)	1.50 (Dry)	
Soft to firm becoming firm brown and orangish brown CLAY. Rare rootlets present. Rare blue gleying around rootlets. *From 2.00m: Becoming slightly gravelly. Gravel is angular to subangular fine and medium flint.*				D4 UT1 D5 SPT(S) D6	2.00 2.50 - 2.95 3.00 3.50 3.50 - 3.95	Blows = 45. 80% recovered. N=14 (1,2/2,3,4,5)	1.50 (Dry)	
Firm brown and grey CLAY with rare orangish brown silt.		3.90	21.84	D7	4.00			
Firm brown gravelly CLAY. Gravel is angular to subrounded fine to coarse flint. Occasionally slightly sandy		4.50	21.24	UT2 D8	4.50 - 4.95 5.00	Blows = 70. 60% recovered.		
Very dense brown occasionally mottled orangish brown silty fine to coarse SAND.		5.50	20.24	D9 SPT(S) D10	5.50 6.00 6.00 - 6.45	N=50 (5,7/50 for 265mm)	6.00 (5.50)	
At 7.50m: Rare flint fragments.				SPT(S) B2	7.50 7.50 - 7.95	N= (4,7/50 for 215mm)	7.50 (6.00)	
From 9.00m: Becoming medium dense.				SPT(S) D11 D12	9.00 9.00 - 9.45 9.00 - 9.45	N=20 (2,3/4,5,5,6)	9.00 (6.00)	

Chiselling Details		Water Added Records		Water Strike						
Depths (m)	Duration (hh:mm)	Depth (m)	Litres	Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
		5.50 - 10.00	150	21-05-2018 22-05-2018	5.50 17.40		1.50 11.50	20 20	5.10 13.87	Slow flow Medium flow

Hole Diameter by Depth		Casing Diameter by Depth	
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)
17.50	150	11.50	150

Remarks:

1. Inspection pit GL to 1.20m.
2. Installation: 50mm standpipe GL to 5.00m plain, 5.00m to 12.00m slotted, fitted with gas tap, bung and flush cover.
3. Backfill: GL to 5.00m bentonite pellets, 5.00m to 12.00m gravel, 12.00m to 13.00m bentonite pellets, 13.00m too 17.50m arisings.

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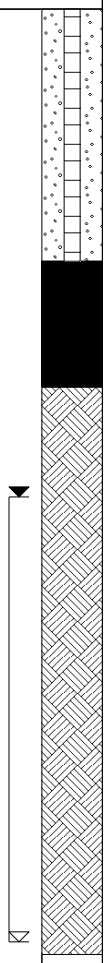
Cable Percussive Borehole Record

BH201 Sheet 2 of 2

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472565.54	N: 108095.60
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 21/05/2018 - 22/05/2018	
	Plant used: Dando 3000 Cable Percussive Rig	SPT Hammer Serial No: SI03 (ER: 64%)	

Geology Description	Depth (m)	Elevation (maOD) 25.74	Sample / In-Situ Test Information: Type	Depth	Results / Remarks	Date - Depth (m) Casing (Water)
Very dense brown occasionally mottled orangish brown silty fine to coarse SAND.						
Medium dense dark grey silty fine to coarse SAND.	10.50	15.24	SPT(S)	10.50	N=18 (2,3/4,4,5,5)	10.50 (6.00)
			B3	10.50 - 10.95		
			D13	10.50 - 10.95		
Stiff dark greenish grey slightly sandy CLAY with occasional lenses of sand and silt and occasional shell fragments.	11.50	14.24	D14	11.50		
			UT3	12.00 - 12.45	Blows = 55. 75% recovered.	
			D15	12.50		
			D16	13.00		
			SPT(S)	13.50	N=26 (2,3/5,6,7,8)	11.50 (Dry)
			D17	13.50 - 13.95		
			D18	14.50		
			UT4	15.00 - 15.45	Blows = 75. 100% recovered.	
			D19	15.50		
			D21	15.50 - 16.95		
			D20	16.00		
			SPT(S)	16.50	N=29 (2,4/5,7,8,9)	11.50 (Dry)
Borehole completed at 17.50m.	17.50	8.24	D22	17.50		

Installation & Backfill



Chiselling Details		Water Added Records	
Depths (m)	Duration (hh:mm)	Depth (m)	Litres
		5.50 - 10.00	150

Water Strike						
Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
21-05-2018	5.50		1.50	20	5.10	Slow flow
22-05-2018	17.40		11.50	20	13.87	Medium flow

Hole Diameter by Depth		Casing Diameter by Depth	
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)
17.50	150	11.50	150

Remarks:

1. Inspection pit GL to 1.20m.
2. Installation: 50mm standpipe GL to 5.00m plain, 5.00m to 12.00m slotted, fitted with gas tap, bung and flush cover.
3. Backfill: GL to 5.00m bentonite pellets, 5.00m to 12.00m gravel, 12.00m to 13.00m bentonite pellets, 13.00m too 17.50m arisings.

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Cable Percussive Borehole Record

BH202

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472620.65	N: 108005.52
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 22/05/2018	
	Plant used: Hand Excavated	SPT Hammer Serial No:	

Geology Description	Legend	Depth (m)	Elevation (maOD) 20.08	Sample / In-Situ Test Information: Type	Depth	Results / Remarks	Date - Depth (m) Casing (Water)	Installation & Backfill
MADE GROUND. CONCRETE with rebar.		0.20	19.88					
MADE GROUND. Reddish brown slightly clayey gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse brick, concrete and flint.		0.30	19.78					
Borehole terminated at 0.30m: Pit flooded								

Chiselling Details		Water Added Records	
Depths (m)	Duration (hh:mm)	Depth (m)	Litres

Water Strike						
Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
						No groundwater encountered

Hole Diameter by Depth		Casing Diameter by Depth	
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)

Remarks:

1. Inspection pit from GL to 0.30m.
2. Borehole terminated early due to inspection pit becoming flooded.
3. Backfill: GL to 0.30m arisings.

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Cable Percussive Borehole Record

BH202A | Sheet 1 of 2

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472632.95	N: 107998.84
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 22/05/2018 - 23/05/2018	
	Plant used: Dando 3000 Cable Percussive Rig	SPT Hammer Serial No: SI03 (ER: 64%)	

Geology Description	Legend	Depth (m)	Elevation (maOD) 20.08	Sample / In-Situ Test Information: Type	Depth	Results / Remarks	Date - Depth (m) Casing (Water)	Installation & Backfill
MADE GROUND. CONCRETE.		0.20	19.88					
MADE GROUND. Soft to firm to firm brown slightly gravelly CLAY. Gravel is angular to subangular fine to coarse concrete, flint and brick. Occasionally slightly sandy.				D1	0.50			
				ES1	0.50			
				D2	1.00			
				ES2	1.00			
From 1.50m: Becoming mottled bluish grey.				SPT(C)	1.50	N=14 (1,2/3,3,3,5)	- (1.40)	
				B1	1.50 - 1.95			
Firm brown and grey gravelly CLAY. Gravel is angular to subrounded fine to coarse flint.		1.80	18.28	ES3	1.50			
				D3	2.00			
Firm bluish grey mottled orangish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse flint.		2.30	17.78	SPT(C)	2.50	N=13 (1,1/2,3,4,4)	- (Dry)	
				B2	2.50 - 2.95			
				D4	3.00			
Firm to stiff dark grey CLAY with rare lenses of silt and rare shell fragments. Occasionally slightly sandy.		3.20	16.88	UT1	3.50 - 3.95	Blows = 30. 100% recovered.		
				D5	4.00			
				SPT(S)	4.50	N=11 (1,2/2,2,3,4)	- (Dry)	
				D6	4.50 - 4.95			
				D7	5.50			
				UT2	6.00 - 6.45	Blows = 35. 90% recovered.		
				D8	6.50			
				D9	7.00			
At 7.50m: Claystone fragments.				SPT(S)	7.50	N=28 (2,3/5,6,8,9)	- (6.50)	
				D10	7.50 - 7.95			
				D11	8.50			
At 9.00m: Rare siltstone fragments.				UT3	9.00 - 9.45	Blows = 50. 100% recovered.		
				D12	9.50			
				D13	10.00			

Chiselling Details		Water Added Records	
Depths (m)	Duration (hh:mm)	Depth (m)	Litres

Water Strike						
Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
22-05-2018	6.00		3.00	20	5.34	Slow flow
23-05-2018	12.50		9.00	20	9.73	Medium flow

Hole Diameter by Depth		Casing Diameter by Depth	
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)
12.50	150	9.00	150

Remarks:

1. Inspection pit GL to 1.20m.
2. Installation: 50mm standpipe GL to 4.00m plain, 4.00m to 12.00m slotted, fitted with gas tap, bung and flush cover.
3. Backfill: GL to 4.00m bentonite pellets, 4.00m to 12.50m gravel.

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Cable Percussive Borehole Record

BH202A Sheet 2 of 2

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472632.95	N: 107998.84
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 22/05/2018 - 23/05/2018	
	Plant used: Dando 3000 Cable Percussive Rig	SPT Hammer Serial No: SI03 (ER: 64%)	

Geology Description	Legend	Depth (m)	Elevation (maOD) 20.08	Sample / In-Situ Test Information			Date - Depth (m) Casing (Water)	Installation & Backfill
				Type	Depth	Results / Remarks		
Firm to stiff dark grey CLAY with rare lenses of silt and rare shell fragments. Occasionally slightly sandy.				SPT(S)	10.50	N=36 (3,5/6,8,10,12)	- (Damp)	
				D14	10.50 - 10.95			
				D15	11.50			
At 12.00m: Rare siltstone fragments.				UT4	12.00 - 12.45	Blows = 85. 75% recovered.		
Borehole completed at 12.50m.		12.50	7.58	D16	12.50			

Chiselling Details		Water Added Records	
Depths (m)	Duration (hh:mm)	Depth (m)	Litres

Water Strike						
Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
22-05-2018	6.00		3.00	20	5.34	Slow flow
23-05-2018	12.50		9.00	20	9.73	Medium flow

Hole Diameter by Depth		Casing Diameter by Depth	
Depth Base (m)	Diameter (mm)	Depth Base (m)	Diameter (mm)
12.50	150	9.00	150

Remarks:

1. Inspection pit GL to 1.20m.
2. Installation: 50mm standpipe GL to 4.00m plain, 4.00m to 12.00m slotted, fitted with gas tap, bung and flush cover.
3. Backfill: GL to 4.00m bentonite pellets, 4.00m to 12.50m gravel.

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Trial Pit Record

HP201

Sheet 1 of 1

Project ID:	**GL20590**	Client:	Hughes & Salvidge Limited	E: 472708.04	N: 108034.55
Location:	Colt International, Havant	Consultant:	Campbell Reith Hill LLP		
		Plant used:	Hand Excavated	Date: 05/06/2018	

Geology Description	Legend	Depth	Elevation (maOD) 18.95	Sample / In-Situ Test Information			Installation & Backfill
				Type	Depth	Results / Remarks	
MADE GROUND. Brown slightly clayey slightly silty slightly gravelly fine to coarse SAND. Gravel is subangular fine to coarse flint, concrete, glass, brick and chalk. Occasional roots and rootlets present.				ES1	0.20		
Trial pit terminated at 0.40m: Services encountered		0.40	18.55				

Weather: Cloudy and dry

Pit Stability: Stable

Shoring Used:

Pit Dimensions: L: 0.30m x W: 0.30m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
				No groundwater encountered

Remarks

1. Backfill: GL to 0.40m arisings.
2. Pit terminated early due to services encountered.

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Trial Pit Record

HP202

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472718.50	N: 108021.69
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP		
	Plant used: Hand Excavated	Date: 05/06/2018	

Geology Description	Legend	Depth	Elevation (maOD) 18.95	Sample / In-Situ Test Information: Type	Sample / In-Situ Test Information: Depth	Sample / In-Situ Test Information: Results / Remarks	Installation & Backfill
MADE GROUND. Dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse flint. Occasional rootlets present.		0.10	18.85				
MADE GROUND. Dark brown slightly gravelly clayey fine to coarse SAND. Gravel is angular to subangular fine to coarse flint, brick, concrete and clay pipe. *At 0.20m: Suspected asbestos fragment.*				ES1	0.20		
				ES2	0.50		
Trial pit terminated at 0.60m: Concrete obstruction		0.60	18.35				

Weather: Cloudy and dry

Pit Stability: Stable

Shoring Used:

Pit Dimensions: L: 0.30m x W: 0.30m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
				No groundwater encountered

Remarks

1. Backfill: GL to 0.60m arisings.
2. Pit terminated early due to concrete obstruction.

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Trial Pit Record

HP203

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472666.82	N: 107922.91
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP		
	Plant used: Hand Excavated	Date: 21/05/2018	

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
			18.07	Type	Depth	Results / Remarks	
TOPSOIL. Brown slightly sandy CLAY.		0.10	17.97				
MADE GROUND. Firm to stiff grey sandy gravelly friable CLAY. Gravel is angular to subangular fine to coarse concrete, flint, brick and glass.		0.40	17.67	ES1	0.15		
Soft to firm brown mottled dark grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse flint, brick, concrete and charcoal. *At 0.50m: Cobble of flint and concrete.*		1.00	17.07	ES2	0.50		
Trial pit terminated at 1.00m.				ES3	1.00		

Weather: Sunny and dry

Pit Stability: Stable

Shoring Used:

Pit Dimensions: L: 0.30m x W: 0.30m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
				No groundwater encountered

Remarks

1. Backfill: GL to 1.00m arisings.

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Trial Pit Record

HP204

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472676.92	N: 107943.99
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP		
	Plant used: Hand Excavated	Date: 21/05/2018	

Geology Description	Legend	Depth	Elevation (maOD) 17.99	Sample / In-Situ Test Information: Type	Sample / In-Situ Test Information: Depth	Sample / In-Situ Test Information: Results / Remarks	Installation & Backfill
TOPSOIL. Brown slightly sandy CLAY.		0.10	17.89				
MADE GROUND. Grey slightly silty gravelly fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse concrete, flint and brick. Cobbles are concrete.				ES1	0.15		
MADE GROUND. Brown slightly gravelly sandy CLAY. Gravel is angular to subangular fine to coarse brick, concrete and flint.		0.40	17.59	ES2	0.50		
Trial pit terminated at 0.80m: Concrete obstruction		0.80	17.19				

Weather: Sunny and dry

Pit Stability: Stable

Shoring Used:

Pit Dimensions: L: 0.30m x W: 0.30m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
				No groundwater encountered

Remarks

1. Backfill: GL to 0.80m arisings.
2. Pit terminated early due to concrete obstruction.

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Trial Pit Record

TP202

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472642.48	N: 107921.69
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP		
	Plant used: 8 Tonne Excavator	Date: 05/06/2018	

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
			18.39	Type	Depth	Results / Remarks	
MADE GROUND. ASPHALT.		0.15	18.24				
MADE GROUND. Reddish brown sandy GRAVEL with low cobble content. Gravel is angular to subangular fine to coarse brick. Cobbles are brick.		0.35	18.04	D1	0.40	Southern side of pit	
MADE GROUND. Firm brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse brick, flint and concrete. Staining present.		0.50	17.89	ES1	0.40		
				B1	0.60		
				D2	0.60		
MADE GROUND. Soft to firm dark greenish grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse brick and flint. Rare roots and rare dark grey staining present.		0.80	17.59	ES2	0.60		
				D3	1.00		
Soft dark greenish grey slightly sandy slightly gravelly silty CLAY. Gravel is angular to subangular fine to coarse flint. Rare roots present.		1.20	17.19				
				D4	1.50		
Soft to firm dark greenish grey mottled orangish brown and grey slightly sandy slightly gravelly silty CLAY. Strong hydrocarbon odour.				ES3	1.50		
				B2	1.80		
From 1.60m: Becoming gravelly with occasional pockets of slightly sandy silt.		1.90	16.49				
				B3	2.00		
Soft grey mottled brown slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse flint. Strong hydrocarbon odour. Occasional dark grey staining present.				ES4	2.00		
Trial pit terminated at 2.50m: Dense stratum		2.50	15.89	D5	2.50		

Weather: Cloudy and dry

Pit Stability: Stable

Shoring Used:

Pit Dimensions: L: 2.50m x W: 0.60m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
05-06-2018	2.50			Seepage

Remarks

1. Backfill: GL to 2.50m arisings.
2. Excavation was easy 0.15m to 1.20m, difficult 1.20m to 2.50m.
3. Pit terminated early due to density of gravelly clay.

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Trial Pit Record

TP204

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472620.32	N: 107974.68
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP		
	Plant used: 8 Tonne Excavator	Date: 05/06/2018	

Geology Description	Legend	Depth	Elevation (maOD) 20.13	Sample / In-Situ Test Information: Type	Depth	Results / Remarks	Installation & Backfill
MADE GROUND. CONCRETE with rebar.		0.20	19.93				
MADE GROUND. Brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse flint, brick and concrete.		0.40	19.73	D1 ES1	0.30 0.30		
MADE GROUND. Cream and dark grey slightly silty sandy GRAVEL. Gravel is angular to subangular fine to coarse chalk, flint, brick and asphalt.		0.55	19.58	D2 ES2 B1 D3	0.50 0.50 0.60 0.75		
Soft greenish grey mottled brown slightly sandy slightly gravelly to gravelly CLAY. Gravel is angular to subangular fine to coarse flint.		0.95	19.18	D4	1.00		▼
Soft brown mottled greenish grey slightly sandy slightly gravelly CLAY with occasional pockets of silty sand. Gravel is angular to subrounded fine to coarse flint.		1.30	18.83				
Soft orangish brown and grey slightly sandy silty CLAY. Occasional organic remains present.				B2	1.50		
From 2.00m: Becoming mottled brown.				D5	2.00		
Soft grey mottled brown and orangish brown slightly sandy silty CLAY. Occasional organic remains present.		2.20	17.93	B3	2.50		
Soft dark grey slightly sandy CLAY.		2.70	17.43	D6	2.80		
Trial pit terminated at 3.10m.		3.10	17.03				

Weather: Cloudy and dry

Pit Stability: Stable

Shoring Used:

Pit Dimensions: L: 2.50m x W: 0.60m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
05-06-2018	1.00			Slight seepage

Remarks

1. Backfill: GL to 3.10m arisings.
2. Excavation was difficult GL to 1.30m, easy 1.30m to 3.10m.

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Trial Pit Record

TP205

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472589.80	N: 107999.48
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP		
	Plant used: 8 Tonne Excavator	Date: 05/06/2018	

Geology Description	Legend	Depth	Elevation (maOD) 20.11	Sample / In-Situ Test Information: Type	Sample / In-Situ Test Information: Depth	Sample / In-Situ Test Information: Results / Remarks	Installation & Backfill
MADE GROUND. CONCRETE with rebar.							
MADE GROUND. Pea shingle GRAVEL.		0.20	19.91				
At 0.20m: Plastic membrane.		0.30	19.81	ES1	0.35		
MADE GROUND. Orange slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine and medium flint.		0.40	19.71	B1	0.50		
				ES2	0.50		
Light brown mottled orangish brown silty fine to coarse SAND.							
				D1	1.00		
From 1.50m: Becoming slightly clayey.				B2	1.50		
				D2	2.00		
Trial pit terminated at 2.20m: Pit collapsed		2.20	17.91				

Weather: Cloudy and dry

Pit Stability: Unstable

Shoring Used:

Pit Dimensions: L: 2.50m x W: 0.60m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
				No groundwater encountered

Remarks

1. Backfill: GL to 2.20m arisings.
2. Excavation was very easy.
3. Pit terminated early due to collapse. Pit collapsed from 2.20m to 0.50m.

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Trial Pit Record

TP206

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472650.76	N: 108019.41
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP		
	Plant used: 8 Tonne Excavator	Date: 05/06/2018	

Geology Description	Legend	Depth	Elevation (maOD) 20.11	Sample / In-Situ Test Information: Type	Sample / In-Situ Test Information: Depth	Sample / In-Situ Test Information: Results / Remarks	Installation & Backfill
MADE GROUND. CONCRETE with rebar.		0.20	19.91				
MADE GROUND. Brown slightly clayey slightly sandy GRAVEL. Gravel is angular to subangular fine to coarse brick, concrete, flint and ceramic.		0.45	19.66	D1 ES1	0.30 0.30		
Soft to firm bluish grey and brown slightly gravelly slightly sandy CLAY. Rare dark grey staining present. Gravel is angular to subangular fine and medium flint and brick. (Possible made ground).		0.80	19.31	D2 ES2	0.50 0.50		
Soft orangish brown mottled grey slightly sandy CLAY.				D3	1.00		
Soft to firm dark grey occasionally gravelly CLAY. Occasionally slightly sandy.		1.40	18.71	B1	1.50		
Soft brown mottled bluish grey slightly sandy silty CLAY. Rare organic remains present.		1.90	18.21	D4	2.00		
				D5	2.50		
Firm to stiff dark grey slightly sandy silty CLAY with occasional lenses of greenish brown silt.		2.80	17.31				
Trial pit terminated at 3.00m.		3.00	17.11				

Weather: Cloudy and dry

Pit Stability: Stable

Shoring Used:

Pit Dimensions: L: 2.50m x W: 0.60m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
05-06-2018	0.40			Seepage

Remarks

1. Backfill: GL to 3.00m arisings.
2. Excavation was easy.

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Trial Pit Record

TP207

Sheet 1 of 1

Project ID:	**GL20590**	Client:	Hughes & Salvidge Limited	E: 472575.95	N: 108019.95
Location:	Colt International, Havant	Consultant:	Campbell Reith Hill LLP		
		Plant used:	8 Tonne Excavator	Date: 06/06/2018	

Geology Description	Legend	Depth	Elevation (maOD) 20.12	Sample / In-Situ Test Information: Type	Sample / In-Situ Test Information: Depth	Sample / In-Situ Test Information: Results / Remarks	Installation & Backfill
MADE GROUND. CONCRETE with rebar.		0.20	19.92				
MADE GROUND. Pea shingle GRAVEL. *At 0.20m: Plastic membrane.*		0.40	19.72				
MADE GROUND. Orangish brown slightly silty SAND.		0.50	19.62				
Light brown mottled orangish brown and reddish brown slightly silty to silty fine to coarse SAND with rare gravel of flint. Rare roots and dark grey staining present.				B1 ES1	0.60 0.60		
From 1.00m: Becoming slightly clayey.				D1	1.00		
Trial pit terminated at 1.10m: Clay pipe encountered		1.10	19.02				

Weather:	Sunny and dry
Pit Stability:	Unstable from 0.40m to 1.00m
Shoring Used:	
Pit Dimensions:	L: 2.50m x W: 0.60m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
				No groundwater encountered

Remarks

1. Backfill: GL to 1.10m arisings.
2. Excavation was easy.
3. Pit terminated early due to clay pipe running north to south.

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Trial Pit Record

TP208

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472611.95	N: 108038.05
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP		
	Plant used: 8 Tonne Excavator	Date: 05/06/2018	

Geology Description	Legend	Depth	Elevation (maOD) 20.14	Sample / In-Situ Test Information: Type	Sample / In-Situ Test Information: Depth	Sample / In-Situ Test Information: Results / Remarks	Installation & Backfill
MADE GROUND. CONCRETE with rebar.							
MADE GROUND. Pea shingle GRAVEL.		0.20	19.94				
MADE GROUND. Orangish brown slightly silty SAND.		0.40	19.74				
Greyish brown occasionally mottled orangish brown and reddish brown slightly silty fine to coarse SAND. Occasionally slightly gravelly. Gravel is angular to subangular fine to coarse flint.		0.50	19.64	B1 ES1	0.60 0.60		
				D1	1.00		
				B2	1.50		
				D2	2.00		
From 2.20m: Becoming slightly clayey.							
At 2.50m: Becoming silty.				B3	2.50		
Trial pit terminated at 2.70m.		2.70	17.44				

Weather: Cloudy and dry

Pit Stability: Slight instability from 2.00m

Shoring Used:

Pit Dimensions: L: 2.50m x W: 0.60m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
				No groundwater encountered

Remarks

1. Backfill: GL to 2.70m arisings.
2. Excavation was easy.

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Trial Pit Record

TP209

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472539.35	N: 108011.47
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP		
	Plant used: 8 Tonne Excavator	Date: 04/06/2018	

Geology Description	Legend	Depth	Elevation (maOD)	Sample / In-Situ Test Information			Installation & Backfill
			20.45	Type	Depth	Results / Remarks	
MADE GROUND. Brown slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint, brick and steel. Occasional rootlets present.				B1 D1 ES1	0.20 0.20 0.20		
Soft orangish brown slightly sandy slightly gravelly to gravelly CLAY. Gravel is angular to subrounded fine to coarse flint. Rare rootlets present. Stratum not present at bottom of slope. Occasionally slightly sandy clayey gravel.		0.40	20.05	D2 ES2	0.50 0.50		
Orangish brown mottled grey slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint.		1.00	19.45	B2	1.20		
Yellowish brown slightly silty fine to coarse SAND. *From 2.20m: Silt becoming occasionally slightly silty.*		1.40	19.05	D3 B3	1.50 2.00		
Trial pit terminated at 2.50m.		2.50	17.95	D4	2.50		

Weather: Sunny and dry

Pit Stability: Stable

Shoring Used:

Pit Dimensions: L: 4.00m x W: 0.60m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
				No groundwater encountered

Remarks

1. Backfill: GL to 2.50m arisings.
2. Excavation was easy.

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TP210

Sheet 1 of 1

Project ID:	**GL20590**	Client:	Hughes & Salvidge Limited	E: 472548.54	N: 108031.99
Location:	Colt International, Havant	Consultant:	Campbell Reith Hill LLP		
		Plant used:	8 Tonne Excavator	Date: 04/06/2018	

Geology Description	Legend	Depth	Elevation (maOD) 20.80	Sample / In-Situ Test Information Type	Depth	Results / Remarks	Installation & Backfill
MADE GROUND. Brown slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint, brick and concrete. Frequent rootlets present.				D1	0.20		
		0.30	20.50	ES1	0.20		
MADE GROUND. Soft to firm orangish brown and grey slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse flint and brick fragments. Rare dark grey staining present.		0.50	20.30	B1	0.50 - 0.80		
				D2	0.50		
				ES2	0.50		
MADE GROUND. Soft to firm orangish brown and grey slightly sandy slightly gravelly to gravelly CLAY. Gravel is angular to subrounded fine to coarse flint. Rare rootlets present. Stratum not present at bottom of slope.				D3	1.00		
From 0.90m: Becoming slightly gravelly.		1.20	19.60				
Orangish brown and yellowish brown slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint.				B2	1.50		
		1.90	18.90				
Trial pit terminated at 1.90m.							

Weather:	Sunny and dry
Pit Stability:	Unstable from 0.50m to 1.00m
Shoring Used:	
Pit Dimensions:	L: 3.50m x W: 0.60m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
				No groundwater encountered

Remarks

1. Backfill: GL to 1.90m arisings.
2. Excavation was easy.

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Trial Pit Record

TP211

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472571.46	N: 108069.55
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP		
	Plant used: 8 Tonne Excavator	Date: 04/06/2018	

Geology Description	Legend	Depth	Elevation (maOD) 20.24	Sample / In-Situ Test Information Type	Depth	Results / Remarks	Installation & Backfill
MADE GROUND. Dark brown mottled orangish brown slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse brick, flint and concrete. Frequent rootlets present.				D1 ES1	0.20 0.20		
		0.40	19.84				
MADE GROUND. Dark brown mottled grey and orangish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse flint with occasional brick fragments. Rare roots and rootlets present. *At 0.40m: Black cable at top of slope.* *From 0.40m to 1.80m: At southern side of pit: Orangish brown and yellowish brown slightly silty fine to coarse SAND. Occasionally slightly clayey and slightly gravelly. Gravel is angular to subrounded fine to coarse flint.*				B1 D2 ES2 B2A D3 D3A ES3	0.50 0.50 0.50 1.00 1.00 1.00 1.00	 Southern side of pit	
		1.60	18.64				
MADE GROUND. Orangish brown and yellowish brown slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint.							
		2.00	18.24				
Trial pit terminated at 2.00m: Services encountered							

Weather: Sunny and dry

Pit Stability: Unstable from 1.40m to 2.00m

Shoring Used:

Pit Dimensions: L: 4.00m x W: 0.60m

Water Strike

Date	Strike Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
				No groundwater encountered

Remarks

1. Backfill: GL to 2.00m arisings.
2. Excavation was easy.
3. Pit terminated early due to services encountered.

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Dynamic Continuous Sampling Borehole Record

WS201

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472534.01	N: 108025.46
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 22/05/2018	
	Plant used:	SPT Hammer Serial No:	

Geology Description	Legend	Depth (m)	Elevation (maOD) 24.02	Sample / In-Situ Test Information			Casing (Water)	Installation & Backfill
				Type	Depth	Results / Remarks		
MADE GROUND. ASPHALT.		0.15	23.87					
MADE GROUND. Cream and dark grey gravelly CLAY with low cobble content. Gravel is angular to subangular fine to coarse chalk and asphalt. Cobbles are chalk.		0.40	23.62	ES1	0.45			
MADE GROUND. Brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse flint, brick, chalk, clinker and asphalt.		0.50	23.52					
Borehole terminated at 0.50m: Brick surface encountered								

Window or Windowless Sampling Run Details

Diameter (mm)	Top Depth (m)	Base Depth (m)	Sample Length (m)	Recovery (%)

Water Strike

Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
						No groundwater encountered

Remarks:

1. Inspection pit GL to 0.50m.
2. Borehole terminated early due to brick surface encountered.
3. Backfill: GL to 0.50m arisings.

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Dynamic Continuous Sampling Borehole Record

WS202 | Sheet 1 of 1

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Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472508.53	N: 108046.14
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 21/05/2018 - 22/05/2018	
	Plant used: Premier Tracker	SPT Hammer Serial No: 382709 (ER: 88%)	

Geology Description	Legend	Depth (m)	Elevation (maOD) 24.90	Sample / In-Situ Test Information: Type	Depth	Results / Remarks	Casing (Water)	Installation & Backfill
MADE GROUND. ASPHALT.		0.15	24.75					
MADE GROUND. White slightly clayey sandy GRAVEL. Gravel is angular to subangular fine to coarse chalk with rare brick.		0.40	24.50	D1 ES1	0.20 0.20			
MADE GROUND. Dark grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse chalk, flint and brick. Rare rootlets present.		0.75	24.15	D2 ES2	0.50 0.50			
MADE GROUND. Soft dark grey mottled greenish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine and medium flint with rare brick and chalk fragments.		1.20	23.70	D3 ES3 SPT(C)	1.00 1.00 1.20	N=7 (0,1/2,1,3,1)	- (Dry)	
Firm dark orangish brown and bluish grey slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse flint. Rare rootlets present.		1.70	23.20	D4 PP01	1.50 1.50	74 kPa		
Stiff orangish brown mottled grey CLAY.		2.30	22.60	SPT(C) D5 PP02	2.00 2.00 2.00	N=23 (1,2/3,4,7,9) 108 kPa	- (Dry)	
Firm to stiff brown slightly sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse flint.		2.55	22.35	D6	2.40			
Very dense orangish brown silty fine to coarse SAND.		2.90	22.00	SPT(C)	2.60	N= (9,13/50 for 150mm)	- (Dry)	
Borehole terminated at 2.90m: Dense stratum								

Window or Windowless Sampling Run Details

Diameter (mm)	Top Depth (m)	Base Depth (m)	Sample Length (m)	Recovery (%)
85	1.20	2.00	0.64	80
75	1.80	2.60	0.80	100

Water Strike

Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
						No groundwater encountered

Remarks:

1. Inspeciton pit GL to 1.20m.
2. Borehole terminated early due to dense stratum.
3. Hole collapsed from 2.00m to 1.80m during L01 sampling run.
4. Installation: 50mm standpipe GL to 1.00m plain, 1.00m to 2.60m slotted, fitted with gas tap, bung and flush cover.
5. Backfill: GL to 1.00m bentonite pellets, 1.00m to 2.90m gravel.

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Dynamic Continuous Sampling Borehole Record

WS203

Sheet 1 of 2

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472540.66	N: 108074.24
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 21/05/2018	
	Plant used: Premier Tracker	SPT Hammer Serial No: 382709 (ER: 88%)	

Geology Description	Legend	Depth (m)	Elevation (maOD) 25.42	Sample / In-Situ Test Information			Casing (Water)	Installation & Backfill
				Type	Depth	Results / Remarks		
MADE GROUND. ASPHALT.		0.15	25.27					
MADE GROUND. Cream and dark grey silty GRAVEL. Gravel is angular to subangular fine to coarse chalk and asphalt.		0.20	25.22					
MADE GROUND. Orangish brown gravelly CLAY. Gravel is angular to subangular fine to coarse flint.		0.25	25.17	D1 ES1	0.30 0.30			
MADE GROUND. Soft to firm cream mottled grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse chalk with rare brick fragments.		0.50	24.92	D2 ES2	0.60 0.60			
MADE GROUND. Soft dark grey mottled brown and greenish grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse brick with rare chalk. Rare roots present. *From 0.75m: Becoming greenish grey and slightly gravelly.*		0.90	24.52					
MADE GROUND. Soft brownish grey slightly gravelly CLAY. Gravel is angular to subangular fine and medium flint and brick with rare wood fragments.		1.05	24.37	D3 ES3 SPT(C)	1.00 1.00 1.20	N=3 (0,0/0,1,1,1)	- (Damp)	
Very soft to soft grey mottled bluish grey and greenish brown CLAY. Occasional rootlets and rare roots present.				D4 PP01	1.50 1.50	25 kPa		
Soft to firm becoming firm brown mottled bluish grey CLAY. Rare rootlets present. *From 1.85m to 1.90m: Pockets of blue and orangish brown CLAY.* *Horizontal root present.*		1.80	23.62	SPT(C) D5 PP02	2.00 2.00 2.00	N=7 (0,1/2,1,2,2) 74 kPa	- (Dry)	
				PP03	2.50	98 kPa		
				SPT(C) D6 PP04	3.00 3.00 3.00	N=13 (1,2/2,3,4,4) 123 kPa	- (Dry)	
				PP05	3.50	127 kPa		
Stiff brown mottled dark grey slightly gravelly to gravelly CLAY. Gravel is angular to subrounded fine to coarse flint.		3.90	21.52	PP06 SPT(C) D7	3.90 4.00 4.00	127 kPa N=28 (3,5/7,7,7,7)	- (Dry)	
Very dense orangish brown slightly silty fine to coarse SAND.		4.80	20.62					
				SPT(C) D8	5.00 5.00	N=60 (8,10/11,14,16,19)	- (Dry)	

Window or Windowless Sampling Run Details

Diameter (mm)	Top Depth (m)	Base Depth (m)	Sample Length (m)	Recovery (%)
85	1.20	2.00	0.80	100
75	2.00	3.00	0.80	80
75	2.00	3.00	0.00	0
65	2.80	4.00	0.90	75
55	4.00	5.00	1.00	100

Water Strike

Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
						No groundwater encountered

Remarks:

1. Inspection pit GL to 1.20m.
2. Hole collapsed from 3.00m to 2.80m during L03 sampling run.
3. Backfill: GL to 5.45m arisings.

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Dynamic Continuous Sampling Borehole Record

WS203 | Sheet 2 of 2

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472540.66	N: 108074.24
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 21/05/2018	
	Plant used: Premier Tracker	SPT Hammer Serial No: 382709 (ER: 88%)	

Geology Description	Legend	Depth (m)	Elevation (maOD) 25.42	Sample / In-Situ Test Information: Type	Depth	Results / Remarks	Casing (Water)	Installation & Backfill
Very dense orangish brown slightly silty fine to coarse SAND.								
Borehole completed at 5.45m.		5.45	19.97					

Window or Windowless Sampling Run Details

Diameter (mm)	Top Depth (m)	Base Depth (m)	Sample Length (m)	Recovery (%)
85	1.20	2.00	0.80	100
75	2.00	3.00	0.80	80
75	2.00	3.00	0.00	0
65	2.80	4.00	0.90	75
55	4.00	5.00	1.00	100

Water Strike

Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
						No groundwater encountered

Remarks:

1. Inspection pit GL to 1.20m.
2. Hole collapsed from 3.00m to 2.80m during L03 sampling run.
3. Backfill: GL to 5.45m arisings.

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Dynamic Continuous Sampling Borehole Record

WS204 | Sheet 1 of 1

harrisongroup ENVIRONMENTAL

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472651.07	N: 107988.61
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 22/05/2018	
	Plant used: Premier Tracker	SPT Hammer Serial No: 382709 (ER: 88%)	

Geology Description	Legend	Depth (m)	Elevation (maOD) 20.08	Sample / In-Situ Test Information: Type	Depth	Results / Remarks	Casing (Water)	Installation & Backfill
MADE GROUND. CONCRETE with rebar.								
MADE GROUND. Grey slightly silty gravelly fine to coarse SAND with occasional pockets of sandy clay. Gravel is angular to subangular fine to coarse concrete, brick, flint and chalk.		0.20	19.88	B1 D1 ES1	0.50 0.50 0.50			
MADE GROUND. Cream and dark grey clayey GRAVEL. Gravel is angular to subangular fine to coarse chalk.		0.70	19.38	D2 ES2	1.00 1.00			
Firm to stiff grey mottled brown slightly sandy CLAY.		1.20	18.88	SPT(C)	1.20	N=16 (1,3/5,4,3,4)	- (Dry)	
Soft to firm grey and orangish brown slightly gravelly CLAY. Gravel is angular to subangular fine and medium flint.		1.50	18.58	D3 PP01	1.40 1.50	98 kPa		
Firm brown and grey very gravelly CLAY. Gravel is angular to subrounded fine to coarse flint.		2.20	17.88	SPT(C) D4 PP02 D5	2.00 2.00 2.00 2.50	N=10 (1,1/1,2,3,4) 108 kPa	- (Dry)	
Very soft to soft dark grey occasionally mottled orangish brown sandy CLAY.		3.10	16.98	SPT(C) D6	3.00 3.50	N=4 (3,1/1,1,1,1)	- (3.00)	
Borehole terminated at 4.00m: Hole collapsed		4.00	16.08					

Window or Windowless Sampling Run Details

Diameter (mm)	Top Depth (m)	Base Depth (m)	Sample Length (m)	Recovery (%)
75	1.20	2.00	0.80	100
65	2.00	3.00	0.50	50
65	3.00	4.00	0.50	50
65	3.00	4.00	0.00	0

Water Strike

Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
22-05-2018	3.00					

Remarks:

1. Inspection pit GL to 1.20m.
2. Borehole terminated early due to hole collapse.
3. Hole collapsed from 4.00m to 3.00m during L04 sampling run.
4. Installation: 50mm standpipe GL to 0.90m plain, 0.90m to 3.90m slotted, fitted with gas tap, bung and flush cover.
5. Backfill: GL to 0.90m bentonite pellets, 0.90m to 4.00m gravel.

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Testing Services: 01603 416333

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Website: www.harrisongroupuk.com

Drilled by: Geotecnical Services | Logged by: G. Pursey | Checked by: J.Keay | Fm-Hn-R-3068-Rev C

Dynamic Continuous Sampling Borehole Record

WS205 | Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472598.12	N: 107964.55
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 22/05/2018	
	Plant used: Premier Tracker	SPT Hammer Serial No: 382709 (ER: 88%)	

Geology Description	Legend	Depth (m)	Elevation (maOD) 20.12	Sample / In-Situ Test Information: Type	Depth	Results / Remarks	Casing (Water)	Installation & Backfill
MADE GROUND. CONCRETE with rebar.								
MADE GROUND. Firm brown sandy gravelly CLAY. Gravel is angular to subangular fine to coarse flint, brick and concrete.		0.20	19.92	D1 ES1 B1	0.30 0.30 0.40			
MADE GROUND. Firm grey and greenish grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse flint with occasional brick fragments.		0.60	19.52					
Very stiff grey and greenish grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse flint.		0.80	19.32	D2 ES2 B2 D3	0.75 0.75 0.80 - 1.00 0.90			
				SPT(C)	1.20	N=42 (5,8/11,10,11,10)	- (Dry)	
From 1.50m: Becoming a very clayey slightly sandy gravel.				D4	1.50			
Medium dense brown occasionally mottled reddish brown and grey silty fine to coarse SAND.		1.75	18.37	SPT(C) D5	2.00 2.00	N=11 (3,2/2,3,3,3)	- (2.00)	
Firm orangish brown sandy CLAY. Occasional silty sand.		2.50	17.62	D6	2.50			
Firm dark grey sandy very silty CLAY.		2.80	17.32	D7	2.80			
Borehole terminated at 2.90m: Hole collapsed		2.90	17.22					

Window or Windowless Sampling Run Details

Diameter (mm)	Top Depth (m)	Base Depth (m)	Sample Length (m)	Recovery (%)
85	1.20	2.00	0.80	100
75	2.00	2.90	0.45	50
75	2.00	2.80	0.80	100

Water Strike

Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
22-05-2018	2.00					

Remarks:

1. Inspection pit GL to 1.20m.
2. Borehole terminated early due to hole collapse.
3. Hole collapsed from 2.90m to 2.00m during L02 sampling run.
4. Installation: 50mm standpipe GL to 0.80m plain, 0.80m to 2.80m slotted, fitted with gas tap, bung and flush cover.
5. Backfill: GL to 0.80m bentonite pellets, 0.80m to 2.90m gravel.

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Drilled by: Geotecnical Services | Logged by: G. Pursey | Checked by: J.Keay | Fm-Hn-R-3068-Rev C

Dynamic Continuous Sampling Borehole Record

WS206 | Sheet 1 of 1

harrisongroup ENVIRONMENTAL

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472539.99	N: 108001.32
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 22/05/2018	
	Plant used: Premier Tracker	SPT Hammer Serial No: 382709 (ER: 88%)	

Geology Description	Legend	Depth (m)	Elevation (maOD) 18.60	Sample / In-Situ Test Information			Casing (Water)	Installation & Backfill
				Type	Depth	Results / Remarks		
TOPSOIL. Brown slightly gravelly clayey fine to coarse SAND. Gravel is angular to subangular fine and medium flint. Frequent rootlets present.		0.10	18.50	ES1 B1	0.15 0.20			
Grey slightly silty fine to coarse SAND and GRAVEL with low cobble content. Gravel is angular to subangular fine to coarse flint and chalk. Cobbles are flint. Occasional glass fragments.		0.40	18.20	B2 ES2	0.50 0.50			
Brown slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine and medium flint.		0.60	18.00					
Medium dense brown mottled dark grey silty fine to coarse SAND.				D1	1.00			
				SPT(C)	1.20	N=18 (2,2/3,5,5,5)	- (Dry)	
				D2	1.50			
				SPT(C) D3	2.00 2.00	N=21 (2,3/4,5,6,6)	- (1.40)	
Borehole terminated at 2.45m: Hole collapsed		2.45	16.15					

Window or Windowless Sampling Run Details

Diameter (mm)	Top Depth (m)	Base Depth (m)	Sample Length (m)	Recovery (%)
85	1.20	2.00	0.80	100
85	1.40	2.00	0.60	100

Water Strike

Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
22-05-2018	1.40					

Remarks:

1. Inspection pit GL to 1.20m.
2. Borehole terminated early due to hole collapse.
3. Hole collapsed from 2.00m to 1.40m during L01 sampling run.
3. Installation: 50mm standpipe GL to 1.00 plain, 1.00m to 2.00m slotted, fitted with gas tap, bung and flush cover.
5. Backfill: GL to 1.00m bentonite pellets, 1.00m to 2.45m gravel.

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Drilled by: Geotecnical Services | Logged by: G. Pursey | Checked by: J.Keay | Fm-Hn-R-3068-Rev C

Dynamic Continuous Sampling Borehole Record

WS207

Sheet 1 of 1

Project ID: **GL20590**	Client: Hughes & Salvidge Limited	E: 472594.78	N: 108080.13
Location: Colt International, Havant	Consultant: Campbell Reith Hill LLP	Date: 22/05/2018	
	Plant used:	SPT Hammer Serial No:	

Geology Description	Legend	Depth (m)	Elevation (maOD) 20.04	Sample / In-Situ Test Information			Casing (Water)	Installation & Backfill
				Type	Depth	Results / Remarks		
TOPSOIL. Brown slightly gravelly clayey fine to coarse SAND. Gravel is angular to subangular fine and medium flint. Frequent rootlets present.		0.10	19.94					
MADE GROUND. Grey slightly silty sandy GRAVEL. Gravel is angular to subangular fine to coarse flint with rare brick.		0.25	19.79	D1 ES1	0.30 0.30			
MADE GROUND. Dark brown and reddish brown clayey gravelly fine to coarse SAND with low cobble content. Gravel is angular to subangular fine to coarse brick and concrete. Cobbles are brick and concrete.		0.50	19.54					
Borehole completed at 0.50m.								

Window or Windowless Sampling Run Details

Diameter (mm)	Top Depth (m)	Base Depth (m)	Sample Length (m)	Recovery (%)

Water Strike

Date	Strike Depth (m)	Depth Sealed (m)	Casing Depth (m)	Time Elapsed (mins)	Standing Level (m)	Remarks
						No groundwater encountered

Remarks:

1. Inspection pit GL to 0.50m.
2. Borehole terminated early due to obstruction.
3. Backfill: GL to 0.50m arisings.

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Drilled by: | Logged by: | Checked by: J.Keay

harrisongroup	**Trial Pit Photograph Record Sheet**
	Project: Colt International, Havant
Client: Hughes & Salvidge Limited	Project ID: GL20590
Exploratory Hole Reference. TP202	Date: 05/06/2018



TP202 - GL to 2.50m



TP202 - Spoil

Remarks	Engineer: G. Pursey	Checked By: J.Keay

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Trial Pit Photograph Record Sheet

Project: Colt International, Havant	
Client: Hughes & Salvidge Limited	Project ID: GL20590
Exploratory Hole Reference. TP204	Date: 05/06/2018



TP204 - GL to 3.10m



TP204 - Spoil

Remarks	Engineer: G. Pursey	Checked By: J.Keay

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Kimberley Street, Norwich, NR2 2RJ

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Trial Pit Photograph Record Sheet

Project: Colt International, Havant	
Client: Hughes & Salvidge Limited	Project ID: GL20590
Exploratory Hole Reference. TP205	Date: 05/06/2018



TP205 - GL to 2.20m



TP205 - Spoil

Remarks	Engineer: G. Pursey	Checked By: J.Keay

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	Project: Colt International, Havant
Client: Hughes & Salvidge Limited	Project ID: GL20590
Exploratory Hole Reference. TP206	Date: 05/06/2018



TP206 - GL to 3.00m



TP206 - Spoil

Remarks	Engineer: G. Pursey	Checked By: J.Keay

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	Project: Colt International, Havant
Client: Hughes & Salvidge Limited	Project ID: GL20590
Exploratory Hole Reference. TP207	Date: 06/06/2018



TP207 - GL to 1.10m



TP207 - Spoil

Remarks	Engineer: G. Pursey	Checked By: J.Keay

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Trial Pit Photograph Record Sheet

	Project: Colt International, Havant
Client: Hughes & Salvidge Limited	Project ID: GL20590
Exploratory Hole Reference. TP208	Date: 05/06/2018



TP208 - GL to 2.70m



TP208 - Spoil

Remarks	Engineer: G. Pursey	Checked By: J.Keay

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Kimberley Street, Norwich, NR2 2RJ

harrisongroup	**Trial Pit Photograph Record Sheet**
	Project: Colt International, Havant
Client: Hughes & Salvidge Limited	Project ID: GL20590
Exploratory Hole Reference. TP209	Date: 04/06/2018



TP209 - GL to 2.50m



TP209 - Spoil

Remarks	Engineer: G. Pursey	Checked By: J.Keay

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Trial Pit Photograph Record Sheet

	Project: Colt International, Havant
Client: Hughes & Salvidge Limited	Project ID: GL20590
Exploratory Hole Reference. TP210	Date: 04/06/2018



TP210 - GL to 1.90m



TP210 - Spoil

Remarks	Engineer: G. Pursey	Checked By: J.Keay

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Trial Pit Photograph Record Sheet

Project: Colt International, Havant	
Client: Hughes & Salvidge Limited	Project ID: GL20590
Exploratory Hole Reference. TP211	Date: 04/06/2018



TP211 - GL to 2.00m



TP210 - Spoil

Remarks	Engineer: G. Pursey	Checked By: J.Keay

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APPENDIX C

GAS & GROUNDWATER MONITORING RECORDS

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring: Dry

Weather Conditions During Monitoring: Overcast

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
BH4	30/05/2018	09:45:00	15	1014	1017	1015	1013	-	0.5	0.9	0.2	0.2	1.0	0.1	20.5	0	0	0.0
		09:45:15							1.4		0.2			4.1	19.8	0	0	0.0
		09:45:30							1.3		0.2			4.6	17.6	0	0	0.0
		09:45:45							1.2		0.2			4.6	16.9	0	0	0.0
		09:46:00							1.2		0.2			4.7	16.8	0	0	0.0
		09:46:30							1.1		0.2			4.7	16.8	0	0	0.0
		09:47:00							1.0		0.2			4.7	16.7	0	0	0.0
		09:48:00							0.9		0.2			4.8	16.7	0	0	0.0
WS204	30/05/2018	10:45:00	15	1014	1017	1015	1013	-	0.5	1.7	0.1	1.1	5.5	0.1	20.5	0	0	0.0
		10:45:15							1.2		0.1			0.0	19.3	0	5	0.0
		10:45:30							1.3		0.1			0.0	18.0	0	5	0.0
		10:45:45							1.4		0.1			0.0	17.9	0	5	0.0
		10:46:00							1.4		0.1			0.0	17.9	0	5	-0.1
		10:46:30							1.4		0.1			0.0	17.7	0	5	0.0
		10:47:00							1.5		1.1			0.0	17.7	0	5	0.0
		10:48:00							1.7		0.1			0.0	17.6	0	4	-0.1
BH7	30/05/2018	11:30:00	15	1014	1017	1015	1013	-	0.5	0.4	6.3	6.3	31.5	0.3	21.1	0	6	7.6
		11:30:15							0.5		5.0			0.0	10.2	3	2	7.4
		11:30:30							0.5		5.0			0.5	10.3	0	2	7.3
		11:30:45							0.5		5.0			0.5	10.3	0	2	6.4
		11:31:00							0.5		5.0			0.3	10.3	0	2	5.9
		11:31:30							0.5		5.0			0.2	10.3	0	2	5.4
		11:32:00							0.4		5.1			0.2	10.3	0	2	4.8
		11:33:00							0.4		5.0			0.1	10.3	0	2	4.2

Field Engineer: IR

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

">" indicates that reading is **over** the limit range,

"*" Level to be determined

Harrison Group Environmental Ltd. Unit 12
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Enfield
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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring: Dry

Weather Conditions During Monitoring: Overcast

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
WS206	30/05/2018	12:00:00	15	1014	1017	1015	1013	-	0.8	1.4	0.1	0.4	2.0	0.2	20.3	0	0	0.0
		12:00:15							1.4		0.4			1.2	19.5	0	0	-0.1
		12:00:30							1.5		0.3			1.1	19.4	0	0	-0.2
		12:00:45							1.5		0.3			1.0	19.6	0	0	-0.2
		12:01:00							1.5		0.2			0.9	19.8	0	0	-0.3
		12:01:30							1.5		0.2			0.8	20.0	0	0	-0.3
		12:02:00							1.5		0.1			0.8	20.0	0	0	-0.3
		12:03:00							1.4		0.1			0.8	20.0	0	0	-0.2
WS202	30/05/2018	12:30:00	15	1014	1017	1015	1013	-	0.2	1.6	0.2	0.3	1.5	0.1	20.3	2	0	-8.7
		12:30:15							1.4		0.3			5.0	15.6	0	3	-8.9
		12:30:30							1.5		0.3			6.0	14.6	0	3	-6.7
		12:30:45							1.6		0.3			6.6	13.8	0	4	-4.9
		12:31:00							1.6		0.3			7.2	13.2	0	4	-3.9
		12:31:30							1.6		0.3			7.3	13.1	0	4	-2.4
		12:32:00							1.6		0.3			7.3	13.0	0	4	-1.3
		12:33:00							1.6		0.3			7.4	12.9	0	4	-0.3
BH11	30/05/2018	13:00:00	15	1014	1017	1015	1013	-	1.0	0.4	0.1	0.1	0.5	0.4	19.5	0	0	0.0
		13:00:15							0.7		0.1			0.5	17.3	0	0	0.0
		13:00:30							0.7		0.1			0.5	17.3	0	0	0.0
		13:00:45							0.6		0.1			0.5	17.4	0	0	0.0
		13:01:00							0.6		0.1			0.5	17.6	0	0	0.0
		13:01:30							0.5		0.1			0.4	18.1	0	0	0.0
		13:02:00							0.5		0.1			0.4	18.7	0	0	0.0
		13:03:00							0.4		0.1			0.3	19.4	0	0	0.0

Field Engineer: IR

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

">" indicates that reading is **over** the limit range,

"*" Level to be determined

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring	Dry
Weather Conditions During Monitoring	Overcast

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
BH1	30/05/2018	13:30:00	15	1014	1017	1015	1013	-	1.0	0.4	0.1	0.1	0.5	0.1	20.5	0	0	0.0
		13:30:15							1.1		0.1			0.1	20.8	0	0	0.0
		13:30:30							1.0		0.1			0.1	20.8	0	0	0.0
		13:30:45							1.0		0.1			0.1	20.8	0	0	0.0
		13:31:00							0.8		0.1			0.0	20.8	0	0	0.0
		13:31:30							0.7		0.1			0.0	20.8	0	0	0.0
		13:32:00							0.6		0.1			0.0	20.8	0	0	0.0
		13:33:00							0.5		0.1			0.0	20.8	0	0	0.0
		13:34:00							0.4		0.1			0.0	20.8	0	0	0.0
BH201	30/05/2018	13:45:00	15	1014	1017	1015	1013	-	0.8	0.5	0.1	0.1	0.5	1.5	20.5	0	1	0.0
		13:45:15							0.8		0.1			1.5	17.8	0	2	0.0
		13:45:30							0.7		0.1			1.5	17.7	0	2	0.0
		13:45:45							0.7		0.1			1.5	17.7	0	2	0.0
		13:46:00							0.7		0.1			1.5	17.7	0	2	0.0
		13:46:30							0.6		0.1			1.5	17.6	0	2	0.0
		13:47:00							0.6		0.1			1.5	17.6	0	2	0.0
		13:48:00							0.5		0.1			1.6	17.6	0	2	0.0

Field Engineer: IR

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

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"*" Level to be determined

Harrison Group Environmental Ltd. Unit 12
Waterways Business Centre
Enfield
EN3 6JJ

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring: Dry

Weather Conditions During Monitoring: Overcast

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
BH202	31/05/2018	14:30:00	15	1014	1017	1015	1013	-6.34	0.9	2.2	0.1	0.1	0.5	0.1	20.7	0	3	0.1
		14:30:15							2.2		0.1			0.7	18.9	0	11	0.2
		14:30:30							2.3		0.1			0.7	17.3	0	13	0.2
		14:30:45							2.3		0.1			0.7	17.2	0	13	0.2
		14:31:00							2.3		0.1			0.7	17.2	0	13	0.1
		14:31:30							2.3		0.1			0.7	17.1	0	13	0.1
		14:32:00							2.2		0.1			0.7	17.1	0	13	0.1
		14:33:00							2.2		0.1			0.7	17.1	0	13	0.1
WS205	01/06/2018	15:00:00	15	1014	1017	1015	1013	-5.29	0.6	N/A	0.1	0.1	0.5	0.1	20.8	0	0	-0.3
		15:00:15							3.1		0.1			0.0	16.4	0	0	-0.6
		15:00:30							3.7		0.1			0.0	12.6	0	0	-0.6
		15:00:45							4.1		0.1			0.0	12.3	0	0	-0.6
		15:01:00							4.5		0.1			0.0	12.3	0	0	-0.4
		15:01:30							5.0		0.1			0.0	12.2	0	0	-0.3
		15:02:00							5.4		0.1			0.0	12.1	0	0	-0.3
		15:03:00							6.0		0.1			0.0	11.9	0	0	-0.2

Field Engineer: IR

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

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"*" Level to be determined

Harrison Group Environmental Ltd. Unit 12
Waterways Business Centre
Enfield
EN3 6JJ

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Groundwater Monitoring Record

Site Name: Colt International, Havant

Job No.: GL20590

Client: Campbell Reith Hill LLP

Weather (include Temperature & Pressure): Overcast

State of Ground: Dry

Location ID	Date	Time	Surface Elevation (mAOD)	LNAPL Depth[1] (mbgl)	LNAPL Depth (mAOD)	Water Level[1] (mbgl)	Water Level (mAOD)	DNAPL Depth[1] (mbgl)	DNAPL Depth (mAOD)	Depth to base[1] (mbgl)	Depth to base (mAOD)	Stabilized Readings					Sample Method[2] (I, S, B, P)	Water Column (m)	Purged Volume[3] (L)	Comments: (e.g. problems encountered, standpipe conditions, unusual odours, colour, tubidity, sheens)
												Temp (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	Redox Potential (mV)				
BH4	30/05/2018	09:45:00				1.82				4.00								2.18		
WS204	30/05/2018	10:45:00	20.08			1.56	18.52			3.80	16.28							2.24		
BH7	30/05/2018	11:30:00				0.91				2.60								1.69		
WS206	30/05/2018	12:00:00	18.60			0.78	17.82			2.00	16.60							1.22		
WS202	30/05/2018	12:30:00	24.90			Dry	-			2.10	22.80									
BH11	30/05/2018	13:00:00				0.30				1.14								0.84		
BH1	30/05/2018	13:30:00				0.15				1.02								0.87		
BH201	30/05/2018	13:45:00	25.74			Dry	-			2.05	23.69									
BH202	30/05/2018	14:45:00	20.08			*	-			11.30	8.78							-		
WS205	30/05/2018	15:15:00	20.12			*	-			2.85	17.27							-		

Field Engineer: IR

Other Remarks: * Dip Meter broke

1 - All (mbgl) depth measurements are recorded as meters below ground level.

2 - I = Inertial, S = Submersible, B = Bailer, P = Peristaltic Pump.

3 - Purge volume standardization: 50mm standpipe = 6 times water column, 35mm = 3.5 times water column, 19mm = 1 times water column

Harrison Group Environmental Ltd. Unit 12
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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring	Dry
Weather Conditions During Monitoring	Dry

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
BH7	21/06/2018	09:45:00	17	1019	1023	1021	1023	-0.05	1.8	1.8	0.0	5.6	28.0	0.1	20.5	0	2	0.0
		09:45:15							1.2		5.6			12.2	7.1	1	3	0.0
		09:45:30							1.3		5.6			13.1	0.7	1	3	0.0
		09:45:45							1.3		5.6			13.2	0.3	1	3	0.0
		09:46:00							1.3		5.6			13.2	0.2	1	3	0.0
		09:46:30							1.3		5.6			13.2	0.1	2	2	0.0
		09:47:00							1.4		5.6			13.3	1.1	2	2	0.0
		09:48:00							1.5		5.6			13.3	0.1	4	2	0.0
		09:49:00							1.7		5.6			13.3	0.1	6	2	0.0
		09:50:00							1.8		5.6			13.3	0.0	8	1	0.0
BH11	21/06/2018	10:45:00	17	1019	1023	1021	1024	-1.17	1.9	-	0.1	0.1	0.5	0.2	19.3	0	3	0.0
		10:45:15							2.1		0.0			5.0	12.9	0	1	0.0
		10:45:30							2.0		0.0			4.8	10.4	0	1	0.0
		10:45:45							1.8		0.0			4.3	11.5	0	1	0.0
		10:46:00							1.7		0.0			3.9	12.1	0	1	0.0
		10:46:30							1.4		0.0			3.3	13.5	0	1	0.0
		10:47:00							1.2		0.0			2.9	14.2	0	1	0.0
		10:48:00							0.9		0.0			2.4	15.3	0	1	0.0
		10:49:00							0.8		0.0			2.1	16.0	0	1	0.0
		10:50:00							0.6		0.0			1.8	16.6	0	1	0.0
BH202	21/06/2018	Well chamber flooded. Gas tap removed and water constantly pouring into the well. Well not monitored.																

Field Engineer: IR

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

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"*" Level to be determined

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Waterways Business Centre
Enfield
EN3 6JJ

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring	Dry
Weather Conditions During Monitoring	Dry

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
WS202*	21/06/2018	11:00:00	17	1019	1023	1021	1023	-0.38	1.3	0.0	0.0	21.3	106.5	0.4	19.7	0	6	0.0
		11:00:15							0.3		18.8			14.1	3.7	0	4	-0.2
		11:00:30							0.3		19.2			14.6	0.6	0	4	-0.2
		11:00:45							0.3		19.5			14.8	0.3	0	3	-0.2
		11:01:00							0.2		19.5			14.8	0.2	0	3	-0.2
		11:01:30							0.2		19.6			14.8	0.2	0	3	-0.2
		11:02:00							0.1		19.7			14.8	0.1	0	3	-0.2
		11:03:00							0.1		20.1			14.7	0.1	0	3	-0.2
		11:04:00							0.1		20.6			14.6	0.1	0	3	-0.2
		11:05:00							0.0		21.3			14.5	0.1	0	2	-0.2
WS202	21/06/2018	13:00:00	17	1019	1023	1021	1024	-0.29	1.4	0.2	0.0	14.6	73.0	0.1	20.1	0	6	0.0
		13:00:15							2.0		2.1			1.5	11.4	0	4	0.0
		13:00:30							2.0		2.1			1.5	9.4	0	4	0.0
		13:00:45							1.8		2.1			1.5	9.2	0	4	0.0
		13:01:00							1.7		2.2			1.6	9.1	0	4	0.0
		13:01:30							1.4		2.5			1.7	8.8	0	4	0.0
		13:02:00							1.3		2.9			2.0	8.5	0	5	0.0
		13:03:00							0.6		6.4			4.0	6.4	0	5	0.0
		13:04:00							0.4		9.3			5.4	5.3	0	5	0.0
		13:05:00							0.3		11.4			6.4	4.5	0	5	0.0
		13:06:00							0.2		13.0			7.0	3.9	0	5	0.0
		13:07:00							0.2		14.6			7.6	3.6	0	4	0.0

Field Engineer: IR

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks: *Purged with nitrogen and monitored 2 hours later.

PID : Photo-Ionisation Detector

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Waterways Business Centre
Enfield
EN3 6JJ

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring	Dry
Weather Conditions During Monitoring	Dry

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
BH1	21/06/2018	11:30:00	17	1019	1023	1021	1024	-0.03	0.9	0.9	0.5	0.5	2.5	0.6	19.7	0	4	0.0
		11:30:15							1.7		0.1			0.2	20.0	0	2	0.0
		11:30:30							1.6		0.0			0.2	20.1	0	1	0.0
		11:30:45							1.5		0.0			0.2	20.0	0	1	-0.1
		11:31:00							1.4		0.0			0.2	20.0	0	1	-0.1
		11:31:30							1.2		0.0			0.2	20.1	0	1	0.0
		11:32:00							1.1		0.0			0.2	20.2	0	1	0.0
		11:33:00							0.9		0.0			0.2	20.1	0	1	0.0
		11:34:00							0.9		0.0			0.2	20.1	0	1	0.0
		11:35:00							0.9		0.0			0.2	20.1	0	1	0.0
BH201	21/06/2018	12:15:00	17	1019	1023	1021	1024	-0.14	1.7	2.3	0.0	0.0	0.0	0.1	18.1	0	10	0.0
		12:15:15							3.4		0.0			2.5	15.0	1	6	-0.1
		12:15:30							3.0		0.0			2.6	14.0	1	4	-0.1
		12:15:45							3.1		0.0			2.6	14.0	1	4	-0.1
		12:16:00							3.0		0.0			2.6	14.0	1	4	-0.1
		12:16:30							2.8		0.0			2.6	13.9	1	4	-0.1
		12:17:00							2.7		0.0			2.6	14.0	1	3	-0.1
		12:18:00							2.6		0.0			2.6	14.0	1	3	-0.1
		12:19:00							2.3		0.0			2.6	14.0	1	3	-0.1
		12:20:00							2.3		0.0			2.6	14.0	1	3	-0.1

Field Engineer: IR

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring	Dry
Weather Conditions During Monitoring	Dry

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
WS206	21/06/2018	13:30:00	17	1019	1023	1021	1024	0.09	1.9	0.5	0.2	0.2	1.0	0.2	20.1	0	5	0.0
		13:30:15							1.7		0.0			1.2	19.7	0	3	0.0
		13:30:30							1.6		0.0			1.2	19.7	0	2	0.0
		13:30:45							1.5		0.0			1.2	19.7	0	2	0.0
		13:31:00							1.4		0.0			1.2	19.7	0	2	0.0
		13:31:30							1.2		0.0			1.2	19.7	0	2	0.0
		13:32:00							1.1		0.0			1.2	19.7	0	2	0.0
		13:33:00							0.8		0.0			1.2	19.8	0	2	0.0
		13:34:00							0.6		0.0			1.2	19.8	0	2	0.0
		13:35:00							0.5		0.0			1.2	19.8	0	2	0.0
WS205	21/06/2018	13:45:00	17	1019	1023	1021	1024	2.59	1.3	2.7	0.0	0.0	0.0	0.1	20.7	0	9	0.0
		13:45:15							3.0		0.0			0.0	16.5	0	4	0.9
		13:45:30							3.0		0.0			0.0	7.8	0	3	1.0
		13:45:45							2.9		0.0			0.0	7.6	0	3	0.8
		13:46:00							2.9		0.0			0.0	7.6	0	3	0.6
		13:46:30							2.8		0.0			0.0	7.6	0	3	0.4
		13:47:00							2.7		0.0			0.0	7.5	0	3	0.3
		13:48:00							2.7		0.0			0.0	7.5	0	3	0.6
		13:49:00							2.7		0.0			0.0	7.5	0	3	0.4
		13:50:00							2.7		0.0			0.0	7.5	0	3	0.4

Field Engineer: IR

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

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Enfield
EN3 6JJ

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring: Dry

Weather Conditions During Monitoring: Dry

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
WS204	21/06/2018	14:45:00	17	1019	1023	1021	1024	0.09	0.6	2.1	0.0	0.0	0.0	0.0	21.3	0	7	0.0
		14:45:15							2.5		0.0			0.0	15.6	0	24	0.0
		14:45:30							2.5		0.0			0.0	12.3	0	28	0.0
		14:45:45							2.6		0.0			0.0	12.5	0	27	0.0
		14:46:00							2.5		0.0			0.0	12.7	0	26	0.0
		14:46:30							2.5		0.0			0.0	12.5	0	24	0.0
		14:47:00							2.3		0.0			0.0	12.6	0	22	0.0
		14:48:00							2.3		0.0			0.0	12.5	0	19	0.0
		14:49:00							2.1		0.0			0.0	12.5	0	16	0.0
		14:50:00							2.1		0.0			0.0	12.5	0	13	0.0
BH4		15:15:00	17	1019	1023	1021	1025	3.50	0.6	0.9	0.0	0.0	0.0	3.0	20.1	0	0	0.0
		15:15:15							1.2		0.0			3.2	19.8	0	1	0.0
		15:15:30							1.2		0.0			3.3	18.6	0	1	0.0
		15:15:45							1.2		0.0			3.3	18.5	0	1	0.0
		15:16:00							1.2		0.0			3.3	18.4	0	1	0.0
		15:16:30							1.2		0.0			3.3	18.4	0	1	0.0
		15:17:00							1.1		0.0			3.4	18.4	0	1	0.0
		15:18:00							0.9		0.0			3.4	18.4	0	1	0.0

Field Engineer: IR

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

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"*" Level to be determined

Harrison Group Environmental Ltd. Unit 12
Waterways Business Centre
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EN3 6JJ

harrisongroup ENVIRONMENTAL

Groundwater Monitoring Record

Site Name: Colt International, Havant

Job No.: GL20590

Client: Campbell Reith Hill LLP

Weather (include Temperature & Pressure): Dry

State of Ground: Dry

Location ID	Date	Time	Surface Elevation (mAOD)	LNAPL Depth[1] (mbgl)	LNAPL Depth (mAOD)	Water Level[1] (mbgl)	Water Level (mAOD)	DNAPL Depth[1] (mbgl)	DNAPL Depth (mAOD)	Depth to base[1] (mbgl)	Depth to base (mAOD)	Stabilized Readings					Sample Method[2] (I, S, B, P)	Water Column (m)	Purged Volume[3] (L)	Comments: (e.g. problems encountered, standpipe conditions, unusual odours, colour, tubidity, sheens)
												Temp (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	Redox Potential (mV)				
BH4	21/06/2018	10:55:00				2.00				4.00		13.31	8.60	1551.90	1.00	-69.40	P	2.00		EW1 3m
WS204	21/06/2018	14:45:00	20.08			1.42	18.66			3.59	16.49	17.54	11.38	1056.30	15.50	-52.50	P	2.17		EW1 2.5m
BH7	21/06/2018	09:55:00				1.67				2.58								0.91		EW1. 0.5m Sample taken of purged water. Hole purged dry.
WS206	21/06/2018	13:40:00	18.60			1.10	17.50			1.94	16.66						P	0.84		Purged dry before water sample could be taken.
WS202	21/06/2018	11:10:00	24.90			Dry	-			2.57	22.33									
BH11	21/06/2018	10:55:00				0.82				1.14							P	0.32		Hole purged dry
BH1	21/06/2018	11:40:00				0.38				1.02								0.64		EW1. 0.5m Sample taken of purged water. Hole purged dry.
BH201	21/06/2018	12:25:00	25.74			5.14	-			12.00	13.74	14.63	7.34	659.70	38.80	37.00	P	6.86		EW1 8m
BH202	Flooded chamber																	-		
WS205	21/06/2018	13:45:00	20.12			1.31	-			2.84	17.28	19.15	10.91	1054.00	31.20	-24.00	P	-		EW1 2.5m
Field Engineer:	IR																			
Other Remarks:																				

1 - All (mbgl) depth measurements are recorded as meters below ground level.

2 - I = Inertial, S = Submersible, B = Bailer, P = Peristaltic Pump.

3 - Purge volume standardization: 50mm standpipe = 6 times water column, 35mm = 3.5 times water column, 19mm = 1 times water column

Harrison Group Environmental Ltd. Unit 12
Waterways Business Centre
Enfield
EN3 6JJ

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring: Dry

Weather Conditions During Monitoring: Sunny

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
BH1	26/06/2018	09:20:00	24	1025	1027	1027	1026	0.21	0.0	0.8	0.0	2.5	15.0	0.1	20.3	0	0	0.0
		09:20:15							0.8		2.5			2.8	18.5	0	0	0.0
		09:20:30							0.8		1.8			3.0	17.4	0	0	0.0
		09:20:45							0.8		1.4			2.5	17.8	0	0	0.0
		09:21:00							0.8		1.2			2.2	18.2	0	0	0.0
		09:21:30							0.8		1.2			2.2	18.2	0	0	0.0
		09:22:00							0.8		1.2			2.2	18.2	0	0	0.0
		09:23:00							0.8		1.2			2.2	18.2	0	0	0.0
BH4	26/06/2018	08:35:00	24	1025	1027	1027	1026	0.24	0.2	1.4	0.0	0.0	0.0	0.1	20.4	0	0	0.0
		08:35:15							1.2		0.0			0.7	19.6	0	0	0.0
		08:35:30							1.4		0.0			1.4	18.7	0	0	0.0
		08:35:45							1.4		0.0			2.8	18.6	0	0	0.0
		08:36:00							1.4		0.0			2.8	18.5	0	0	0.0
		08:36:30							1.4		0.0			2.8	18.5	0	0	0.0
		08:37:00							1.4		0.0			2.8	18.5	0	0	0.0
		08:38:00							1.4		0.0			2.8	18.5	0	0	0.0
BH7	26/06/2018	11:15:00	24	1025	1027	1027	1026	0.17	0.1	0.6	0.0	1.0	5.0	0.0	21.2	0	0	0.0
		11:15:15							0.5		1.0			3.8	16.7	0	0	0.0
		11:15:30							0.6		1.0			4.1	16.2	0	0	0.0
		11:15:45							0.6		0.8			3.6	15.7	0	0	0.0
		11:16:00							0.6		0.8			3.5	15.6	0	0	0.0
		11:16:30							0.6		0.8			3.4	15.8	0	0	0.0
		11:17:00							0.6		0.8			3.3	16.5	0	0	0.0
		11:18:00							0.6		0.8			3.3	16.5	0	0	0.0

Field Engineer: AS

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

">" indicates that reading is **over** the limit range,

"*" Level to be determined

Harrison Group Environmental Ltd. Unit 12
Waterways Business Centre
Enfield
EN3 6JJ

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring: Dry

Weather Conditions During Monitoring: Sunny

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
BH11	26/06/2018	09:50:00	24	1025	1027	1027	1026	-0.19	0.6	0.8	0.1	0.1	0.5	0.2	20.2	0	0	0.0
		09:50:15							0.9		0.0			3.9	16.1	0	0	0.0
		09:50:30							0.8		0.0			4.3	15.7	0	0	0.0
		09:50:45							0.8		0.0			4.7	15.2	0	0	0.0
		09:51:00							0.8		0.0			4.7	15.2	0	0	0.0
		09:51:30							0.8		0.0			4.7	15.2	0	0	0.0
		09:52:00							0.8		0.0			4.7	15.2	0	0	0.0
		09:53:00							0.8		0.0			4.7	15.2	0	0	0.0
BH201	26/06/2018	09:05:00	24	1025	1027	1027	1026	0.75	0.0	2.4	0.0	0.1	0.5	0.1	20.3	0	0	0.0
		09:05:15							2.2		0.1			3.2	20.0	0	0	0.0
		09:05:30							2.4		0.0			3.2	16.8	0	0	0.0
		09:05:45							2.4		0.0			3.2	15.1	0	0	0.0
		09:06:00							2.4		0.0			3.2	15.0	0	0	0.0
		09:06:30							2.4		0.0			3.2	15.0	0	0	0.0
		09:07:00							2.4		0.0			3.2	15.0	0	0	0.0
		09:08:00							2.4		0.0			3.2	15.0	0	0	0.0
BH202	26/06/2018	10:20:00	Well chamber flooded. Gas tap removed and well also flooded. Well not monitored.															

Field Engineer: AS

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

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Harrison Group Environmental Ltd. Unit 12
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Enfield
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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring: Dry

Weather Conditions During Monitoring: Sunny

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
WS202	26/06/2018	09:35:00	24	1025	1027	1027	1026	0.17	0.2	0.1	0.0	13.6	68.0	0.0	20.4	0	0	0.1
		09:35:15							0.1		8.6			12.2	12.3	0	0	0.1
		09:35:30							0.1		11.7			13.6	5.7	0	0	0.1
		09:35:45							0.1		13.5			14.2	1.4	0	0	0.1
		09:36:00							0.1		13.6			14.4	0.8	0	0	0.1
		09:36:30							0.1		13.6			14.4	0.8	0	0	0.1
		09:37:00							0.1		13.6			14.4	0.8	0	0	0.1
		09:38:00							0.1		13.6			14.4	0.8	0	0	0.1
WS204	26/06/2018	10:30:00	24	1025	1027	1027	1026	-0.03	0.7	1.7	0.0	0.0	0.0	0.0	21.0	0	0	0.0
		10:30:15							1.5		0.0			0.0	17.8	2	0	0.0
		10:30:30							1.7		0.0			0.0	16.6	2	0	0.0
		10:30:45							1.7		0.0			0.0	16.5	2	0	0.0
		10:31:00							1.7		0.0			0.0	16.4	1	0	0.0
		10:31:30							1.7		0.0			0.0	16.4	1	0	0.0
		10:32:00							1.7		0.0			0.0	16.4	1	0	0.0
		10:33:00							1.7		0.0			0.0	16.4	1	0	0.0
WS205	26/06/2018	11:00:00	24	1025	1027	1027	1026	-0.83	0.4	2.0	0.0	0.0	0.0	0.1	21.0	0	0	-0.1
		11:00:15							1.5		0.0			0.0	16.4	0	0	-0.1
		11:00:30							1.8		0.0			0.0	16.2	0	0	-0.1
		11:00:45							2.0		0.0			0.0	16.0	0	0	-0.1
		11:01:00							2.0		0.0			0.0	15.7	0	0	-0.1
		11:01:30							2.0		0.0			0.0	15.7	0	0	-0.1
		11:02:00							2.0		0.0			0.0	15.7	0	0	-0.1
		11:03:00							2.0		0.0			0.0	15.7	0	0	-0.1
Field Engineer:	IR																	

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

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"*" Level to be determined

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Enfield
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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring: Dry

Weather Conditions During Monitoring: Sunny

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
WS206	26/06/2018	10:05:00	24	1025	1027	1027	1026	0.15	0.1	1.2	0.0	0.0	0.0	0.2	19.5	0	0	0
		10:05:15							1.3		0.0			1.3	20.1	0	0	0
		10:05:30							1.2		0.0			1.3	19.9	0	0	0
		10:05:45							1.2		0.0			1.3	19.9	0	0	0
		10:06:00							1.2		0.0			1.3	19.9	0	0	0
		10:06:30							1.2		0.0			1.3	19.9	0	0	0
		10:07:00							1.2		0.0			1.3	19.9	0	0	0
		10:08:00							1.2		0.0			1.3	19.9	0	0	0

Field Engineer: IR

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

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"*" Level to be determined

Harrison Group Environmental Ltd. Unit 12
Waterways Business Centre
Enfield
EN3 6JJ

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Groundwater Monitoring Record

Site Name: Colt International, Havant

Job No.: GL20590

Client: Campbell Reith Hill LLP

Weather (include Temperature & Pressure): Sunny, 24°C, 1026mBar

State of Ground: Dry

Location ID	Date	Time	Surface Elevation (mAOD)	LNAPL Depth[1] (mbgl)	LNAPL Depth (mAOD)	Water Level[1] (mbgl)	Water Level (mAOD)	DNAPL Depth[1] (mbgl)	DNAPL Depth (mAOD)	Depth to base[1] (mbgl)	Depth to base (mAOD)	Stabilized Readings					Sample Method[2] (I, S, B, P)	Water Column (m)	Purged Volume[3] (L)	Comments: (e.g. problems encountered, standpipe conditions, unusual odours, colour, tubidity, sheens)
												Temp (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	Redox Potential (mV)				
BH1	26/06/2018	09:20:00				0.54				1.01								0.47		Datalogger inserted
BH4	26/06/2018	08:50:00				2.10				3.99								1.89		Datalogger inserted
BH7	26/06/2018	11:20:00				1.71				2.56								0.85		Datalogger inserted
BH11	26/06/2018	09:55:00				0.87				1.13								0.26		Datalogger inserted
BH201	26/06/2018	09:10:00	25.74			5.12	20.62			10.17	15.57							5.05		
BH202	26/06/2018	10:20:00	20.08			0.00	20.08			11.30	8.78							11.30		Flooded
WS202	26/06/2018	09:40:00	24.90			Dry	-			2.55	22.35							-		
WS204	26/06/2018	10:40:00	20.08			1.44	18.64			3.54	16.54							2.10		Datalogger inserted
WS205	26/06/2018	11:05:00	20.12			1.34	18.78			2.82	17.30							1.48		
WS206	26/06/2018	10:10:00	18.60			1.10	17.50			1.94	16.66							0.84		Datalogger inserted

Field Engineer: AS

Other Remarks: * Dip Meter broke

1 - All (mbgl) depth measurements are recorded as meters below ground level.

2 - I = Inertial, S = Submersible, B = Bailer, P = Peristaltic Pump.

3 - Purge volume standardization: 50mm standpipe = 6 times water column, 35mm = 3.5 times water column, 19mm = 1 times water column

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring: Dry

Weather Conditions During Monitoring: Sunny

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
BH1	07/09/2018	11:00:00	18	1026	1026	1022	1023	-0.03	Equipment malfunction	Equipment malfunction	0.0	0.0	0.0	0.0	20.4	0	0	0.0
		11:00:15									0.0			0.1	20.3	0	0	0.0
		11:00:30									0.0			0.1	20.2	0	0	0.0
		11:00:45									0.0			0.1	20.2	0	0	0.0
		11:01:00									0.0			0.1	20.2	0	0	0.0
		11:01:30									0.0			0.1	20.2	0	0	0.0
		11:02:00									0.0			0.1	20.2	0	0	0.0
		11:03:00									0.0			0.1	20.2	0	0	0.0
BH4	07/09/2018	12:30:00	18	1026	1026	1022	1023	0.09			0.0	0.0	0.0	0.0	20.2	0	0	0.0
		12:30:15									0.0			0.2	19.4	0	0	0.0
		12:30:30									0.0			0.6	19.3	0	0	0.0
		12:30:45									0.0			0.8	18.9	0	0	0.0
		12:31:00									0.0			0.8	18.9	0	0	0.0
		12:31:30									0.0			0.8	18.9	0	0	0.0
		12:32:00									0.0			0.8	18.9	0	0	0.0
		12:33:00									0.0			0.8	18.9	0	0	0.0
BH7	07/09/2018	12:15:00	18	1026	1026	1022	1023	-0.08			0.0	0.0	0.0	0.1	20.4	0	0	0.0
		12:15:15									0.2			0.4	19.2	0	0	0.0
		12:15:30									0.2			0.8	18.7	0	0	0.0
		12:15:45									0.2			1.3	17.9	0	0	0.0
		12:16:00									0.2			1.2	17.9	0	0	0.0
		12:16:30									0.2			1.2	17.9	0	0	0.0
		12:17:00									0.2			1.2	17.9	0	0	0.0
		12:18:00									0.2			1.2	17.9	0	0	0.0

Field Engineer: AS

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

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"*" Level to be determined

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring: Dry

Weather Conditions During Monitoring: Sunny

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
BH11	07/09/2018	11:20:00	18	1026	1026	1022	1023	-0.02	Equipment malfuntion	Equipment malfuntion	0.0	0.0	0.0	0.1	20.3	0	0	0.0
		11:20:15									0.0			3.1	19.0	0	0	0.0
		11:20:30									0.0			3.0	16.8	0	0	0.0
		11:20:45									0.0			2.9	16.9	0	0	0.0
		11:21:00									0.0			2.7	17.0	0	0	0.0
		11:21:30									0.0			2.5	17.3	0	0	0.0
		11:22:00									0.0			2.5	17.3	0	0	0.0
		11:23:00									0.0			2.5	17.3	0	0	0.0
BH201	07/09/2018	10:10:00	18	1026	1026	1022	1023	-0.02			0.0	0.0	0.0	0.0	20.4	0	0	0.0
		10:10:15									0.0			0.0	20.1	0	0	0.0
		10:10:30									0.0			0.0	19.8	0	0	0.0
		10:10:45									0.0			0.0	18.9	0	0	0.0
		10:11:00									0.0			0.0	17.4	0	0	0.0
		10:11:30									0.0			0.0	17.4	0	0	0.0
		10:12:00									0.0			0.0	17.4	0	0	0.0
		10:13:00									0.0			0.0	17.4	0	0	0.0
BH202	07/09/2018	12:05:00	Well chamber flooded. Gas tap removed and well also flooded. Attempted purge with bailer, water ingress to fast. Well not monitored.															

Field Engineer: AS

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

">" indicates that reading is **over** the limit range,

"*" Level to be determined

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Waterways Business Centre
Enfield
EN3 6JJ

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring	Dry
Weather Conditions During Monitoring	Sunny

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
WS202	07/09/2018	11:10:00	18	1026	1026	1022	1023	-0.08	Equipment malfunction	Equipment malfunction	0.0	11.4	57.0	0.0	20.2	0	0	0.2
		11:10:15									9.4			7.8	16.4	0	0	0.2
		11:10:30									10.2			8.4	8.7	0	0	0.2
		11:10:45									11.4			8.6	2.5	0	0	0.2
		11:11:00									11.4			8.6	1.6	0	0	0.2
		11:11:30									11.4			8.6	1.6	0	0	0.2
		11:12:00									11.4			8.6	1.6	0	0	0.2
		11:13:00									11.4			8.6	1.6	0	0	0.2
WS204	07/09/2018	11:50:00	18	1026	1026	1022	1023	0.02			0.0	0.0	0.0	0.1	20.5	0	0	0.0
		11:50:15									0.0			0.1	19.7	1	0	0.0
		11:50:30									0.0			0.1	18.9	1	0	0.0
		11:50:45									0.0			0.1	18.1	1	0	0.0
		11:51:00									0.0			0.1	18.1	0	0	0.0
		11:51:30									0.0			0.1	18.1	0	0	0.0
		11:52:00									0.0			0.1	18.1	1	0	0.0
		11:53:00									0.0			0.1	18.1	0	0	0.0
WS205	07/09/2018	12:10:00	18	1026	1026	1022	1023	-0.07			0.0	0.0	0.0	0.1	20.2	0	0	0.0
		12:10:15									0.0			0.2	20.0	0	0	0.0
		12:10:30									0.0			0.2	19.7	0	0	0.0
		12:10:45									0.0			0.2	19.5	0	0	0.0
		12:11:00									0.0			0.2	19.4	0	0	0.0
		12:11:30									0.0			0.2	19.4	0	0	0.0
		12:12:00									0.0			0.2	19.4	0	0	0.0
		12:13:00									0.0			0.2	19.4	0	0	0.0
Field Engineer:	IR																	

Pump Running Time (sampling): (Standard 180 sec)	
Pump Running Time (purge): (Standard 30 sec)	
Flow Details (e.g. 5 sec average for 1 min.):	

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

">" indicates that reading is **over** the limit range,

"*" Level to be determined

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Gas Monitoring Field Record

Site Name: Colt International, Havant

Job No: GL20590

Client: Campbell Reith Hill LLP

Equipment	Model	Serial Number	Manufacturer's Calibration Date
Land Gas Analyser	GA5000	G501752	22/05/2018
PID	Tiger Pid	T108275	16/05/2018

Weather Conditions 24hrs Prior to Monitoring	Dry
Weather Conditions During Monitoring	Sunny

Location I.D	Date	Time (hhmmss)	Temperature (°C)	Atmospheric Pressure 48hrs Prior to Sampling (hPa)	Atmospheric Pressure 24hrs Prior to Sampling (hPa)	Atmospheric Pressure 3hrs Prior to Sampling (hPa)	Atmospheric Pressure When Sampled (hPa)	Relative Pressure (hPa)	PID -Peak (ppm)	PID - Stabilised (ppm)	CH4 (%)	Peak CH4 (%)	LEL (%)	CO2 (%)	O2 (%)	H2S (ppm)	CO (ppm)	Flow Pod (l/Hr)
WS206	07/09/2018	11:35:00	18	1026	1026	1022	1023	-0.12	Equipment malfunction	Equipment malfunction	0.0	0.0	0.0	0.0	20.3	0	0	0.0
		11:35:15									0.0			0.0	19.6	0	0	0.0
		11:35:30									0.0			0.0	18.5	0	0	0.0
		11:35:45									0.0			0.0	18.2	0	0	0.0
		11:36:00									0.0			0.0	18.1	0	0	0.0
		11:36:30									0.0			0.0	18.1	0	0	0.0
		11:37:00									0.0			0.0	18.1	0	0	0.0
		11:38:00									0.0			0.0	18.1	0	0	0.0

Field Engineer: IR

Pump Running Time (sampling): (Standard 180 sec)

Pump Running Time (purge): (Standard 30 sec)

Flow Details (e.g. 5 sec average for 1 min.):

Other Remarks:

PID : Photo-Ionisation Detector

"<" indicates that reading is **under** the limit range,

">" indicates that reading is **over** the limit range,

"*" Level to be determined

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Groundwater Monitoring Record

Site Name: Colt International, Havant

Job No.: GL20590

Client: Campbell Reith Hill LLP

Weather (include Temperature & Pressure): Sunny, 24°C, 1026mBar

State of Ground: Dry

Location ID	Date	Time	Surface Elevation (mAOD)	LNAPL Depth[1] (mbgl)	LNAPL Depth (mAOD)	Water Level[1] (mbgl)	Water Level (mAOD)	DNAPL Depth[1] (mbgl)	DNAPL Depth (mAOD)	Depth to base[1] (mbgl)	Depth to base (mAOD)	Stabilized Readings					Sample Method[2] (I, S, B, P)	Water Column (m)	Purged Volume[3] (L)	Comments: (e.g. problems encountered, standpipe conditions, unusual odours, colour, tubidity, sheens)
												Temp (°C)	pH	Electrical Conductivity (µS/cm)	DO (%)	Redox Potential (mV)				
BH1	07/09/2018	11:05:00				0.27				1.02								0.75		Datalogger temporarily removed and data downloaded
BH4	07/09/2018	12:35:00				2.02				3.95								1.93		Datalogger temporarily removed and data downloaded
BH7	07/09/2018	12:20:00				1.77				2.56								0.79		Datalogger temporarily removed and data downloaded
BH11	07/09/2018	11:25:00				0.75				1.13								0.38		Datalogger temporarily removed and data downloaded
BH201	07/09/2018	10:15:00	25.74			4.56	21.18			10.15	15.59							5.59		
BH202	07/09/2018	12:05:00	20.08			0.00	20.08			11.28	8.80							11.28	20	Flooded, purge attempted, water ingress too fast
WS202	07/09/2018	11:15:00	24.90			Dry	-			2.55	22.35							-		
WS204	07/09/2018	11:55:00	20.08			1.85	18.23			3.62	16.46							1.77		Datalogger temporarily removed and data downloaded
WS205	07/09/2018	12:15:00	20.12			1.21	18.91			2.79	17.33							1.58		
WS206	07/09/2018	11:40:00	18.60			1.15	17.45			1.95	16.65							0.80		Datalogger temporarily removed and data downloaded

Field Engineer: AS

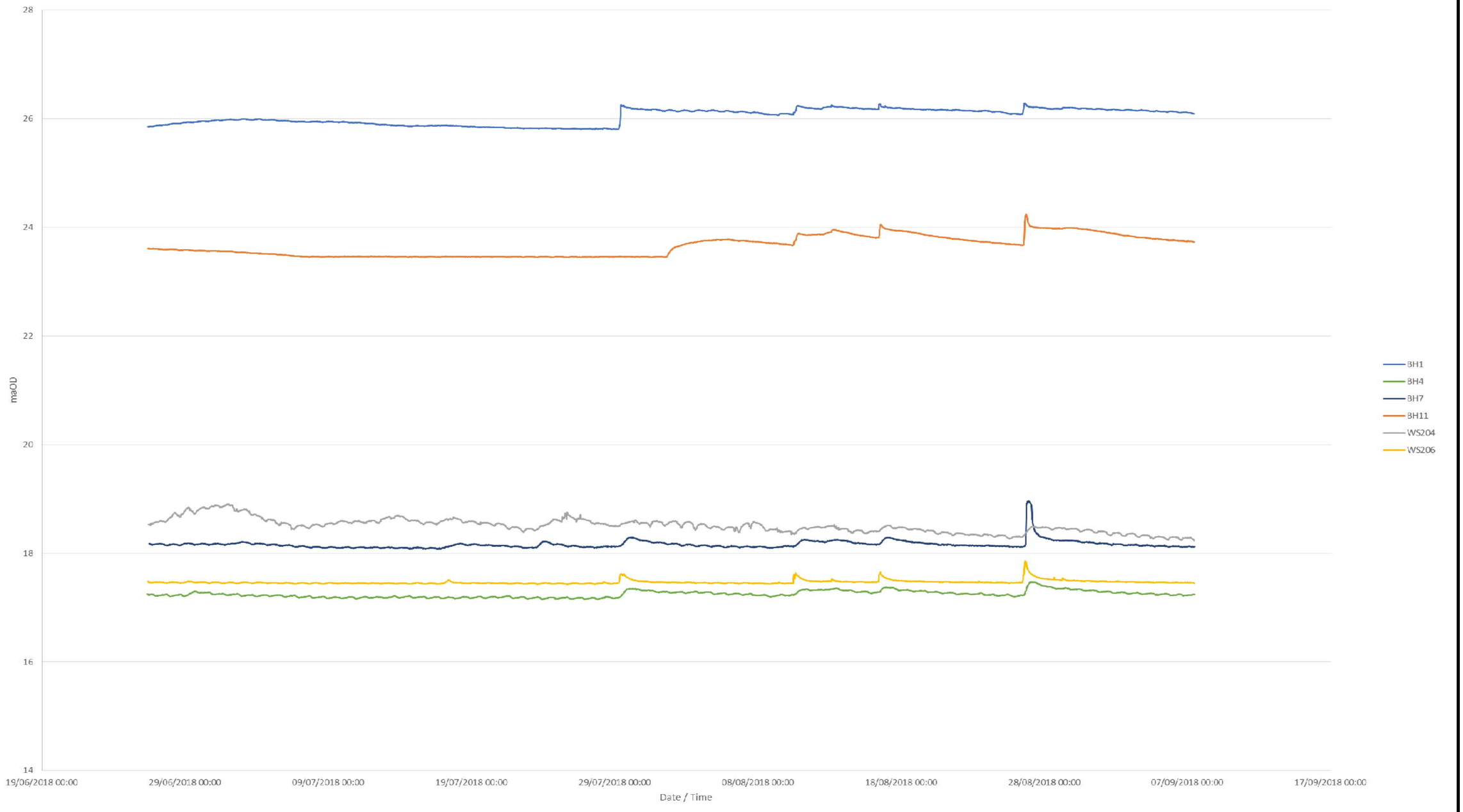
Other Remarks: * Dip Meter broke

1 - All (mbgl) depth measurements are recorded as meters below ground level.

2 - I = Inertial, S = Submersible, B = Bailer, P = Peristaltic Pump.

3 - Purge volume standardization: 50mm standpipe = 6 times water column, 35mm = 3.5 times water column, 19mm = 1 times water column

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Enfield
EN3 6JJ



Contract:	Colt International, Havant		
Title:	Datalogger Data Plot		
Client:	Hughes & Salvidge Limited		
Drawn By:	CS	Scale:	Not to Scale
Drawing No.:	DR/GL20590/CS	Date:	September-18

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APPENDIX D

LABORATORY TESTING

SUMMARY OF RESTRICTED TESTS

Project Name:	**Colt Industrial, Havant**	Project Number:
Client Name:	**Hughes & Salvidge Limited**	**GL20590-01**

Location	Depth m	Sample Ref	Test Scheduled	Reason why sample could not be tested
BH201	1.50	D3	Atterberg Limit	Insufficient sample after preparation
WS205	1.50	D4	Atterberg Limit	Insufficient sample after preparation

Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

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SERVICES

Harrison Testing Services
Unit 1, Alston Road
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Tel: +44 (0) 1603 416333
www.harrisongroupuk.com
Email: laboratory@harrisongroupuk.com

Client: Harrison Group Environmental
Unit 12, Waterways Business Centre
Navigation Drive
Enfield, London
EN3 6JJ

For the attention of: Glenn Pursey

Date of Issue: 28/07/2018
Page Number: 1 of 38

TEST REPORT TRANSMITTAL

Project:	Colt Industrial, Havant	Samples received:	13/06/2018
Report No:	GL20590-01	Instruction received:	13/06/2018
Your Ref:	GL20590	Testing commenced:	30/06/2018

Test Method and Description	Quantity	UKAS Accredited
BS1377: Part 2: 1990:3.2 Moisture Content	37	Yes
BS1377: Part 2: 1990:4.3/4.5 Liquid & Plastic Limits - Definitive Method	14	Yes
BS1377: Part 2: 1990:4.4/5.0 Liquid & Plastic Limits - Single Point Method	3	Yes
BS1377: Part 2: 1990:9.3 Particle Size Distribution - Wet Sieve Method	6	Yes
BS1377: Part 7: 1990:8.0 Unconsolidated Undrained Shear Strength - Single Stage	8	Yes

Remarks:

Issued by: M Willson

Approved Signatories:

M Willson (Laboratory Manager), G Breame (Senior Laboratory Technician)

Unless we are notified to the contrary, samples will be disposed after a period of one month from this date

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Only those results indicated in this report are UKAS accredited and any opinion or interpretations expressed are outside the scope of UKAS accreditation

DETERMINATION OF MOISTURE CONTENT

BS 1377 : Part 2 : 1990 : Clause 3.2

Project Name:	**Colt Industrial, Havant**	Project Number:
Client Name:	**Hughes & Salvidge Limited**	**GL20590**

Location	Depth m	Sample Ref	Sample Description	Moisture Content %	Remarks
BH201	0.50	D1	MADE GROUND (Grey brown clayey sandy GRAVEL. Gravel is of flint and brick)	9.6	
BH201	1.00	D2	MADE GROUND (Grey and brown gravelly slightly sandy CLAY. Gravel is of flint and brick)	33	
BH201	1.50-1.95	D3	Grey brown CLAY	27	
BH201	2.00	D4	Brown mottled grey slightly gravelly CLAY. Gravel is of flint	25	
BH201	3.00	D5	Brown mottled grey slightly gravelly CLAY. Gravel is of flint	27	
BH201	3.50-3.95	D6	Brown mottled grey slightly gravelly CLAY. Gravel is of flint	26	
BH201	4.00	D7	Brown mottled grey CLAY	30	
BH201	5.00	D8	Brown gravelly CLAY. Gravel is of flint	12	
BH201	12.50	D15	Grey slightly sandy CLAY	22	
BH201	14.50	D18	Grey CLAY	21	

Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 4

DETERMINATION OF MOISTURE CONTENT

BS 1377 : Part 2 : 1990 : Clause 3.2

Project Name:	**Colt Industrial, Havant**	Project Number:
Client Name:	**Hughes & Salvidge Limited**	**GL20590**

Location	Depth m	Sample Ref	Sample Description	Moisture Content %	Remarks
BH201	17.50	D22	Grey slightly sandy CLAY	23	
BH202A	0.50	D1	MADE GROUND (Brown mottled grey slightly gravelly CLAY. Gravel is of flint and brick)	18	
BH202A	1.00	D2	MADE GROUND (Light brown mottled grey slightly gravelly CLAY. Gravel is of flint and brick)	12	
BH202A	2.00	D3	Light brown mottled grey slightly gravelly CLAY. Gravel is of flint	18	
BH202A	3.00	D4	Brown mottled grey slightly gravelly CLAY. Gravel is of flint	26	
BH202A	4.00	D5	Grey silty CLAY	23	
BH202A	4.50-4.95	D6	Dark grey CLAY	21	
BH202A	5.50	D7	Dark grey CLAY	22	
BH202A	11.50	D15	Grey slightly sandy CLAY	22	
TP202	1.00	D3	Brown mottled grey CLAY	23	

Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	2 of 4

DETERMINATION OF MOISTURE CONTENT

BS 1377 : Part 2 : 1990 : Clause 3.2

Project Name:	**Colt Industrial, Havant**	Project Number:
Client Name:	**Hughes & Salvidge Limited**	**GL20590**

Location	Depth m	Sample Ref	Sample Description	Moisture Content %	Remarks
TP202	1.50	D4	Brown slightly gravelly sandy CLAY. Gravel is of flint	13	
TP202	2.50	D5	Brown slightly gravelly sandy CLAY. Gravel is of flint	13	
TP204	1.50	B2	Brown and grey slightly sandy CLAY	25	
TP206	0.50	D2	MADE GROUND (Brown slightly gravelly sandy CLAY. Gravel is of flint and brick)	24	
TP206	1.00	D3	Brown mottled grey and orange brown slightly sandy CLAY	23	
TP206	2.00	D4	Grey and brown CLAY	30	
TP206	2.50	D5	Grey brown silty CLAY	25	
TP209	0.50	D2	Brown and grey clayey slightly sandy GRAVEL. Gravel is of flint	11	
WS202	1.00	D3	MADE GROUND (Brown mottled grey gravelly slightly sandy CLAY. Gravel is of flint, chalk and brick)	27	
WS202	1.50	D4	Brown mottled grey CLAY	36	

Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	3 of 4

DETERMINATION OF MOISTURE CONTENT

BS 1377 : Part 2 : 1990 : Clause 3.2

Project Name:	**Colt Industrial, Havant**	Project Number:
Client Name:	**Hughes & Salvidge Limited**	**GL20590**

Location	Depth m	Sample Ref	Sample Description	Moisture Content %	Remarks
WS203	1.50	D4	Brown mottled grey CLAY	33	
WS204	1.40	D3	Brown mottled grey CLAY	21	
WS205	0.90	D3	Grey brown gravelly CLAY. Gravel is of flint and quartzite	8.9	
WS205	1.50	D4	Grey very clayey slightly sandy GRAVEL. Gravel is of flint and quartz	11	
WS205	2.00	D5	Light brown clayey very silty SAND	25	
WS205	2.50	D6	Light brown clayey very silty SAND	23	
WS205	2.80	D7	Grey brown sandy very silty CLAY	22	

Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	4 of 4

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DETERMINATION OF LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS1377 : Part 2 : 1990

Project Name:	**Colt Industrial, Havant**	Project Number:
Client Name:	**Hughes & Salvidge Limited**	**GL20590**

Location	Depth m	Sample Ref	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	Percentage passing 425µm %	Classification	Sample Description
BH201	4.00	D7	30	65	19	46	100	CH	Brown mottled grey CLAY
BH201	5.00	D8	12	55	17	38	25	CH	Brown very gravelly CLAY. Gravel is of flint
BH201	12.50	D15	22	37	19	18	100	CI	Grey slightly sandy CLAY
BH201	14.50	D18	21	46	18	28	100	CI	Grey CLAY
BH201	17.50	D22	23	48	17	31	100	CI	Grey slightly sandy CLAY
BH202A	2.00	D3	18	42	14	28	82	CI	Light brown mottled grey slightly gravelly CLAY. Gravel is of flint
BH202A	3.00	D4	26	42	15	27	99	CI	Brown mottled grey slightly gravelly CLAY. Gravel is of flint
BH202A	4.00	D5	23	40	15	25	100	CI	Grey silty CLAY
BH202A	11.50	D15	22	47	18	29	100	CI	Grey slightly sandy CLAY
TP202	1.00	D3	23	37	16	21	100	CI	Brown mottled grey CLAY

Please note this summary sheet is provided for convenience and in no way replaces individual test result sheets which shall, without exception, be regarded as the definitive result. Please refer to the individual test result sheets for the respective methods used.

Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 2

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DETERMINATION OF LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS1377 : Part 2 : 1990

Project Name:	**Colt Industrial, Havant**	Project Number:
Client Name:	**Hughes & Salvidge Limited**	**GL20590**

Location	Depth m	Sample Ref	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	Percentage passing 425µm %	Classification	Sample Description
TP204	1.50	B2	25	35	16	19	100	CL	Brown and grey slightly sandy CLAY
TP206	2.00	D4	30	42	16	26	100	CI	Grey and brown CLAY
TP209	0.50	D2	11	62	18	44	16	CH	Brown and grey clayey slightly sandy GRAVEL. Gravel is of flint
WS202	1.00	D3	27	42	19	23	66	CI	MADE GROUND (Brown mottled grey gravelly slightly sandy CLAY. Gravel is of flint, chalk and brick)
WS202	1.50	D4	36	77	20	57	100	CV	Brown mottled grey CLAY
WS203	1.50	D4	33	70	19	51	100	CH	Brown mottled grey CLAY
WS204	1.40	D3	21	46	15	31	100	CI	Brown mottled grey CLAY

Please note this summary sheet is provided for convenience and in no way replaces individual test result sheets which shall, without exception, be regarded as the definitive result. Please refer to the individual test result sheets for the respective methods used.

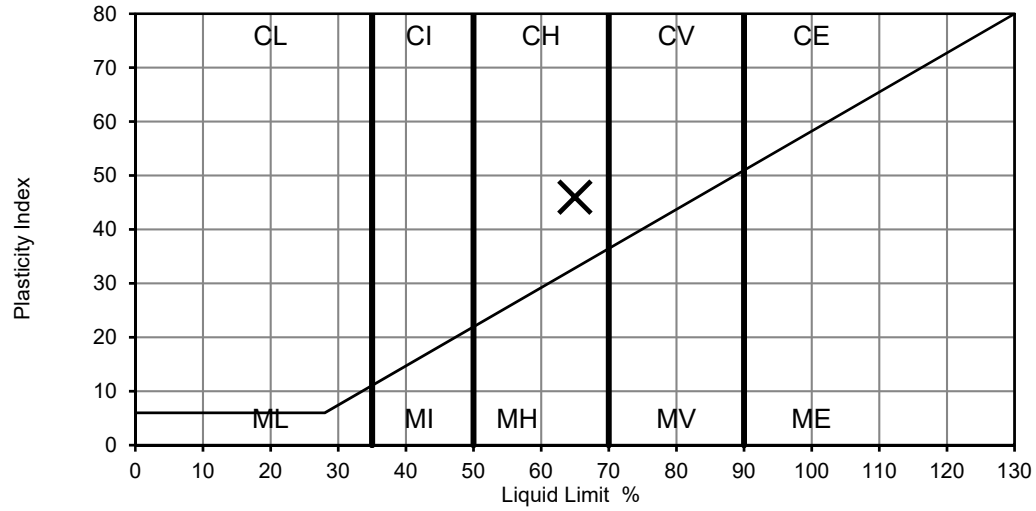
Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	2 of 2

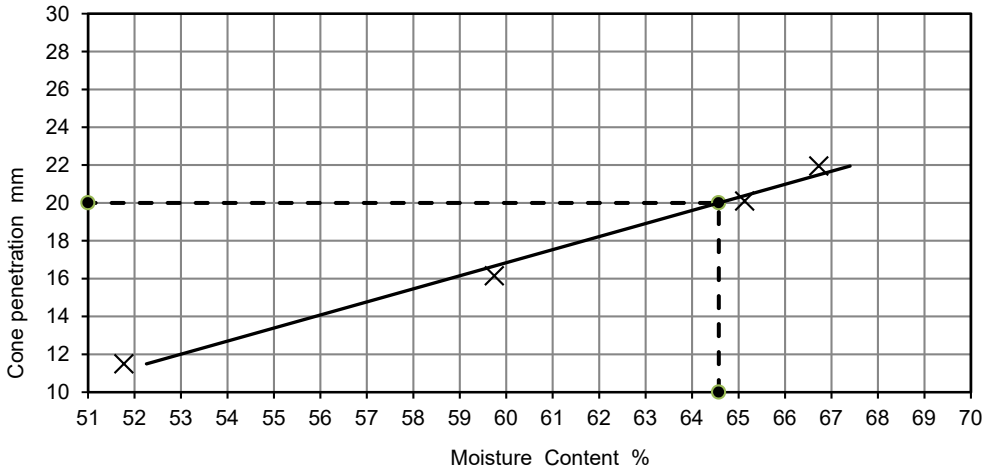
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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH201
Sample Description:	Brown mottled grey CLAY	Sample Depth (m)	4.00
		Sample Reference	D7





Preparation: Material was natural

Results:	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	30 %
	Percentage Passing 425µm sieve:	100 %
	Liquid Limit:	65 %
	Plastic Limit:	19 %
	Plasticity Index:	46
	Liquidity Index:	0.24
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	46

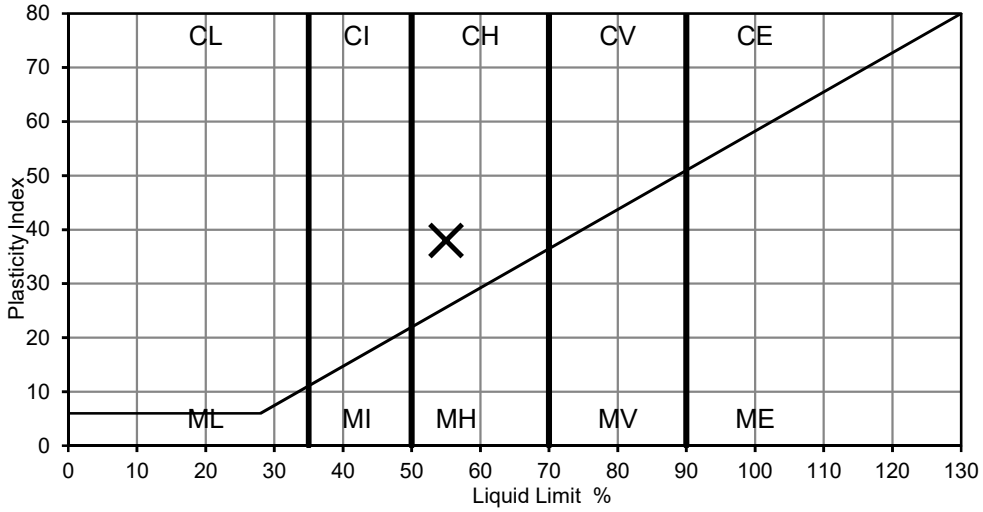
Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.4 one point LL and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH201
Sample Description:	Brown very gravelly CLAY. Gravel is of flint	Sample Depth (m)	5.00
		Sample Reference	D8



Preparation: Material was washed and oven dried at below 50°C

Results:

As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	12	%
Percentage Passing 425µm sieve:	25	%
Liquid Limit:	55	%
Plastic Limit:	17	%
Plasticity Index:	38	
Liquidity Index:	-0.13	
Modified Plasticity Index: (NHBC Standards Chapter 4.2)	10	

Remarks

Liquid limit determined by single point cone method due to insufficient sample for definitive test

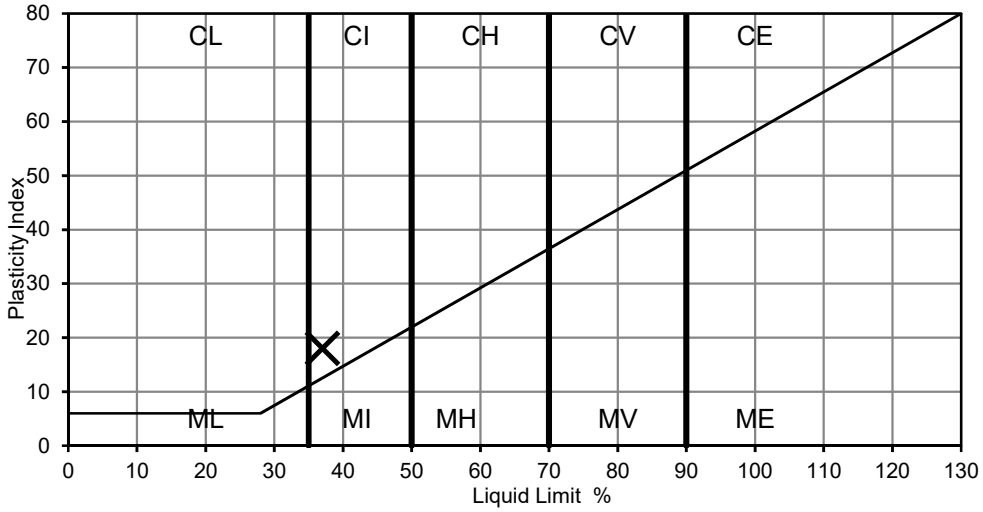
Approved	Date	Sheet No.:
MW	28/07/2018	1 of 1

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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.4 one point LL and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH201
Sample Description:	Grey slightly sandy CLAY	Sample Depth (m)	12.50
		Sample Reference	D15



Preparation: Material was natural

Results:

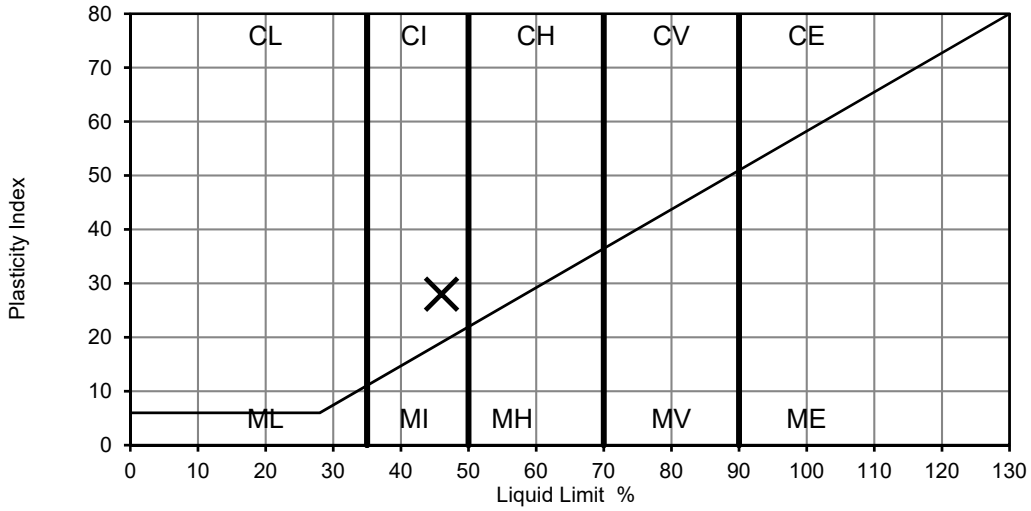
As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	22	%
Percentage Passing 425µm sieve:	100	%
Liquid Limit:	37	%
Plastic Limit:	19	%
Plasticity Index:	18	
Liquidity Index:	0.17	
Modified Plasticity Index: (NHBC Standards Chapter 4.2)	18	

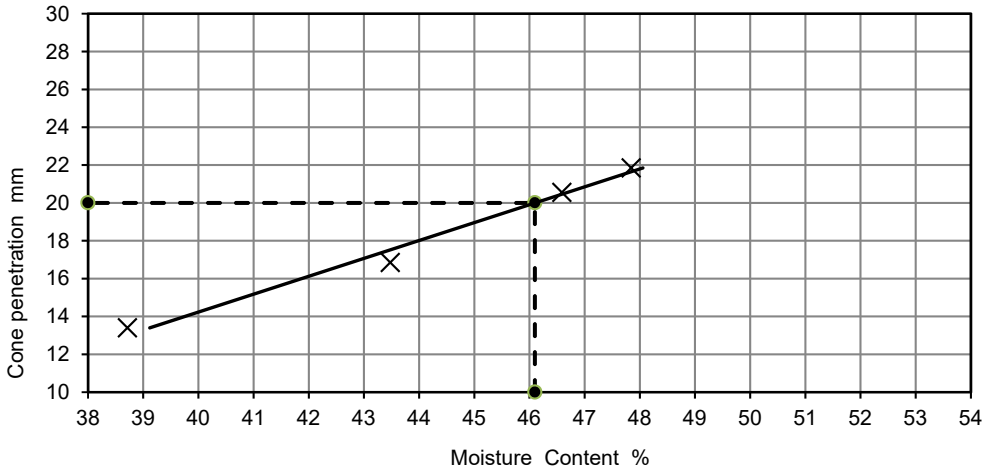
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Liquid limit determined by single point cone method due to insufficient sample for definitive test	MW	28/07/2018	1 of 1

LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH201
Sample Description:	Grey CLAY	Sample Depth (m)	14.50
		Sample Reference	D18





Preparation: Material was natural

Results:		
	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	21 %
	Percentage Passing 425µm sieve:	100 %
	Liquid Limit:	46 %
	Plastic Limit:	18 %
	Plasticity Index:	28
	Liquidity Index:	0.11
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	28

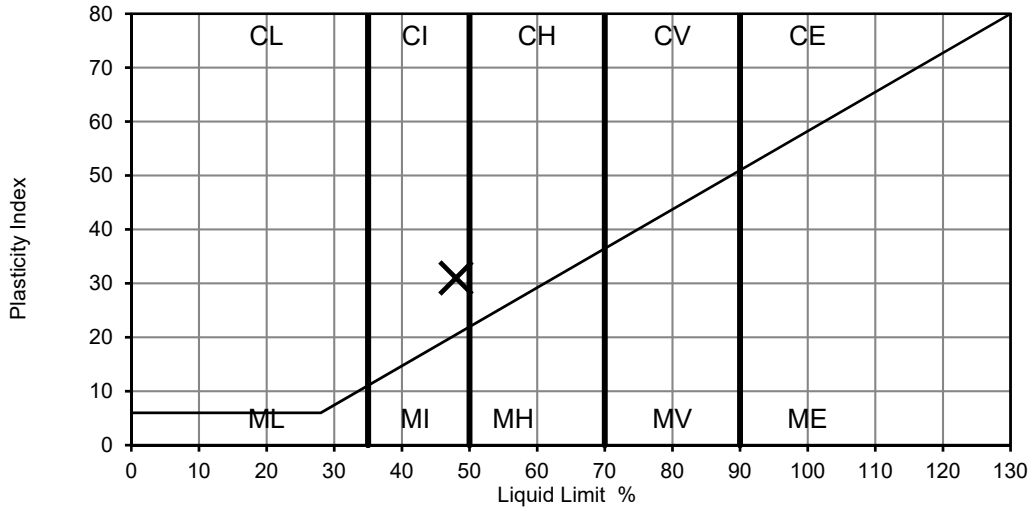
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	MW	28/07/2018	1 of 1

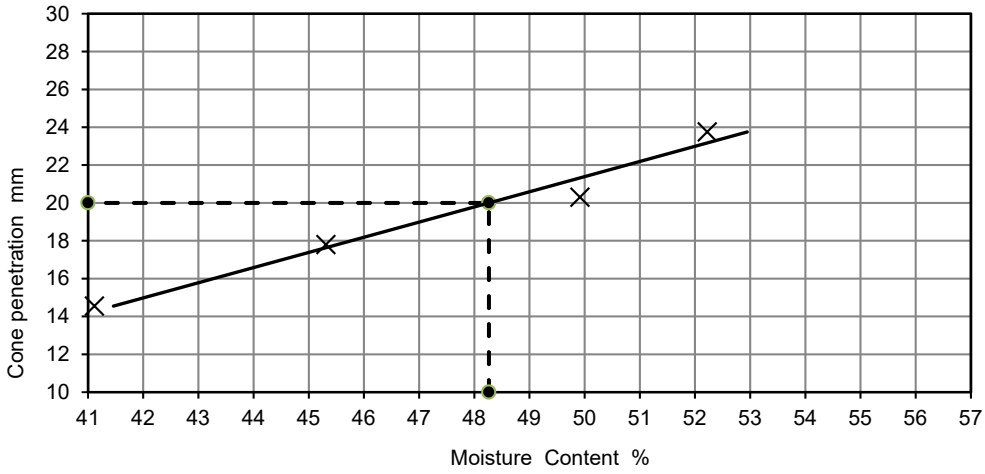
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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH201
Sample Description:	Grey slightly sandy CLAY	Sample Depth (m)	17.50
		Sample Reference	D22





Preparation: Material was natural

Results:		
	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	23 %
	Percentage Passing 425µm sieve:	100 %
	Liquid Limit:	48 %
	Plastic Limit:	17 %
	Plasticity Index:	31
	Liquidity Index:	0.19
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	31

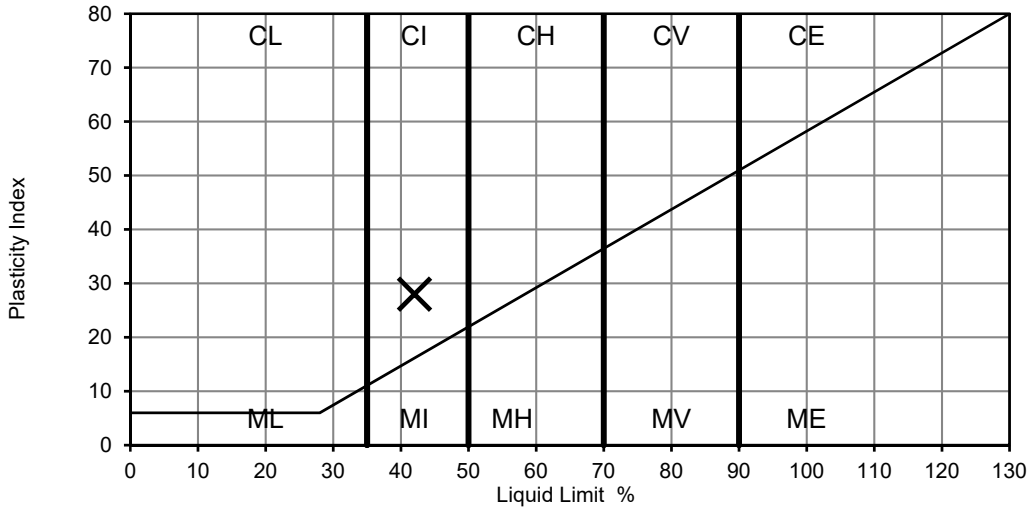
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	MW	28/07/2018	1 of 1

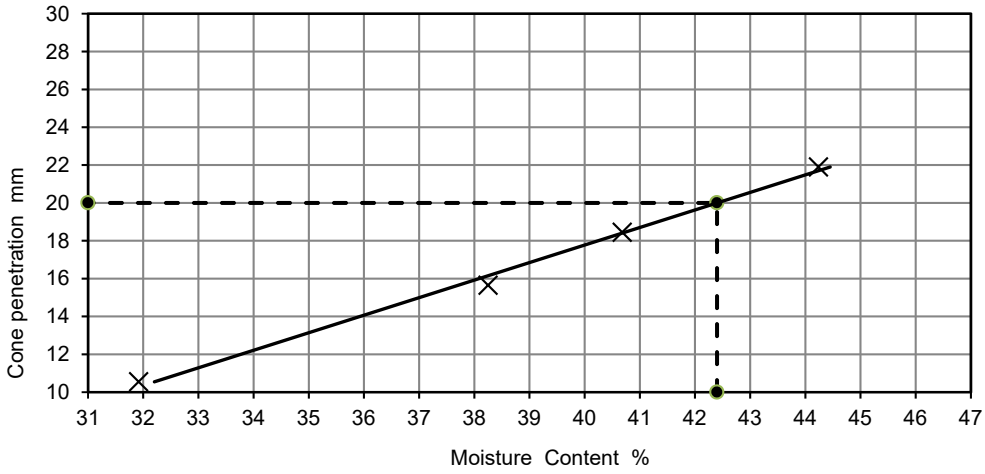
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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH202A
Sample Description:	Light brown mottled grey slightly gravelly CLAY. Gravel is of flint	Sample Depth (m)	2.00
		Sample Reference	D3





Preparation: Material was washed and oven dried at below 50°C

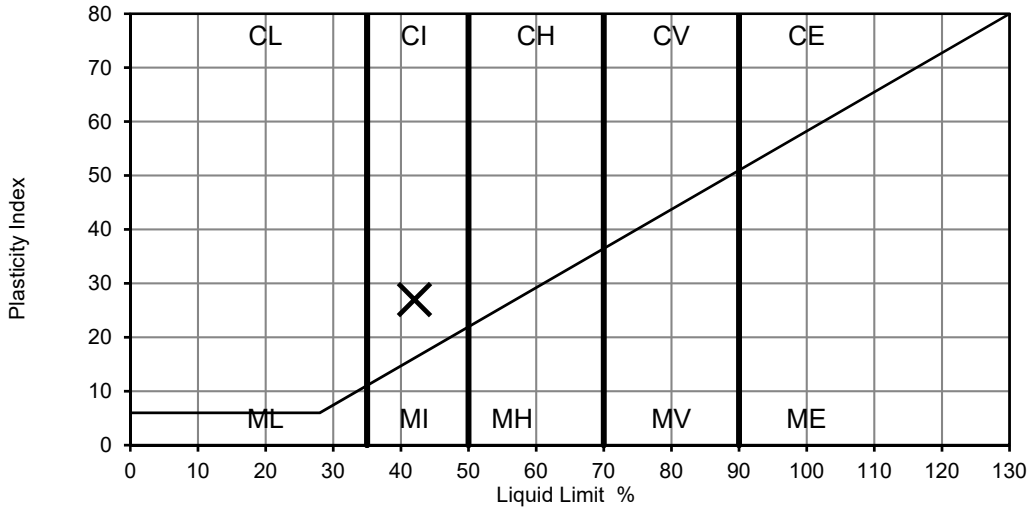
Results:		
	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	18 %
	Percentage Passing 425µm sieve:	82 %
	Liquid Limit:	42 %
	Plastic Limit:	14 %
	Plasticity Index:	28
	Liquidity Index:	0.14
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	23

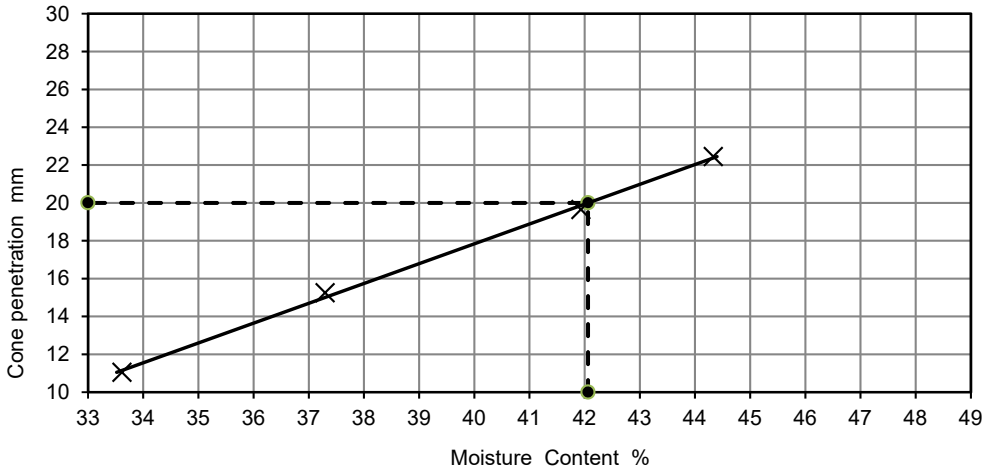
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	MW	28/07/2018	1 of 1

LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH202A
Sample Description:	Brown mottled grey slightly gravelly CLAY. Gravel is of flint	Sample Depth (m)	3.00
		Sample Reference	D4





Preparation: Material was washed and oven dried at below 50°C

Results:	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	26 %
	Percentage Passing 425µm sieve:	99 %
	Liquid Limit:	42 %
	Plastic Limit:	15 %
	Plasticity Index:	27
	Liquidity Index:	0.41
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	27

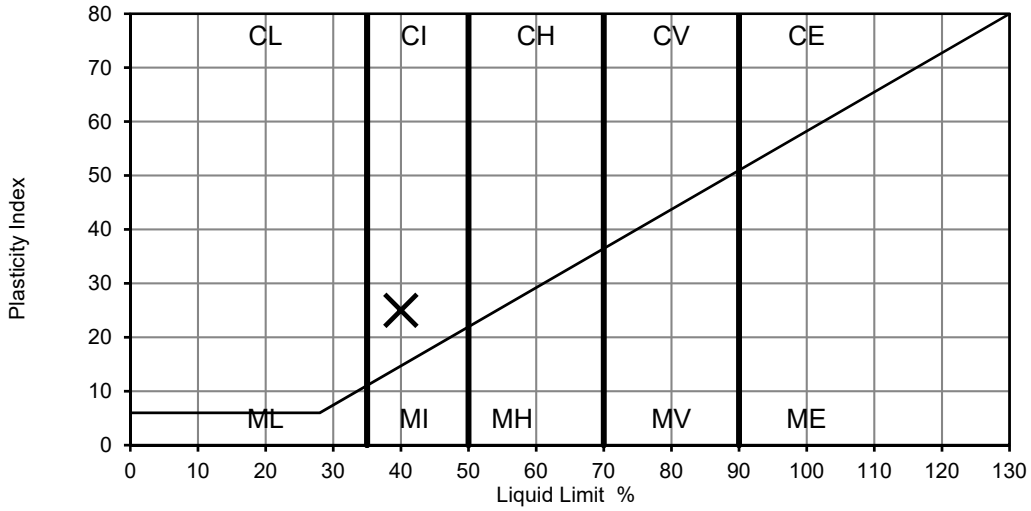
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	MW	28/07/2018	1 of 1

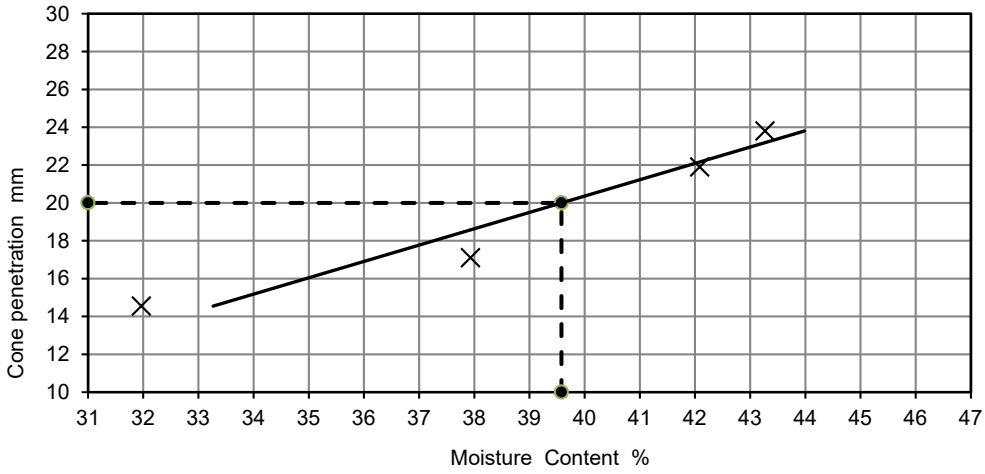
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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH202A
Sample Description:	Grey silty CLAY	Sample Depth (m)	4.00
		Sample Reference	D5





Preparation: Material was natural

Results:

As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	23	%
Percentage Passing 425µm sieve:	100	%
Liquid Limit:	40	%
Plastic Limit:	15	%
Plasticity Index:	25	
Liquidity Index:	0.32	
Modified Plasticity Index: (NHBC Standards Chapter 4.2)	25	

Remarks

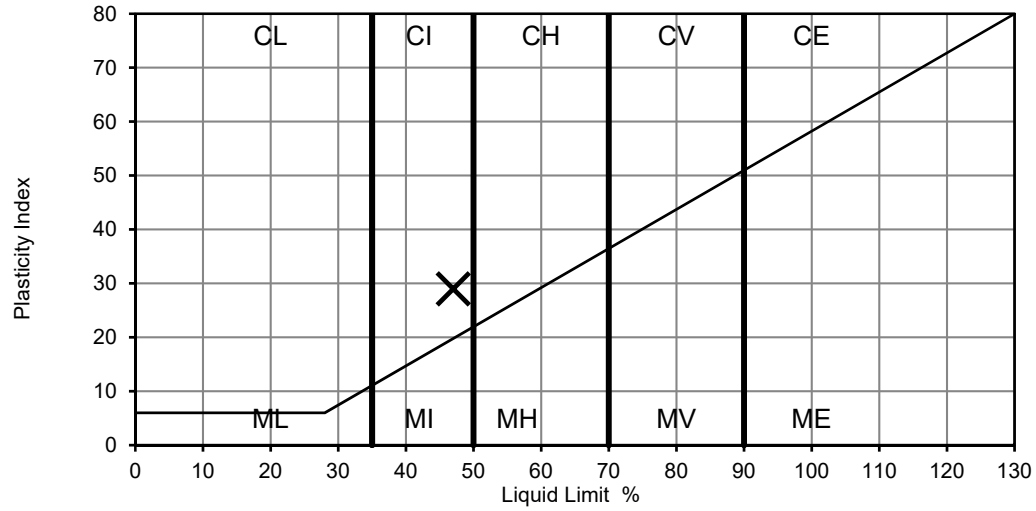
Approved	Date	Sheet No.:
MW	28/07/2018	1 of 1

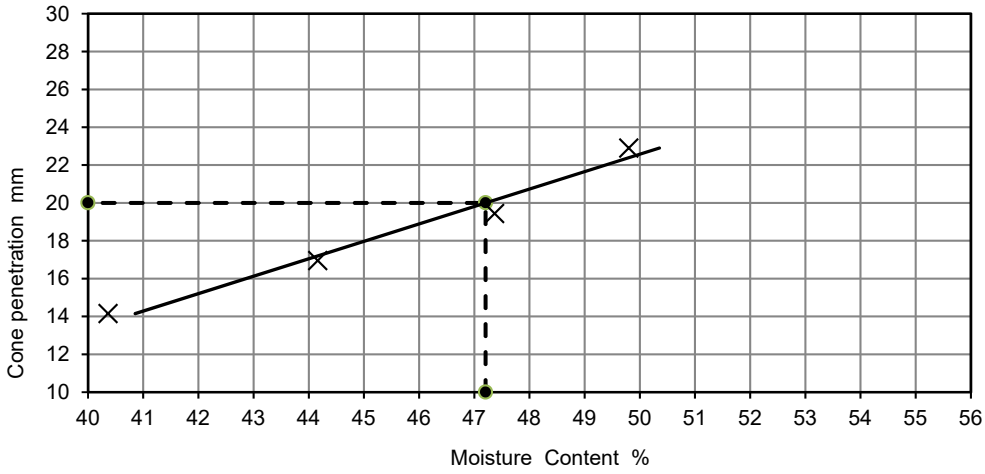
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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH202A
Sample Description:	Grey slightly sandy CLAY	Sample Depth (m)	11.50
		Sample Reference	D15





Preparation: Material was natural

Results:		
	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	22 %
	Percentage Passing 425µm sieve:	100 %
	Liquid Limit:	47 %
	Plastic Limit:	18 %
	Plasticity Index:	29
	Liquidity Index:	0.14
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	29

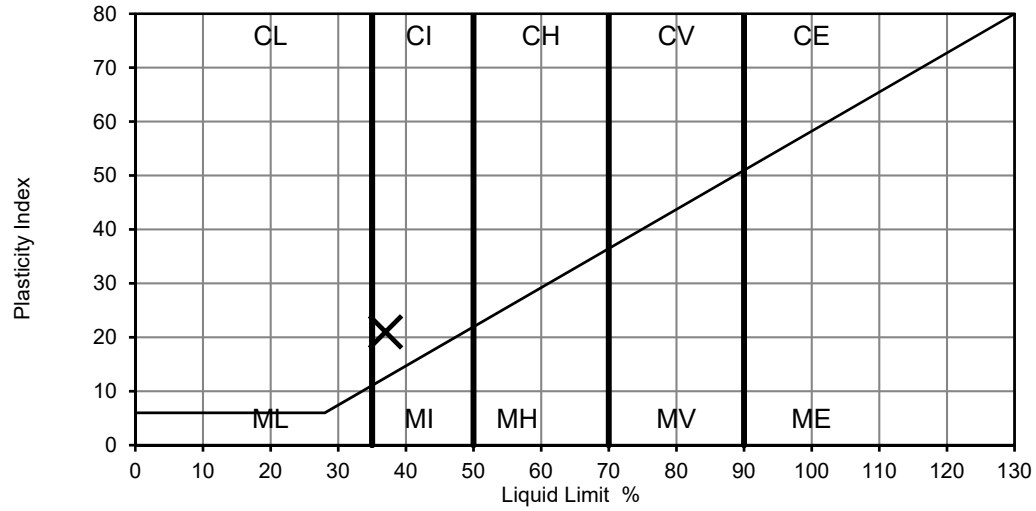
Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

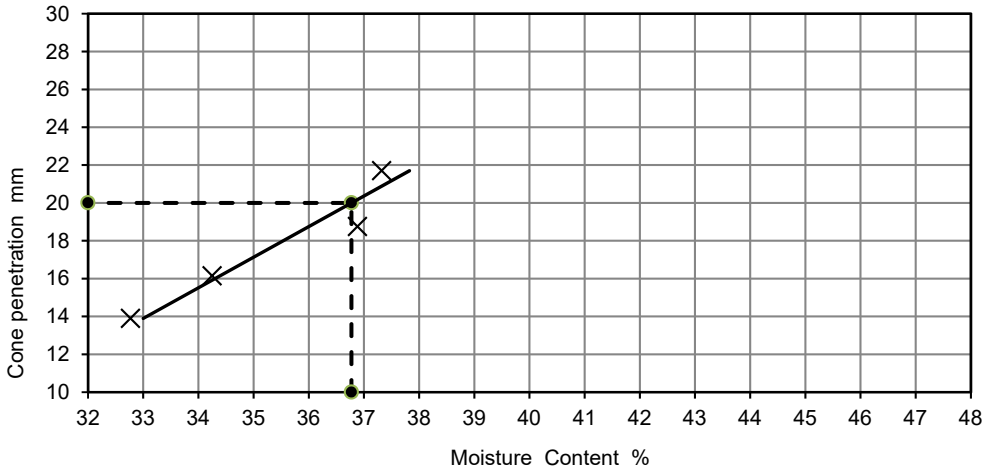
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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	TP202
Sample Description:	Brown mottled grey CLAY	Sample Depth (m)	1.00
		Sample Reference	D3





Preparation: Material was natural

Results:		
	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	23 %
	Percentage Passing 425µm sieve:	100 %
	Liquid Limit:	37 %
	Plastic Limit:	16 %
	Plasticity Index:	21
	Liquidity Index:	0.33
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	21

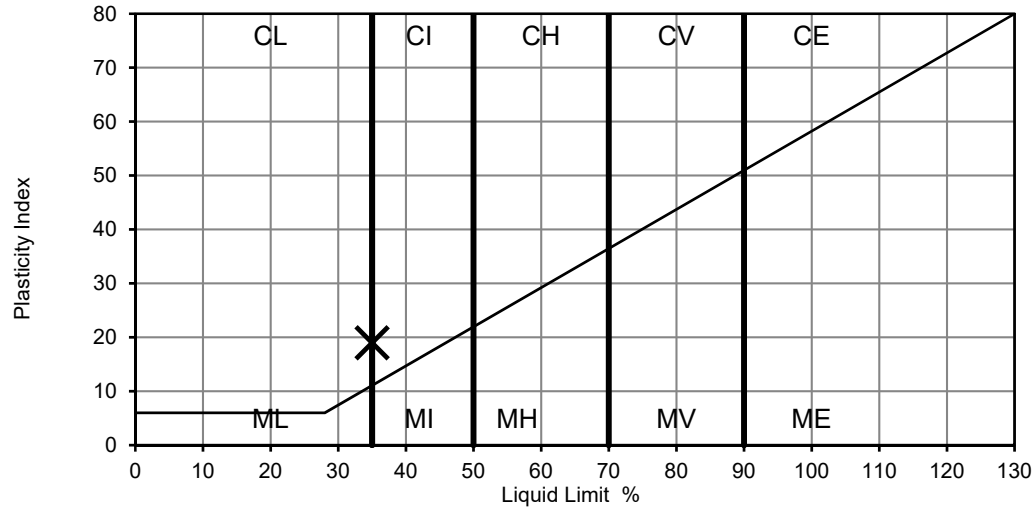
Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

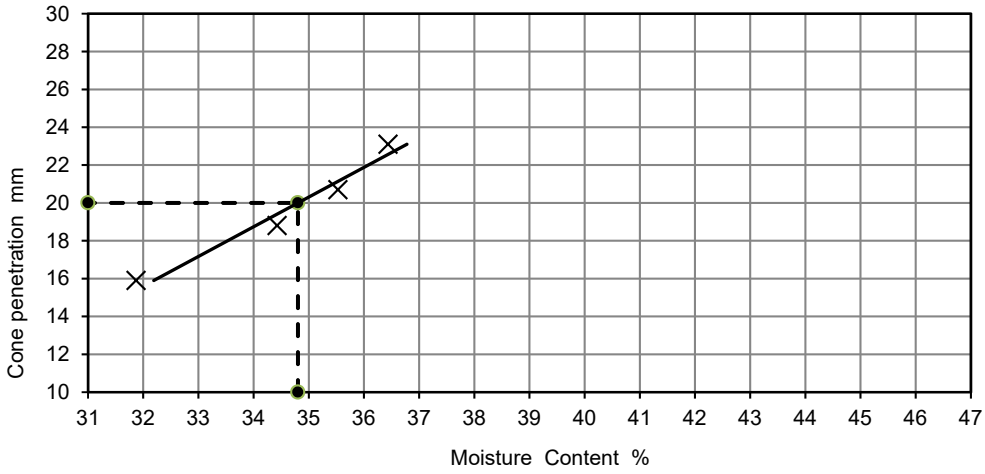
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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	TP204
Sample Description:	Brown and grey slightly sandy CLAY	Sample Depth (m)	1.50
		Sample Reference	B2





Preparation: Material was natural

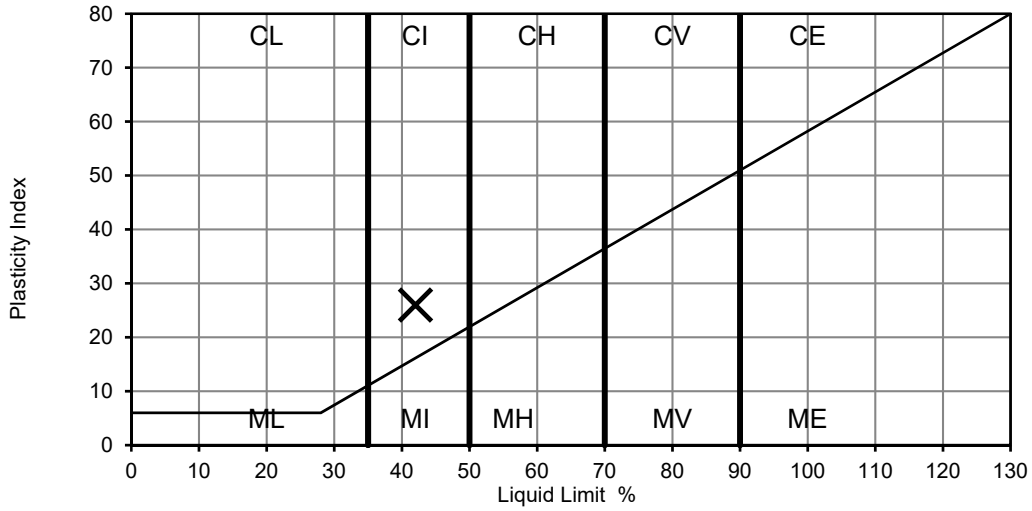
Results:		
	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	25 %
	Percentage Passing 425µm sieve:	100 %
	Liquid Limit:	35 %
	Plastic Limit:	16 %
	Plasticity Index:	19
	Liquidity Index:	0.47
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	19

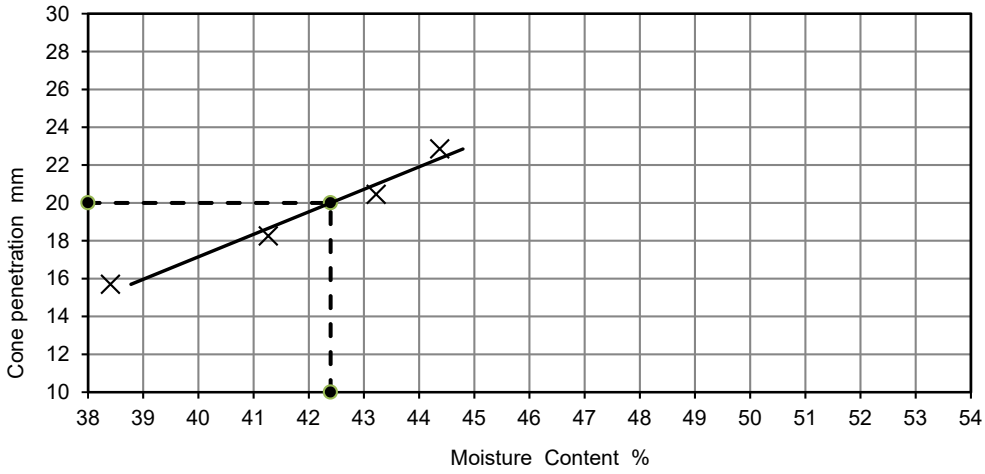
Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	TP206
Sample Description:	Grey and brown CLAY	Sample Depth (m)	2.00
		Sample Reference	D4





Preparation: Material was natural

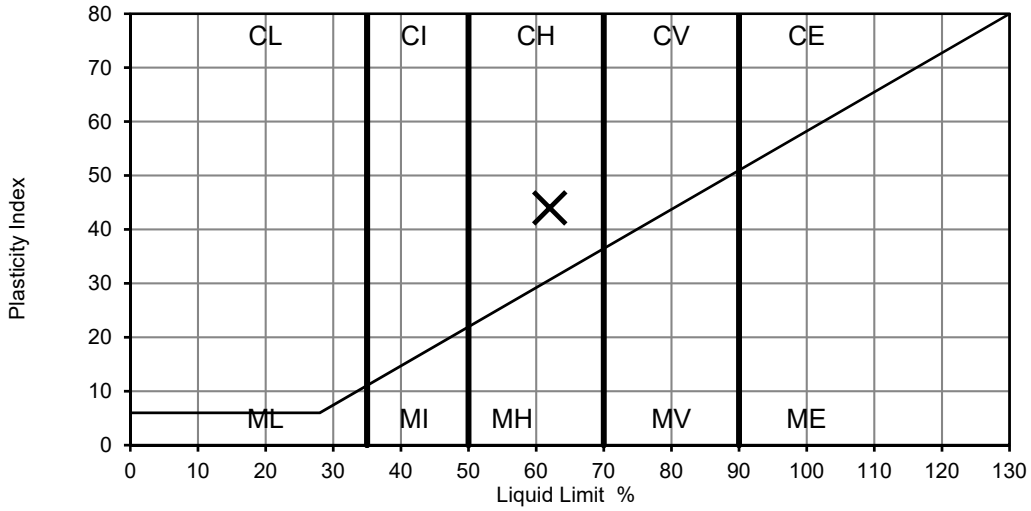
Results:		
	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	30 %
	Percentage Passing 425µm sieve:	100 %
	Liquid Limit:	42 %
	Plastic Limit:	16 %
	Plasticity Index:	26
	Liquidity Index:	0.54
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	26

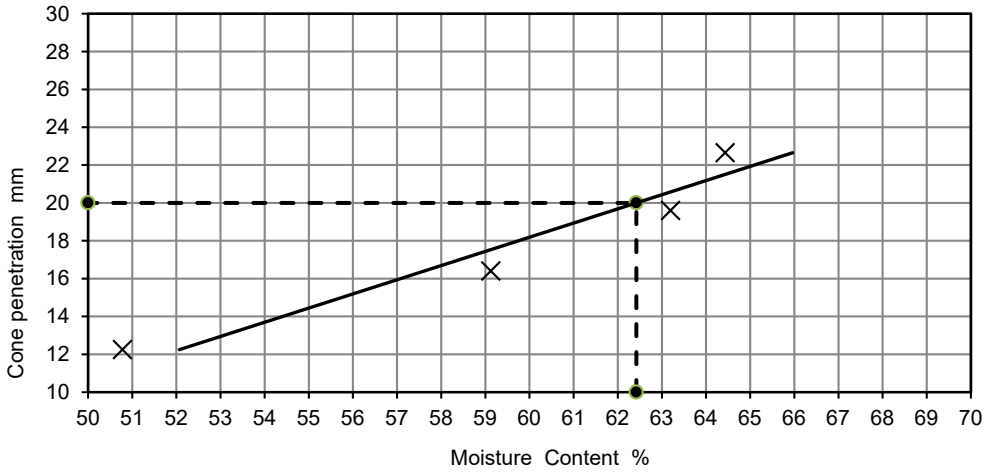
Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	TP209
Sample Description:	Brown and grey clayey slightly sandy GRAVEL. Gravel is of flint	Sample Depth (m)	0.50
		Sample Reference	D2





Preparation: Material was washed and oven dried at below 50°C

Results:		
	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	11 %
	Percentage Passing 425µm sieve:	16 %
	Liquid Limit:	62 %
	Plastic Limit:	18 %
	Plasticity Index:	44
	Liquidity Index:	-0.16
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	7

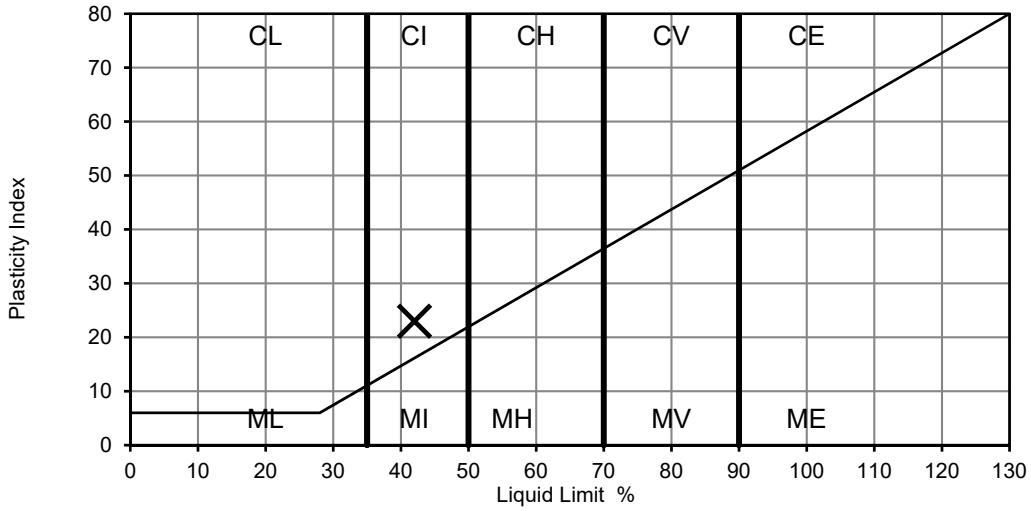
Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

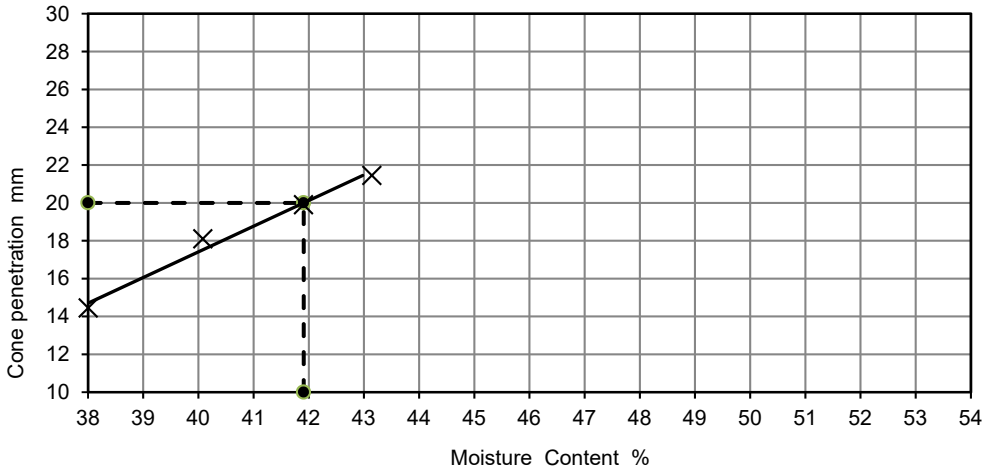
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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	WS202
Sample Description:	MADE GROUND (Brown mottled grey gravelly slightly sandy CLAY. Gravel is of flint, chalk and brick)	Sample Depth (m)	1.00
		Sample Reference	D3





Preparation: Material was washed and oven dried at below 50°C

Results:		
	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	27 %
	Percentage Passing 425µm sieve:	66 %
	Liquid Limit:	42 %
	Plastic Limit:	19 %
	Plasticity Index:	23
	Liquidity Index:	0.35
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	15

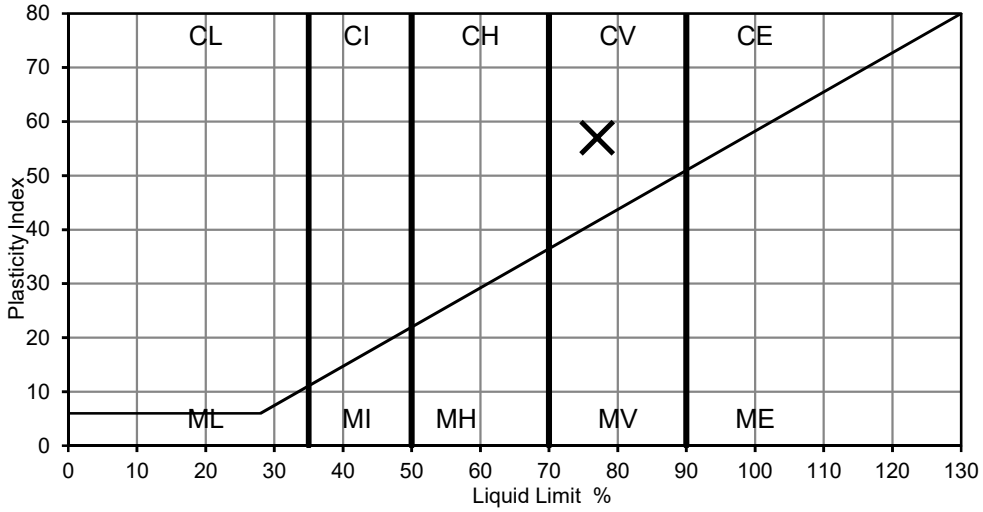
Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.4 one point LL and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	WS202
Sample Description:	Brown mottled grey CLAY	Sample Depth (m)	1.50
		Sample Reference	D4



Preparation: Material was natural

Results:

As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	36	%
Percentage Passing 425µm sieve:	100	%
Liquid Limit:	77	%
Plastic Limit:	20	%
Plasticity Index:	57	
Liquidity Index:	0.28	
Modified Plasticity Index: (NHBC Standards Chapter 4.2)	57	

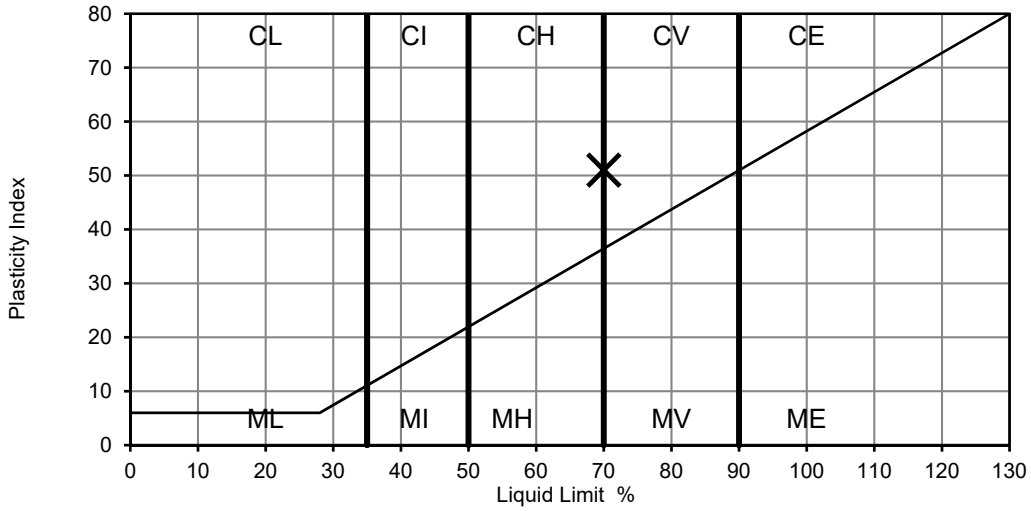
Remarks	Approved	Date	Sheet No.:
Liquid limit determined by single point cone method due to insufficient sample for definitive test	MW	28/07/2018	1 of 1

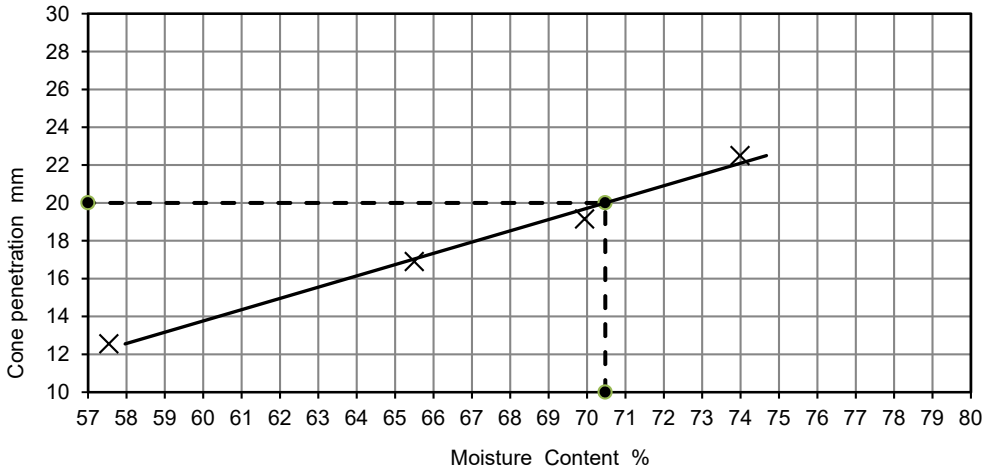
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LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	WS203
Sample Description:	Brown mottled grey CLAY	Sample Depth (m)	1.50
		Sample Reference	D4





Preparation: Material was natural

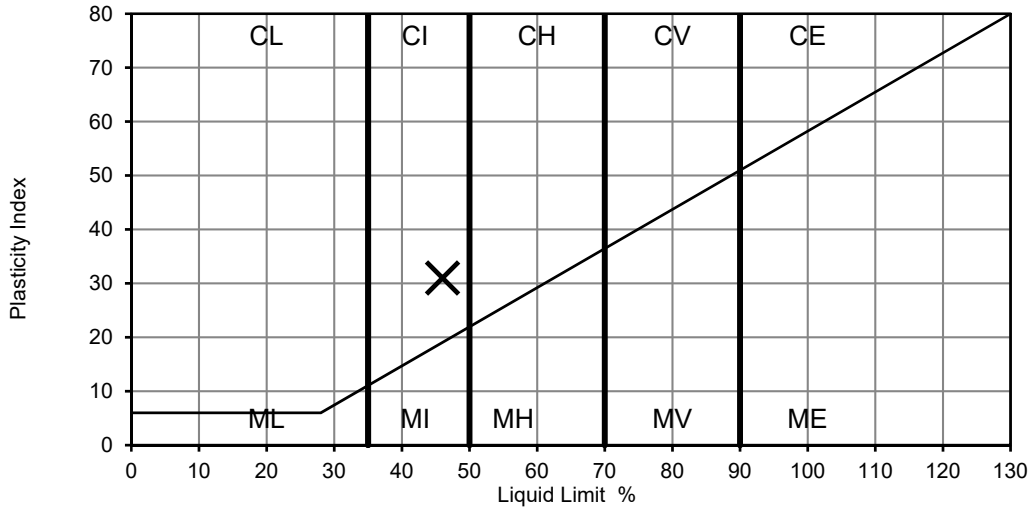
Results:		
	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	33 %
	Percentage Passing 425µm sieve:	100 %
	Liquid Limit:	70 %
	Plastic Limit:	19 %
	Plasticity Index:	51
	Liquidity Index:	0.27
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	51

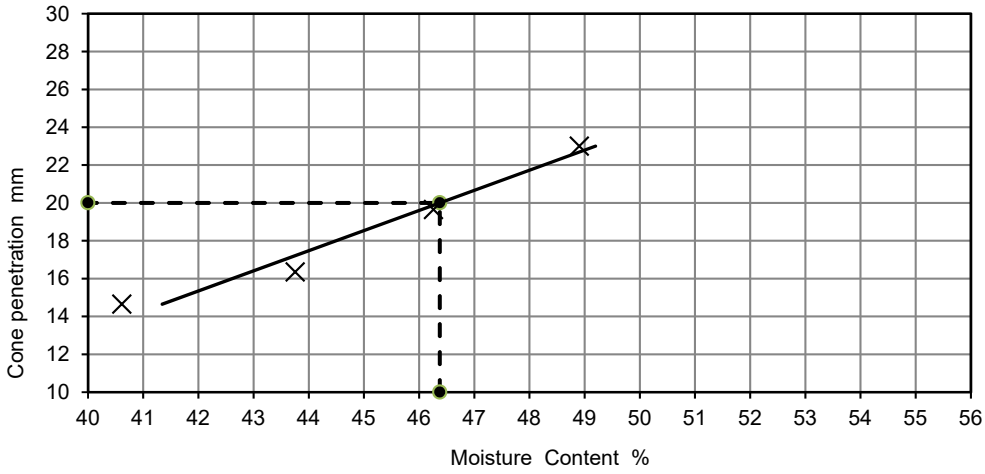
Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX, & LIQUIDITY INDEX

BS 1377 : Part 2 : 1990, clause 4.3 and 5

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	WS204
Sample Description:	Brown mottled grey CLAY	Sample Depth (m)	1.40
		Sample Reference	D3





Preparation: Material was natural

Results:		
	As Received Moisture Content: (BS1377 : Part 2 : Clause 3 : 1990)	21 %
	Percentage Passing 425µm sieve:	100 %
	Liquid Limit:	46 %
	Plastic Limit:	15 %
	Plasticity Index:	31
	Liquidity Index:	0.19
	Modified Plasticity Index: (NHBC Standards Chapter 4.2)	31

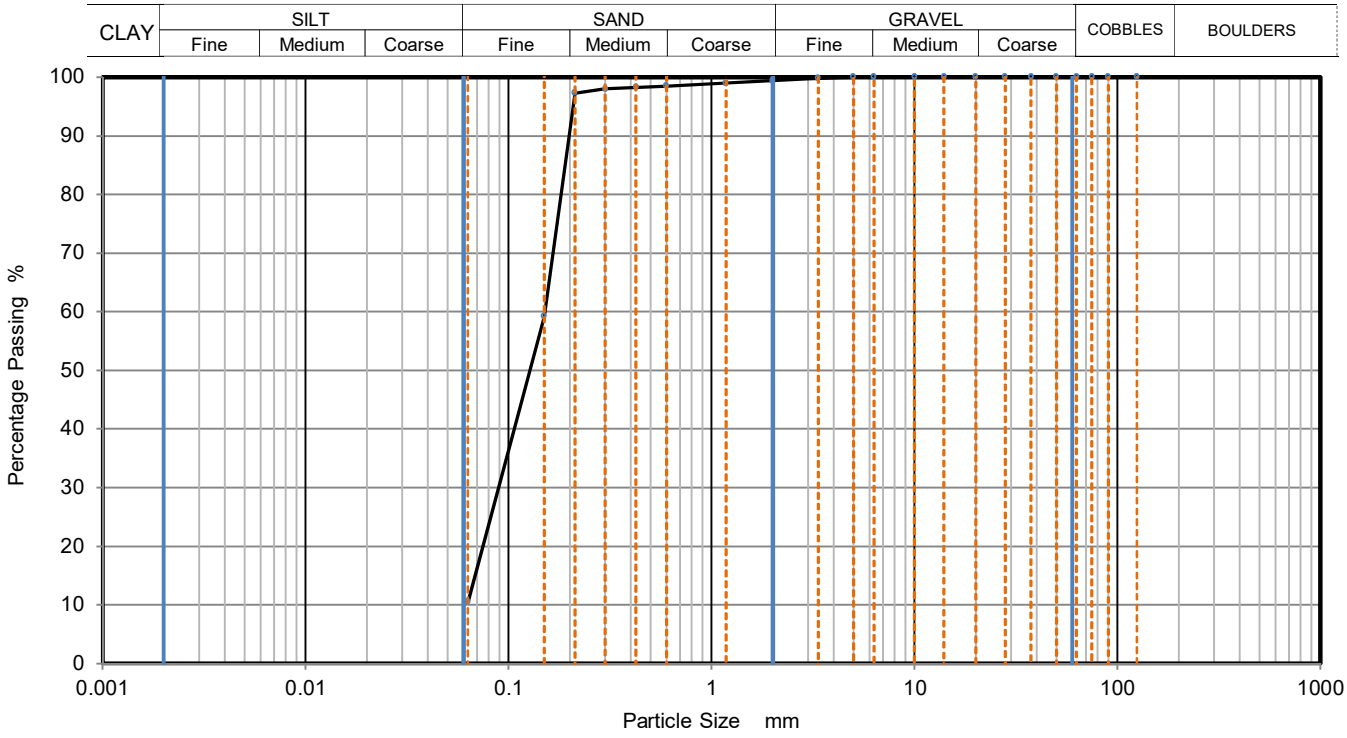
Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

BS1377:Part 2:1990, clause 9.2

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH201
Sample Description:	Brown clayey silty slightly gravelly SAND. Gravel is of flint	Sample Depth (m)	7.50
		Sample Reference	B2



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	99		
1.18	99		
0.6	99		
0.425	98		
0.3	98		
0.212	97		
0.15	59		
0.063	11		

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	89
Fines <0.063mm	11

Grading Analysis		
D100	mm	
D60	mm	0.151
D30	mm	0.089
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

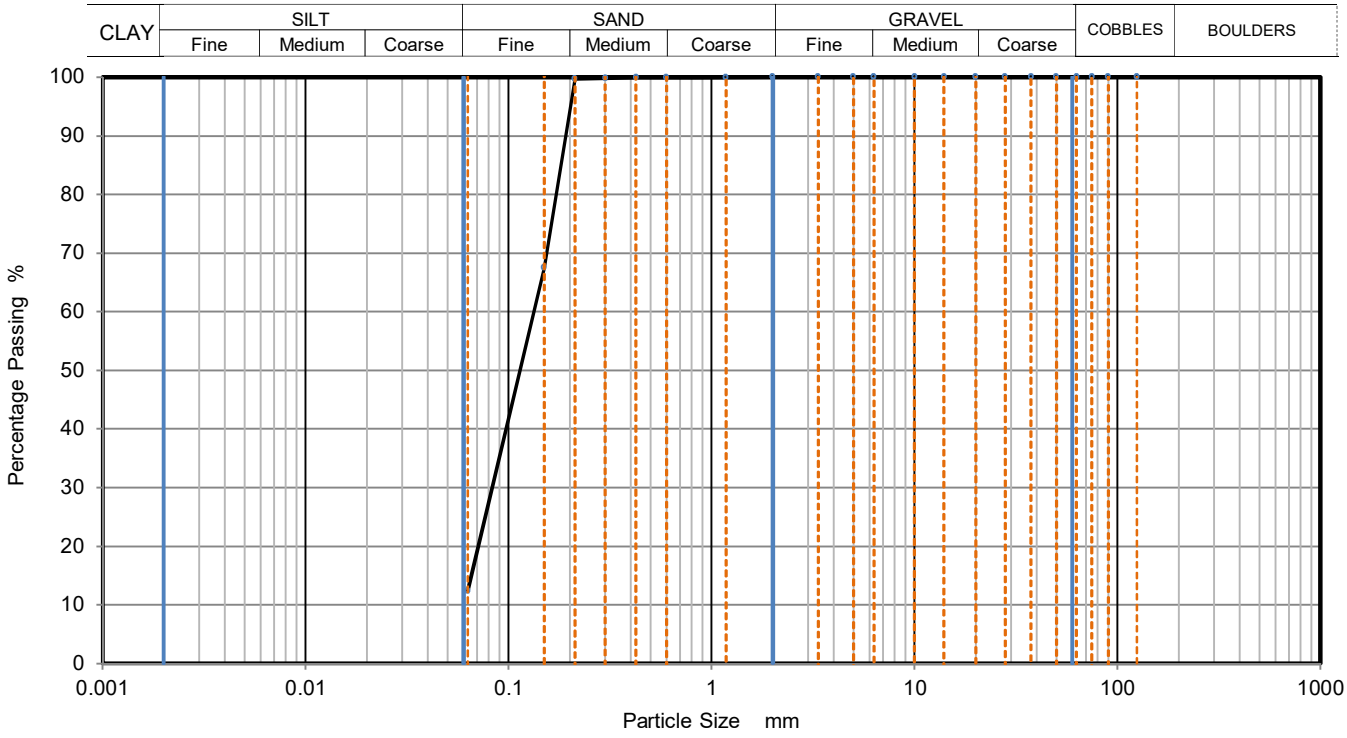
Approved	Date	Sheet No.:
MW	28/07/2018	1 of 1

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

BS1377:Part 2:1990, clause 9.2

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	TP205
Sample Description:	Brown clayey silty SAND	Sample Depth (m)	1.50
		Sample Reference	B2



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	68		
0.063	12		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	88
Fines <0.063mm	12

Grading Analysis		
D100	mm	
D60	mm	0.133
D30	mm	0.083
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

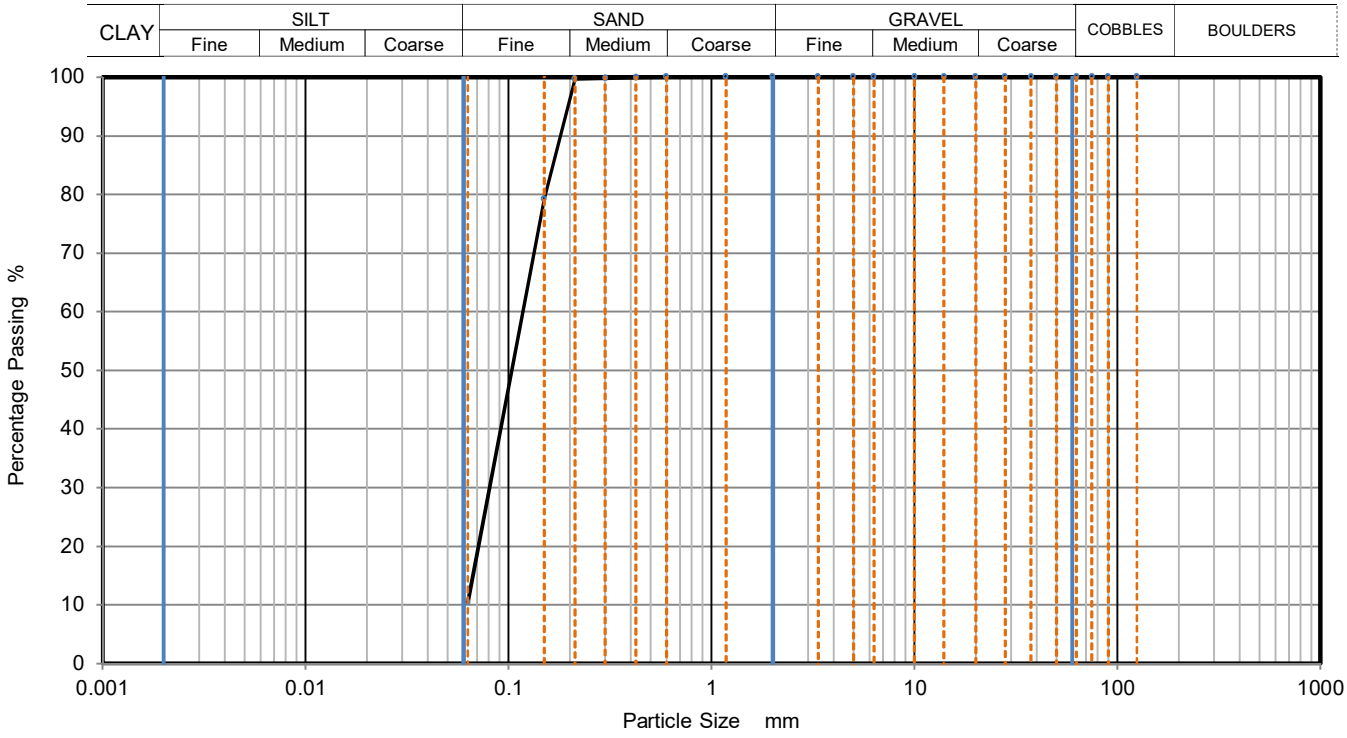
Remarks

Approved	Date	Sheet No.:
MW	28/07/2018	1 of 1

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

BS1377:Part 2:1990, clause 9.2

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	TP208
Sample Description:	Brown silty SAND	Sample Depth (m)	2.50
		Sample Reference	B3



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	100		
0.15	79		
0.063	10		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	90
Fines <0.063mm	10

Grading Analysis		
D100	mm	
D60	mm	0.118
D30	mm	0.081
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

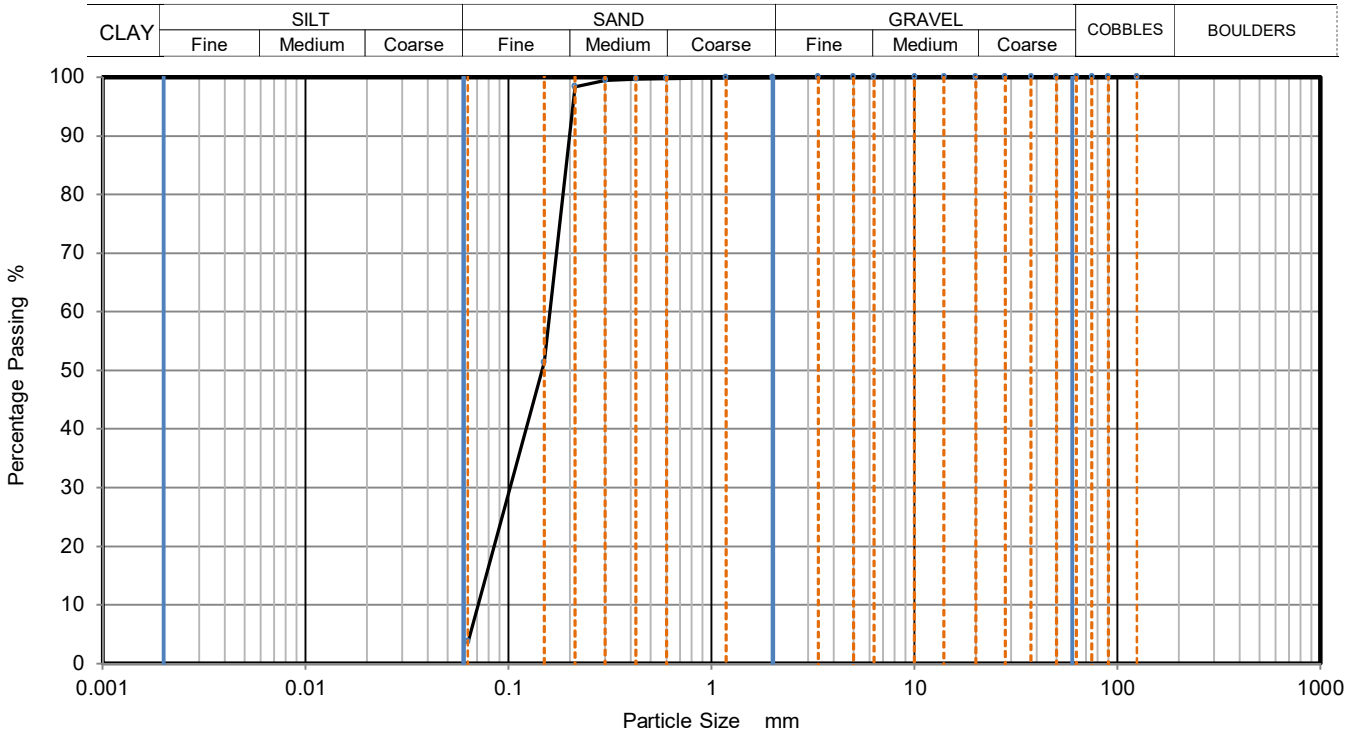
Remarks

Approved	Date	Sheet No.:
MW	28/07/2018	1 of 1

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

BS1377:Part 2:1990, clause 9.2

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	TP209
Sample Description:	Light brown slightly silty SAND	Sample Depth (m)	2.00
		Sample Reference	B3



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	100		
0.425	100		
0.3	100		
0.212	98		
0.15	51		
0.063	4		

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	96
Fines <0.063mm	4

Grading Analysis		
D100	mm	
D60	mm	0.160
D30	mm	0.102
D10	mm	0.071
Uniformity Coefficient		2.3
Curvature Coefficient		0.92

Remarks

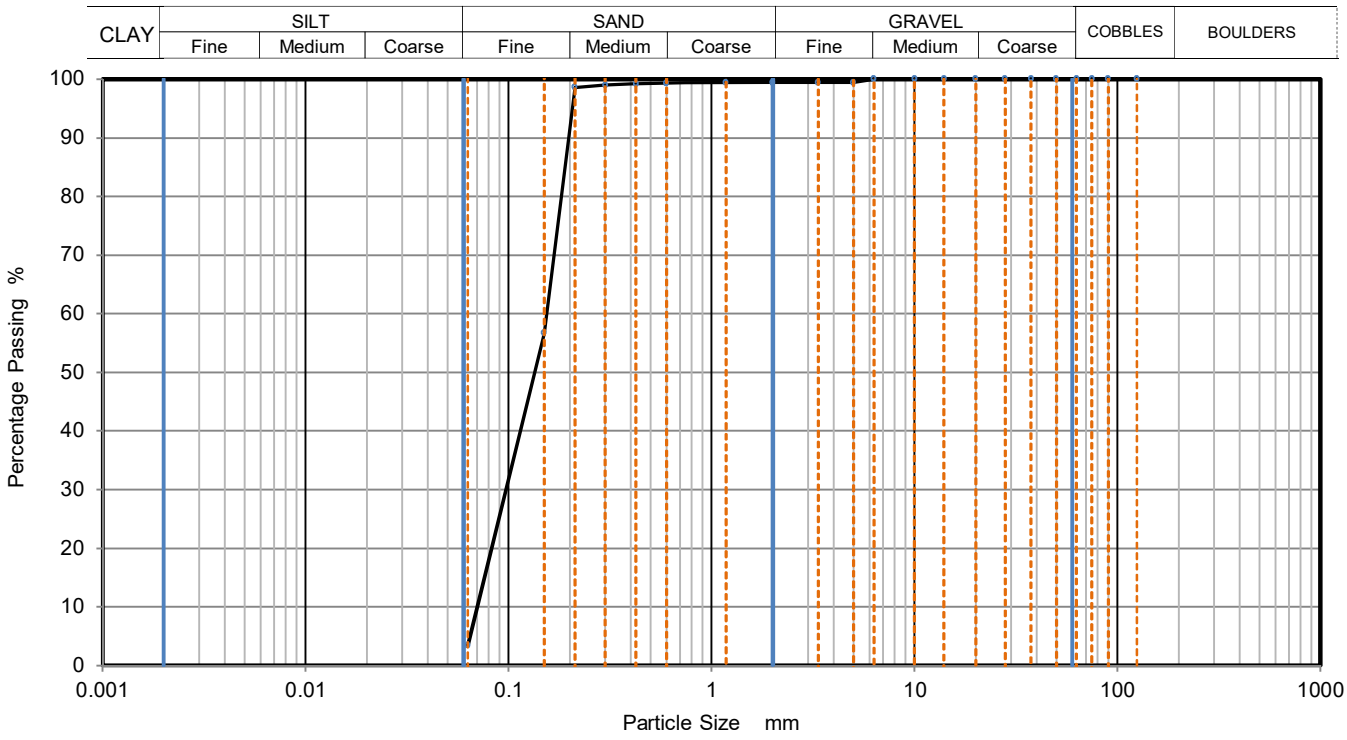
Approved	Date	Sheet No.:
MW	28/07/2018	1 of 1

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

BS1377:Part 2:1990, clause 9.2

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	TP210
Sample Description:	Light brown slightly silty slightly gravelly SAND. Gravel is of flint	Sample Depth (m)	1.50
		Sample Reference	B2



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	99		
3.35	99		
2	99		
1.18	99		
0.6	99		
0.425	99		
0.3	99		
0.212	99		
0.15	57		
0.063	3		

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	96
Fines <0.063mm	3

Grading Analysis		
D100	mm	
D60	mm	0.154
D30	mm	0.097
D10	mm	0.070
Uniformity Coefficient		2.2
Curvature Coefficient		0.87

Remarks

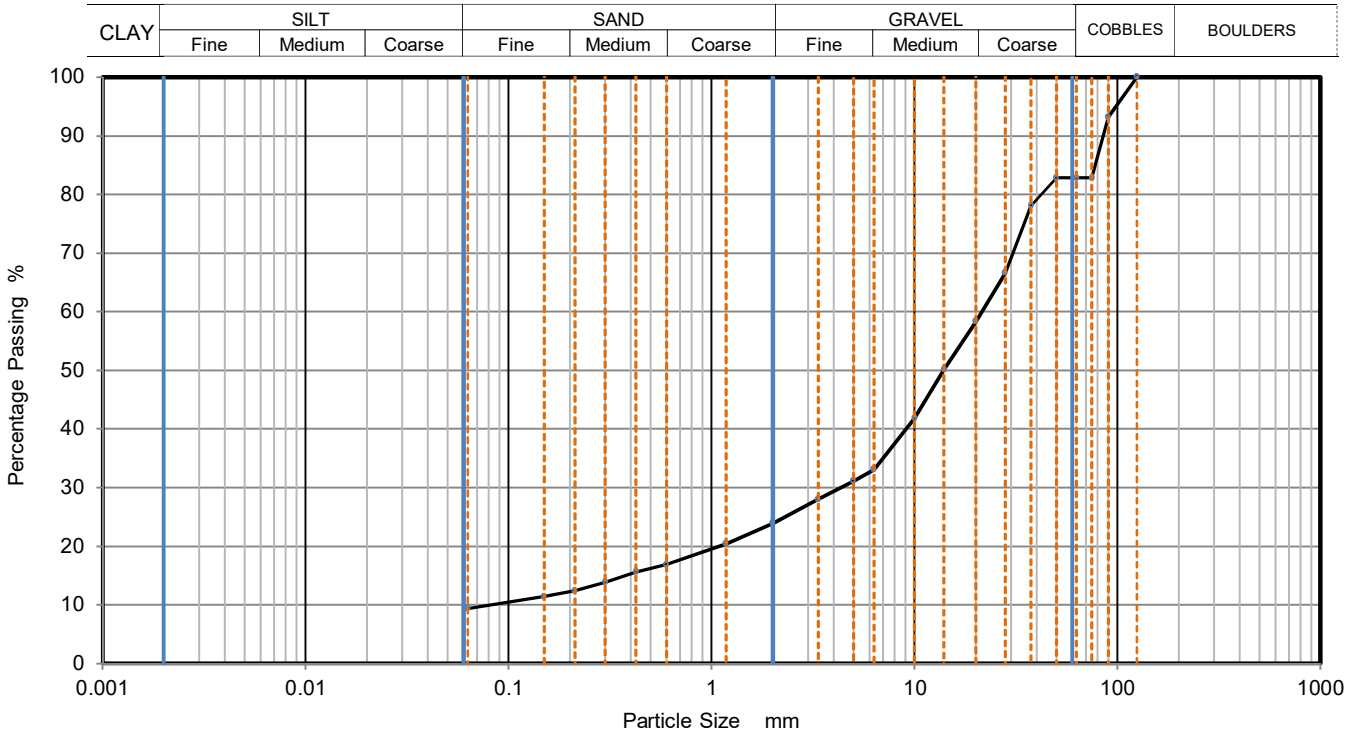
Approved	Date	Sheet No.:
MW	28/07/2018	1 of 1

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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

BS1377:Part 2:1990, clause 9.2

Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	WS206
Sample Description:	MADE GROUND (Brown clayey sandy GRAVEL with medium cobble content. Cobbles are of flint, . Gravel is of flint, chalk and occasional glass fragments)	Sample Depth (m)	0.50
		Sample Reference	B2



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	93		
75	83		
63	83		
50	83		
37.5	78		
28	67		
20	58		
14	50		
10	42		
6.3	33		
5	31		
3.35	28		
2	24		
1.18	20		
0.6	17		
0.425	16		
0.3	14		
0.212	12		
0.15	11		
0.063	9		

Sample Proportions	% dry mass
Very coarse	17
Gravel	59
Sand	15
Fines <0.063mm	9

Grading Analysis		
D100	mm	125.000
D60	mm	21.400
D30	mm	4.330
D10	mm	0.081
Uniformity Coefficient		260
Curvature Coefficient		11

Remarks

Insufficient sample to test in full accordance with BS 1377

Approved	Date	Sheet No.:
MW	28/07/2018	1 of 1

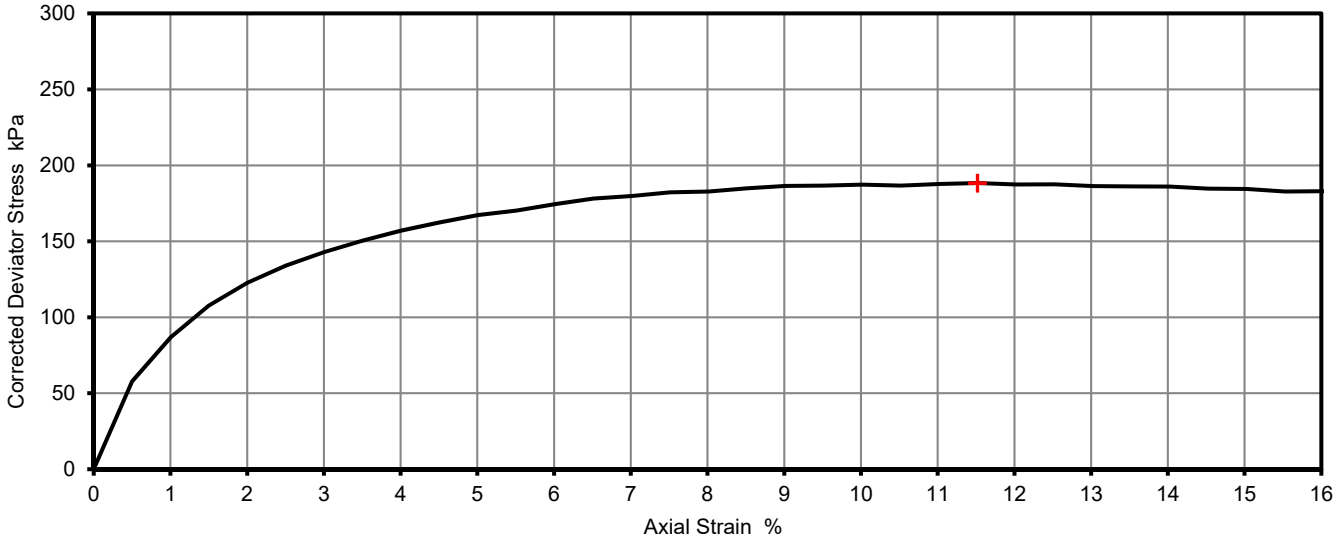
DETERMINATION OF UNDRAINED SHEAR STRENGTH - DEFINITIVE

BS1377 : Part 7 : 1990, clause 8, single specimen

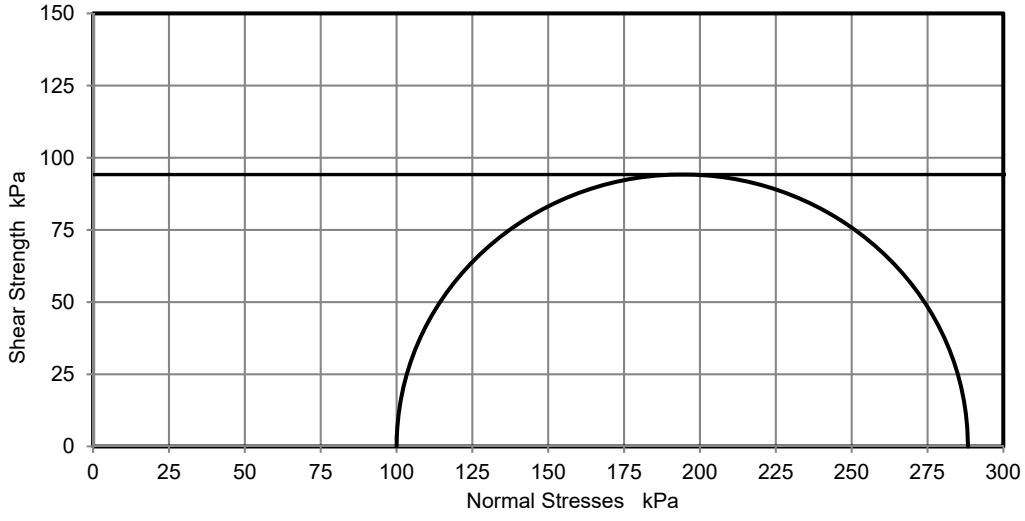
Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH201
Sample Description:	High strength light brown CLAY	Sample Depth (m)	2.50
		Sample Reference	UT1

Test Number		1	
Length		199.6	mm
Diameter		103.0	mm
Bulk Density		2.01	Mg/m3
Moisture Content		27.2	%
Dry Density		1.58	Mg/m3
Rate of Strain		1.5	%/min
Cell Pressure		100	kPa
At failure	Axial Strain	11.5	%
	Deviator Stress, (σ1 - σ3)f	188	kPa
	Undrained Shear Strength, cu	94	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

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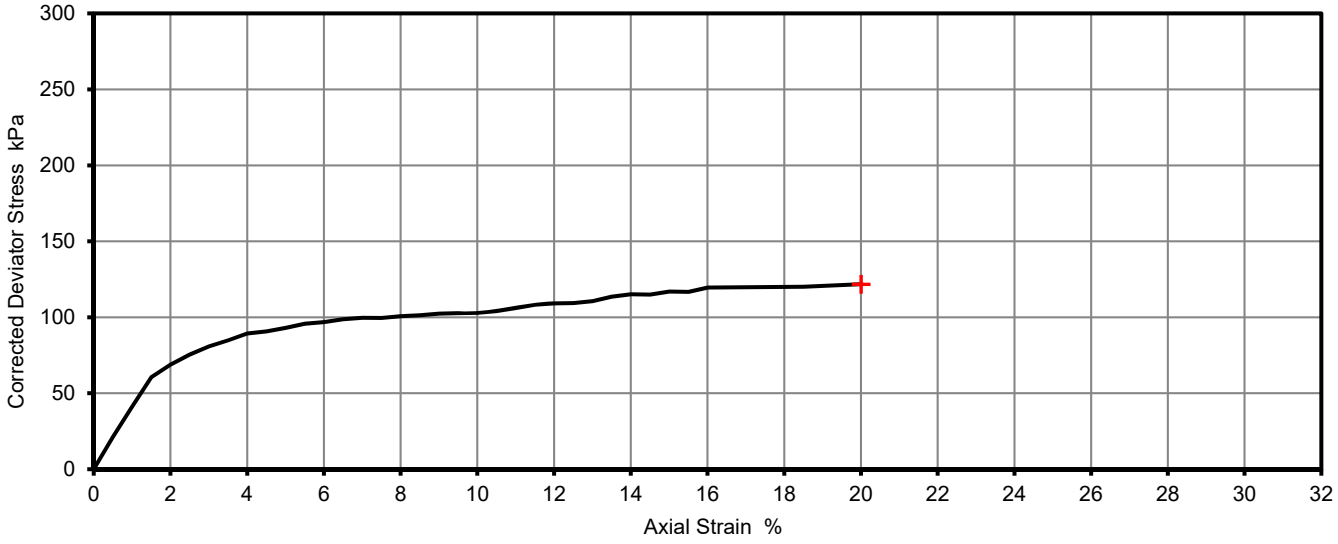
DETERMINATION OF UNDRAINED SHEAR STRENGTH - DEFINITIVE

BS1377 : Part 7 : 1990, clause 8, single specimen

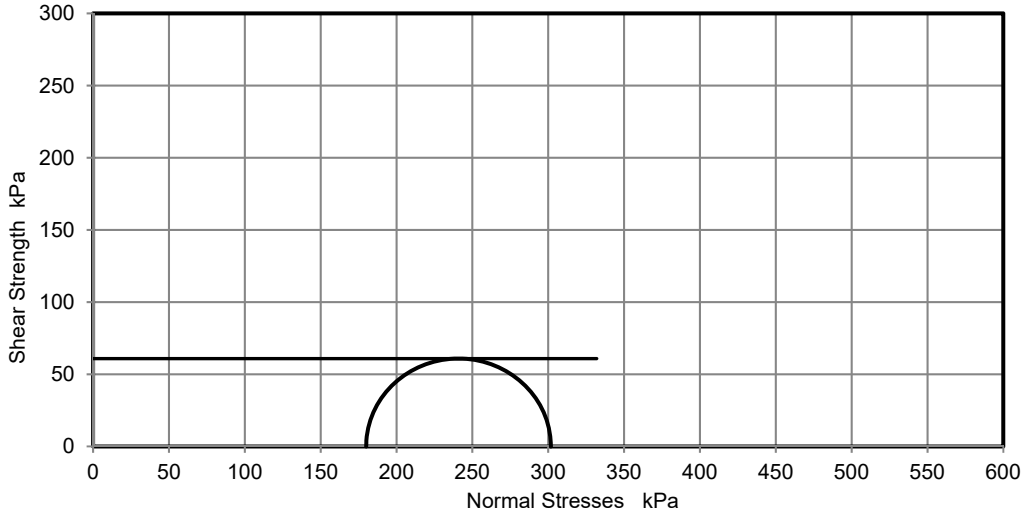
Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH201
Sample Description:	Medium strength brown very gravelly CLAY. Gravel is of flint	Sample Depth (m)	4.50
		Sample Reference	UT2

Test Number		1	
Length		199.9	mm
Diameter		103.4	mm
Bulk Density		1.90	Mg/m3
Moisture Content		10.5	%
Dry Density		1.72	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		180	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	122	kPa
	Undrained Shear Strength, cu	61	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

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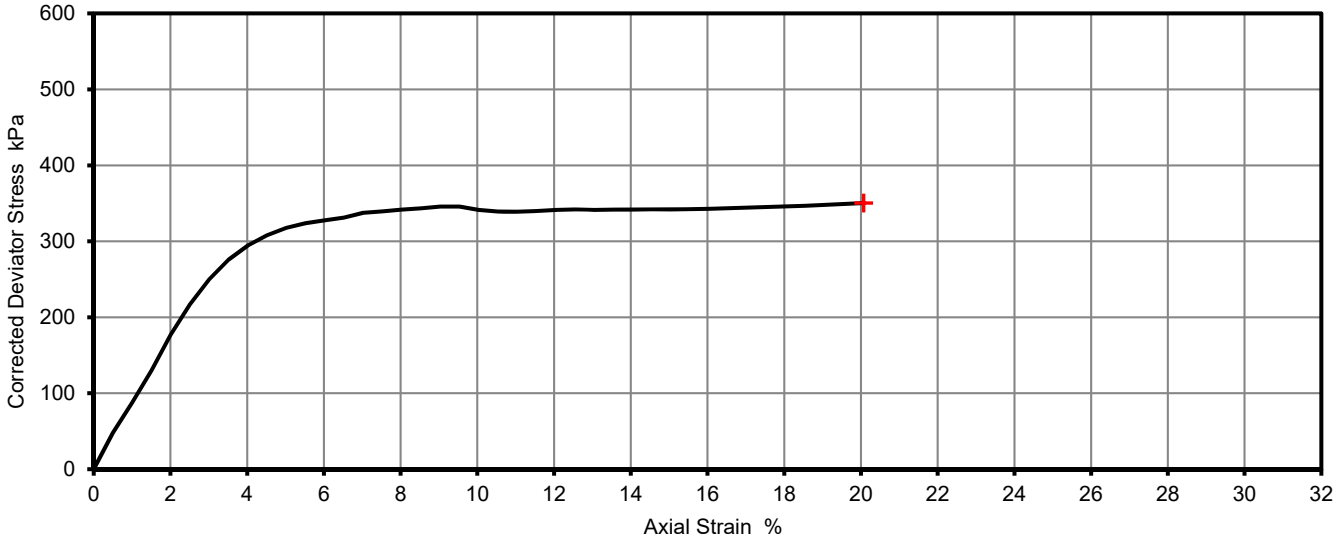
DETERMINATION OF UNDRAINED SHEAR STRENGTH - DEFINITIVE

BS1377 : Part 7 : 1990, clause 8, single specimen

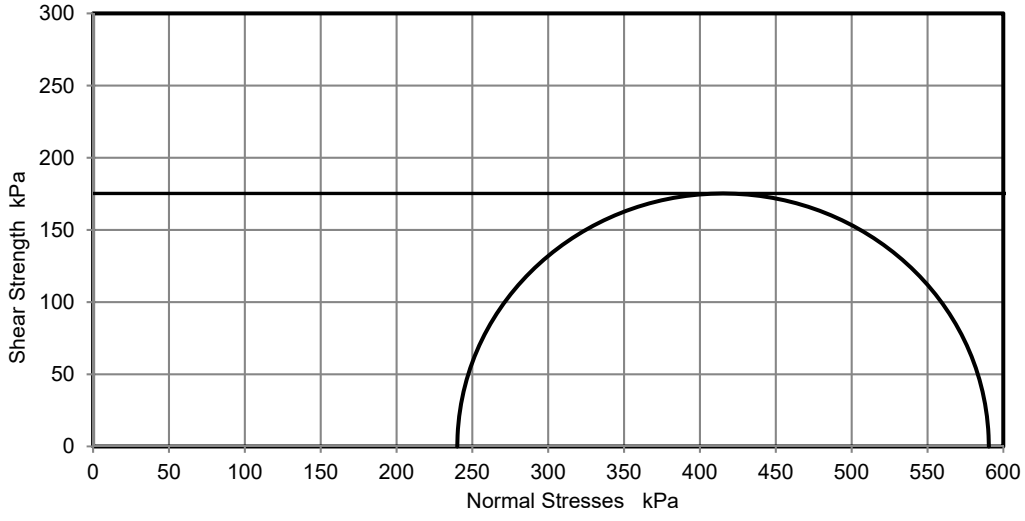
Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH201
Sample Description:	Very high strength grey brown CLAY	Sample Depth (m)	12.00
		Sample Reference	UT3

Test Number		1	
Length		199.3	mm
Diameter		103.2	mm
Bulk Density		2.10	Mg/m3
Moisture Content		22.1	%
Dry Density		1.72	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		240	kPa
At failure	Axial Strain	20.1	%
	Deviator Stress, (σ1 - σ3)f	350	kPa
	Undrained Shear Strength, cu	175	kPa ½(σ1 - σ3)f
	Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
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Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

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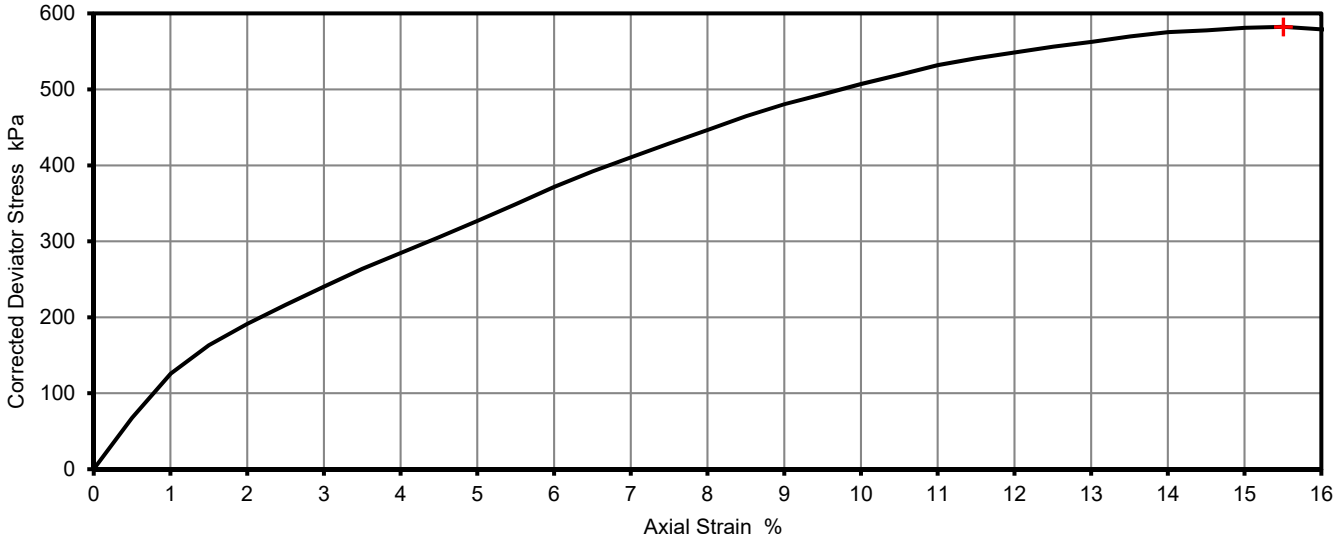
DETERMINATION OF UNDRAINED SHEAR STRENGTH - DEFINITIVE

BS1377 : Part 7 : 1990, clause 8, single specimen

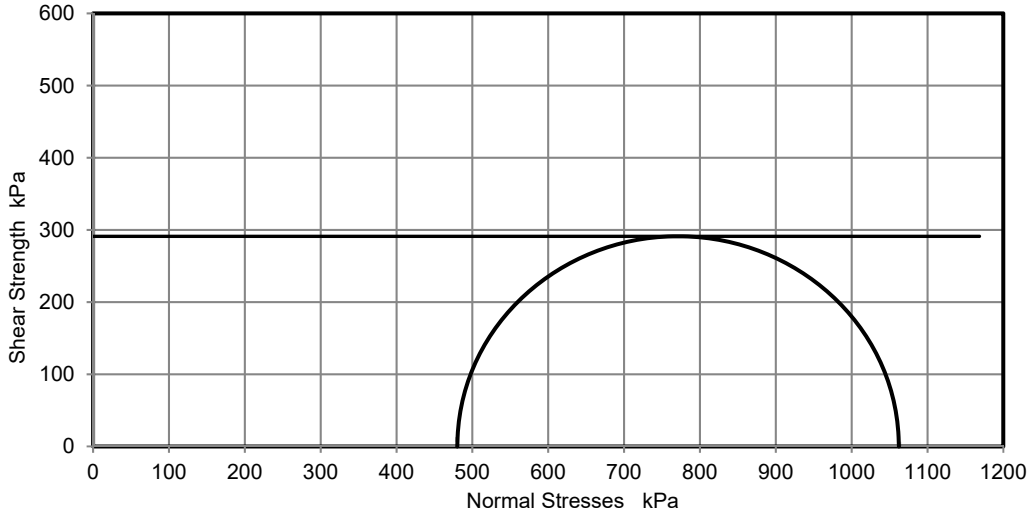
Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH201
Sample Description:	Very high strength dark brown slightly sandy CLAY	Sample Depth (m)	15.00
		Sample Reference	UT4

Test Number		1	
Length		199.9	mm
Diameter		103.6	mm
Bulk Density		2.05	Mg/m3
Moisture Content		20.2	%
Dry Density		1.70	Mg/m3
Rate of Strain		1.5	%/min
Cell Pressure		480	kPa
At failure	Axial Strain	15.5	%
	Deviator Stress, (σ1 - σ3)f	582	kPa
	Undrained Shear Strength, cu	291	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

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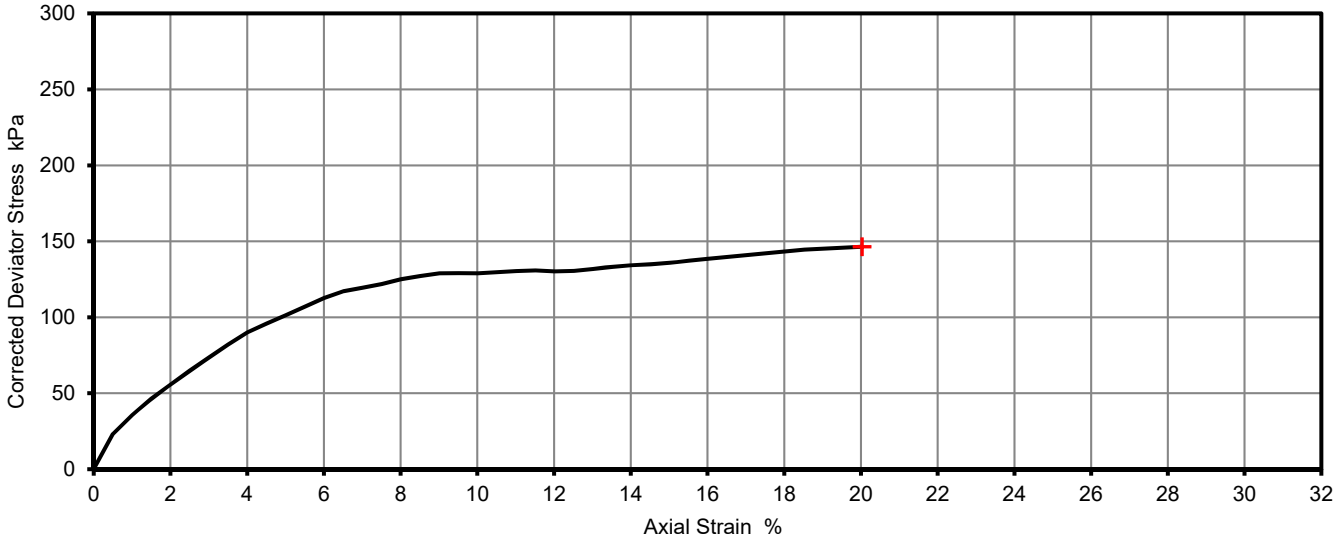
DETERMINATION OF UNDRAINED SHEAR STRENGTH - DEFINITIVE

BS1377 : Part 7 : 1990, clause 8, single specimen

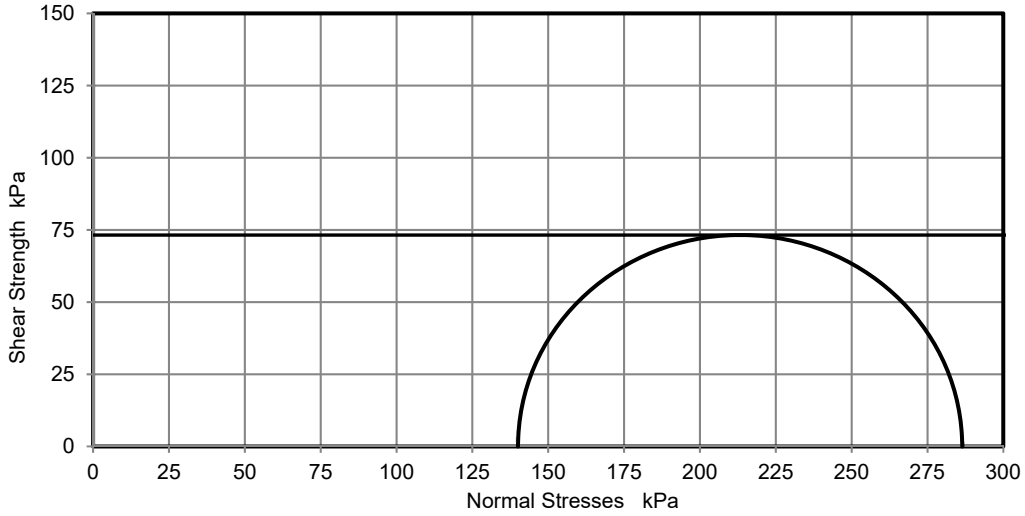
Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH202A
Sample Description:	Medium strength grey brown CLAY	Sample Depth (m)	3.50
		Sample Reference	UT1

Test Number		1	
Length		199.7	mm
Diameter		103.4	mm
Bulk Density		2.02	Mg/m3
Moisture Content		24.9	%
Dry Density		1.62	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		140	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	146	kPa
	Undrained Shear Strength, cu	73	kPa ½(σ1 - σ3)f
	Mode of Failure	Plastic	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

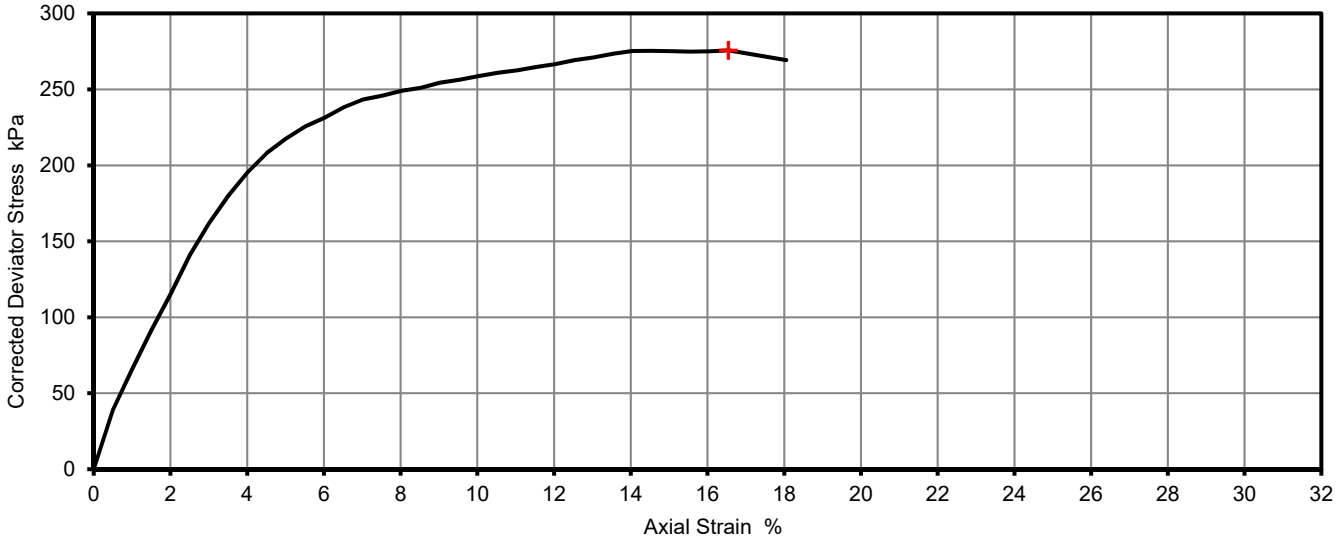
DETERMINATION OF UNDRAINED SHEAR STRENGTH - DEFINITIVE

BS1377 : Part 7 : 1990, clause 8, single specimen

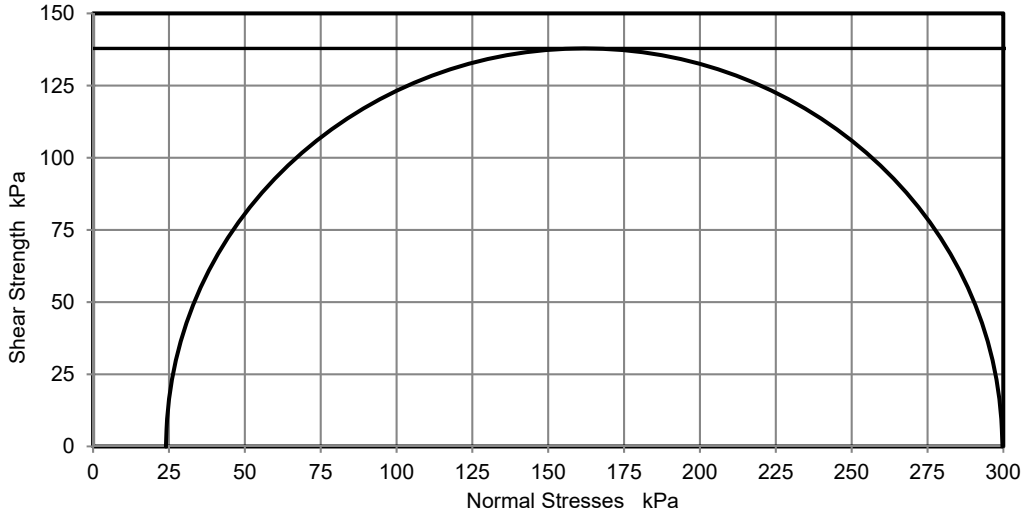
Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH202A
Sample Description:	High strength dark brown sandy silty CLAY	Sample Depth (m)	6.00
		Sample Reference	UT2

Test Number		1	
Length		199.4	mm
Diameter		102.9	mm
Bulk Density		2.09	Mg/m3
Moisture Content		23.4	%
Dry Density		1.69	Mg/m3
Rate of Strain		2.0	%/min
Cell Pressure		240	kPa
At failure	Axial Strain	16.5	%
	Deviator Stress, (σ1 - σ3)f	276	kPa
	Undrained Shear Strength, cu	138	kPa ½(σ1 - σ3)f
	Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

Mohr circles and their interpretation is not covered by BS1377.
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Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

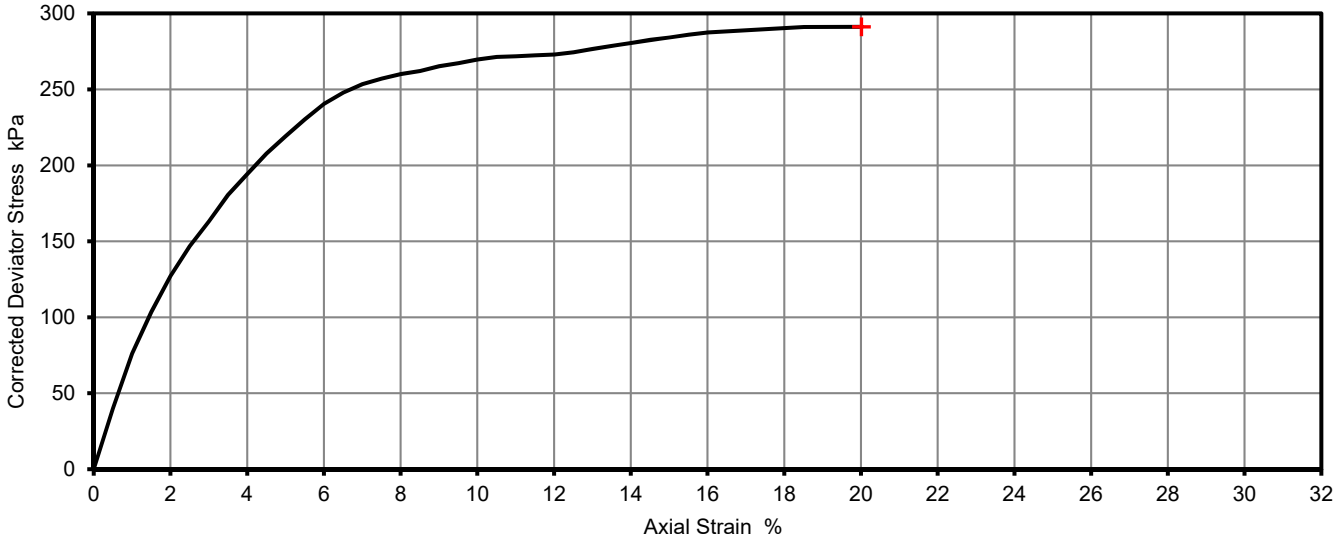
DETERMINATION OF UNDRAINED SHEAR STRENGTH - DEFINITIVE

BS1377 : Part 7 : 1990, clause 8, single specimen

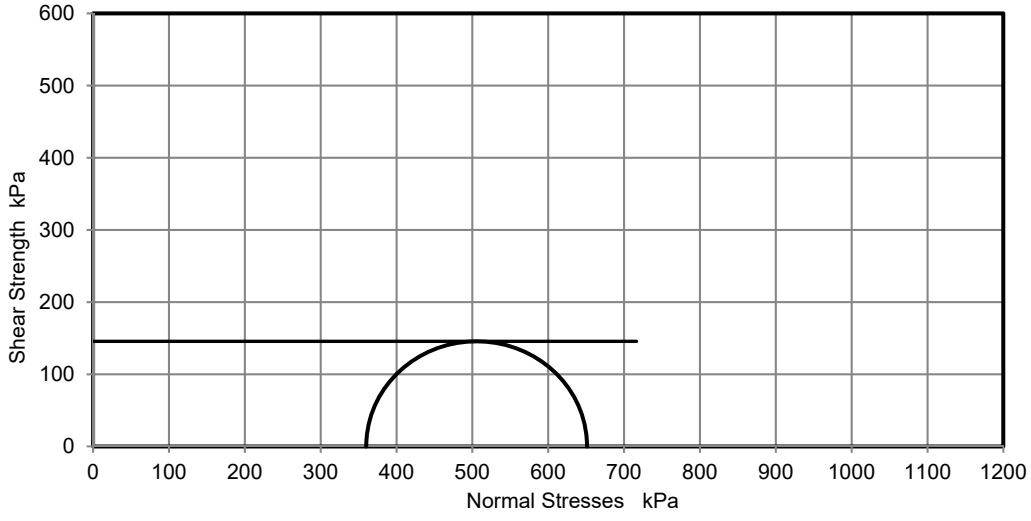
Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH202A
Sample Description:	High strength brown slightly gravelly slightly sandy CLAY. Gravel is of siltstone	Sample Depth (m)	9.00
		Sample Reference	UT3

Test Number		1	
Length		199.8	mm
Diameter		103.2	mm
Bulk Density		2.09	Mg/m3
Moisture Content		21.2	%
Dry Density		1.72	Mg/m3
Rate of Strain		1.5	%/min
Cell Pressure		360	kPa
At failure	Axial Strain	20.0	%
	Deviator Stress, (σ1 - σ3)f	291	kPa
	Undrained Shear Strength, cu	146	kPa ½(σ1 - σ3)f
	Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

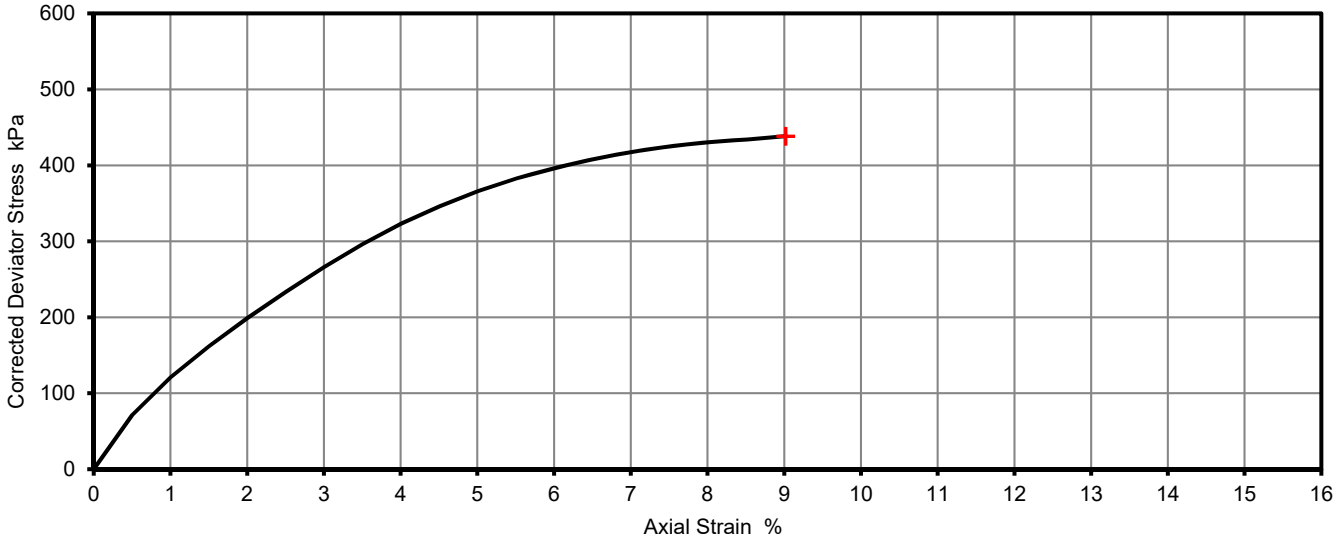
DETERMINATION OF UNDRAINED SHEAR STRENGTH - DEFINITIVE

BS1377 : Part 7 : 1990, clause 8, single specimen

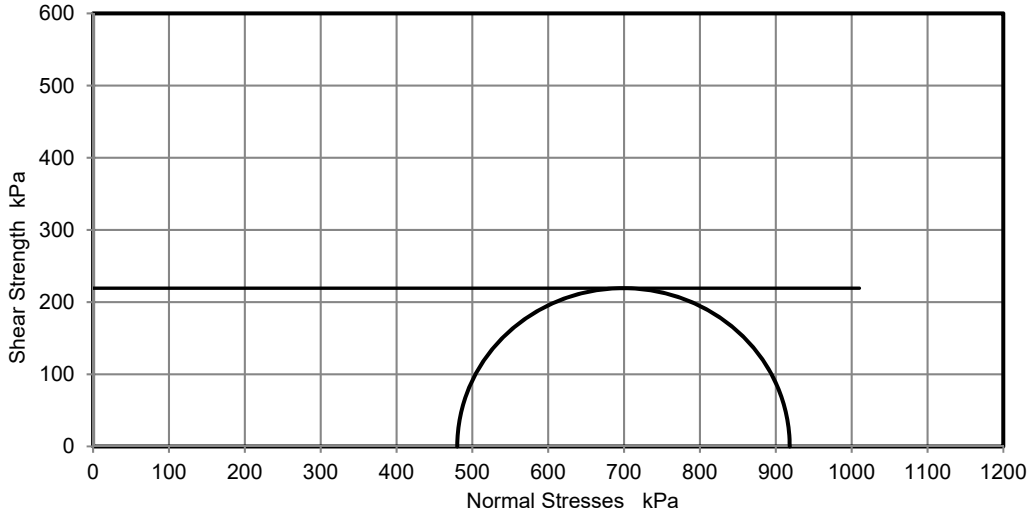
Project Name:	**Colt Industrial, Havant**	Project Number:	**GL20590-01**
Client Name:	**Hughes & Salvidge Limited**	Sample Location:	BH202A
Sample Description:	Very high strength brown and grey slightly gravelly sandy CLAY. Gravel is of siltstone	Sample Depth (m)	12.00
		Sample Reference	UT4

Test Number		1	
Length		199.5	mm
Diameter		102.6	mm
Bulk Density		2.10	Mg/m3
Moisture Content		21.8	%
Dry Density		1.72	Mg/m3
Rate of Strain		1.5	%/min
Cell Pressure		480	kPa
At failure	Axial Strain	9.0	%
	Deviator Stress, (σ1 - σ3)f	438	kPa
	Undrained Shear Strength, cu	219	kPa ½(σ1 - σ3)f
	Mode of Failure	Brittle	

Deviator Stress v Axial Strain



Mohr Circles



Deviator stress corrected for area change and membrane effects

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Remarks	Approved	Date	Sheet No.:
	MW	28/07/2018	1 of 1

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Analytical Report Number : 18-90925

Project / Site name:	Colt Industrial, Havant	**Samples received on:**	02/07/2018
Your job number:	GL20590	**Samples instructed on:**	02/07/2018
Your order number:	PO-31864-GB	**Analysis completed by:**	06/07/2018
Report Issue Number:	1	**Report issued on:**	06/07/2018
Samples Analysed:	26 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 18-90925

Project / Site name: Colt Industrial, Havant
Your Order No: PO-31864-GB

Lab Sample Number				992436	992437	992438	992439	992440
Sample Reference				BH201	BH201	BH201	BH201	BH201
Sample Number				B2	D15	D18	D2	D22
Depth (m)				7.50-7.95	12.50-12.50	14.50-14.50	1.00-1.00	17.50-17.50
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	19	16	15	21	17
Total mass of sample received	kg	0.001	NONE	0.39	0.44	0.41	0.42	0.62
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.3	7.5	7.7	7.9	8.1
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.163	0.178	0.075	0.092
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.034	0.79	0.85	0.26	0.43
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	33.9	794	851	261	426
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	-	22	-
Total Sulphur	%	0.005	MCERTS	-	0.405	0.671	0.045	0.661
Organic Matter	%	0.1	MCERTS	-	-	-	-	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	-	6.3	-
Heavy Metals / Metalloids								
Magnesium (water soluble)	mg/kg	5	NONE	-	-	-	37	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	-	19	-

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Analytical Report Number: 18-90925

Project / Site name: Colt Industrial, Havant
Your Order No: PO-31864-GB

Lab Sample Number				992441	992442	992443	992444	992445
Sample Reference				BH201	BH201	BH201	BH202A	BH202A
Sample Number				D3	D4	D7	D15	D3
Depth (m)				1.50-1.95	2.00-2.00	4.00-4.00	11.50-11.50	2.00-2.00
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	17	16	17	15	18
Total mass of sample received	kg	0.001	NONE	0.35	0.48	0.41	0.44	0.83
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	-	8.3	-	8.0	8.4
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.039	-	0.141	0.056
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.11	-	0.70	0.18
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	110	-	702	178
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	-	-	-
Total Sulphur	%	0.005	MCERTS	-	0.016	-	0.383	0.027
Organic Matter	%	0.1	MCERTS	0.2	-	0.4	-	0.2
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	-	-	-
Heavy Metals / Metalloids								
Magnesium (water soluble)	mg/kg	5	NONE	-	-	-	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	-	-	-

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Analytical Report Number: 18-90925

Project / Site name: Colt Industrial, Havant
Your Order No: PO-31864-GB

Lab Sample Number				992446	992447	992448	992449	992450
Sample Reference				BH202A	BH202A	WS202	WS202	WS203
Sample Number				D4	D5	D3	D4	D4
Depth (m)				3.00-3.00	4.00-4.00	1.00-1.00	1.50-1.50	1.50-1.50
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	20	15	21	20	20
Total mass of sample received	kg	0.001	NONE	0.51	0.35	0.38	0.29	0.31
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.3	6.5	7.5	7.7	7.5
Total Sulphate as SO_4	%	0.005	MCERTS	0.298	0.239	0.026	0.058	0.021
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.080	1.1	0.026	0.19	0.019
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	79.6	1060	25.9	188	18.8
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	7.8	-	-
Total Sulphur	%	0.005	MCERTS	0.102	4.73	0.010	0.032	0.008
Organic Matter	%	0.1	MCERTS	-	-	-	-	0.5
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	< 2.0	-	-
Heavy Metals / Metalloids								
Magnesium (water soluble)	mg/kg	5	NONE	-	-	5.2	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	2.6	-	-

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Analytical Report Number: 18-90925

Project / Site name: Colt Industrial, Havant
Your Order No: PO-31864-GB

Lab Sample Number				992451	992452	992453	992454	992455
Sample Reference				WS203	WS204	WS205	WS205	WS206
Sample Number				D8	D3	D4	D5	D1
Depth (m)				5.00-5.00	1.40-1.40	1.50-1.50	2.00-2.00	1.00-1.00
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	17	15	7.4	18	19
Total mass of sample received	kg	0.001	NONE	0.50	0.35	0.53	0.21	0.38
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.1	7.7	7.5	7.8	7.9
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.028	0.025	-	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.020	0.039	0.049	0.0099	0.0066
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	19.7	38.7	48.6	9.9	6.6
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	-	-	-
Total Sulphur	%	0.005	MCERTS	-	0.011	0.009	-	-
Organic Matter	%	0.1	MCERTS	-	-	-	-	-
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	-	-	-
Heavy Metals / Metalloids								
Magnesium (water soluble)	mg/kg	5	NONE	-	-	-	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	-	-	-

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Analytical Report Number: 18-90925

Project / Site name: Colt Industrial, Havant
Your Order No: PO-31864-GB

Lab Sample Number				992456	992457	992458	992459	992460
Sample Reference				TP202	TP204	TP205	TP206	TP206
Sample Number				D4	B2	B2	D3	D5
Depth (m)				1.50-1.50	1.50-1.50	1.50-1.50	1.00-1.00	2.50-2.50
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	10	18	18	15	21
Total mass of sample received	kg	0.001	NONE	0.41	0.57	0.46	0.38	0.45
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	-	7.4	7.7	7.8	-
Total Sulphate as SO_4	%	0.005	MCERTS	-	0.018	0.015	0.038	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	-	0.019	0.015	0.094	-
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	-	19.1	15.1	94.2	-
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-	-	-	-	-
Total Sulphur	%	0.005	MCERTS	-	0.007	0.006	0.014	-
Organic Matter	%	0.1	MCERTS	0.4	0.2	-	-	1.1
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-	-	-	-	-
Heavy Metals / Metalloids								
Magnesium (water soluble)	mg/kg	5	NONE	-	-	-	-	-
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-	-	-	-	-

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Analytical Report Number: 18-90925

Project / Site name: Colt Industrial, Havant
Your Order No: PO-31864-GB

Lab Sample Number				992461				
Sample Reference				TP208				
Sample Number				D1				
Depth (m)				1.00-1.00				
Date Sampled				Deviating				
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1				
Moisture Content	%	N/A	NONE	18				
Total mass of sample received	kg	0.001	NONE	0.92				
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.3				
Total Sulphate as SO_4	%	0.005	MCERTS	-				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.026				
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	25.6				
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	-				
Total Sulphur	%	0.005	MCERTS	-				
Organic Matter	%	0.1	MCERTS	-				
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	-				
Heavy Metals / Metalloids								
Magnesium (water soluble)	mg/kg	5	NONE	-				
Magnesium (leachate equivalent)	mg/l	2.5	NONE	-				

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Analytical Report Number : 18-90925

Project / Site name: Colt Industrial, Havant

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
992436	BH201	B2	7.50-7.95	Light brown sandy clay.
992437	BH201	D15	12.50-12.50	Grey clay and sand.
992438	BH201	D18	14.50-14.50	Grey clay and sand.
992439	BH201	D2	1.00-1.00	Light brown clay with gravel.
992440	BH201	D22	17.50-17.50	Grey clay with gravel.
992441	BH201	D3	1.50-1.95	Brown clay.
992442	BH201	D4	2.00-2.00	Brown clay.
992443	BH201	D7	4.00-4.00	Brown clay.
992444	BH202A	D15	11.50-11.50	Grey clay.
992445	BH202A	D3	2.00-2.00	Light brown clay with gravel.
992446	BH202A	D4	3.00-3.00	Light brown clay and sand with gravel.
992447	BH202A	D5	4.00-4.00	Grey clay and sand.
992448	WS202	D3	1.00-1.00	Light brown clay.
992449	WS202	D4	1.50-1.50	Light brown clay with gravel.
992450	WS203	D4	1.50-1.50	Light brown clay.
992451	WS203	D8	5.00-5.00	Light brown sand with gravel.
992452	WS204	D3	1.40-1.40	Brown clay.
992453	WS205	D4	1.50-1.50	Light brown clay and sand with gravel.
992454	WS205	D5	2.00-2.00	Light brown sandy clay.
992455	WS206	D1	1.00-1.00	Light brown sandy clay.
992456	TP202	D4	1.50-1.50	Brown clay with gravel.
992457	TP204	B2	1.50-1.50	Light brown clay and sand.
992458	TP205	B2	1.50-1.50	Light brown sandy clay.
992459	TP206	D3	1.00-1.00	Light brown clay.
992460	TP206	D5	2.50-2.50	Brown clay and sand.
992461	TP208	D1	1.00-1.00	Light brown sand.

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Analytical Report Number : 18-90925

Project / Site name: Colt Industrial, Havant

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests. 2:1 extraction.	L082-PL	D	MCERTS
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L038	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, and MEWAM 2006 Methods for the Determination of Metals in Soil	L038	W	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH201	15	S	18-90925	992437	a			
BH201	18	S	18-90925	992438	a			
BH201	2	S	18-90925	992436	a			
BH201	2	S	18-90925	992439	a			
BH201	22	S	18-90925	992440	a			
BH201	3	S	18-90925	992441	a			
BH201	4	S	18-90925	992442	a			
BH201	7	S	18-90925	992443	a			
BH202A	15	S	18-90925	992444	a			
BH202A	3	S	18-90925	992445	a			
BH202A	4	S	18-90925	992446	a			
BH202A	5	S	18-90925	992447	a			
TP202	4	S	18-90925	992456	a			
TP204	2	S	18-90925	992457	a			
TP205	2	S	18-90925	992458	a			
TP206	3	S	18-90925	992459	a			
TP206	5	S	18-90925	992460	a			
TP208	1	S	18-90925	992461	a			
WS202	3	S	18-90925	992448	a			
WS202	4	S	18-90925	992449	a			
WS203	4	S	18-90925	992450	a			
WS203	8	S	18-90925	992451	a			
WS204	3	S	18-90925	992452	a			
WS205	4	S	18-90925	992453	a			
WS205	5	S	18-90925	992454	a			
WS206	1	S	18-90925	992455	a			

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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Analytical Report Number : 18-87090

Project / Site name:	Colt Industrial, Havant	**Samples received on:**	24/05/2018
Your job number:	GL20590	**Samples instructed on:**	30/05/2018
Your order number:		**Analysis completed by:**	06/06/2018
Report Issue Number:	1	**Report issued on:**	06/06/2018
Samples Analysed:	3 leachate samples - 13 soil samples		

Signed:

Dr Claire Stone
Quality Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 18-87090

Project / Site name: Colt Industrial, Havant

Lab Sample Number				970477	970478	970479	970480	970481
Sample Reference				BH201	BH202A	HP203	HP203	HP204
Sample Number				ES1	ES1	ES1	ES2	ES1
Depth (m)				0.25-0.25	0.50-0.50	0.15-0.15	0.50-0.50	0.15-0.15
Date Sampled				21/05/2018	22/05/2018	21/05/2018	21/05/2018	21/05/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	10	17	6.5	14	5.0
Total mass of sample received	kg	0.001	NONE	1.3	1.3	1.1	1.2	1.4
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	Chrysotile - Bitumen	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.4	10.5	8.4	9.2	10.2
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	950	1300	710	860	1500
Sulphide	mg/kg	1	MCERTS	9.7	< 1.0	< 1.0	3.9	< 1.0
Phenols by HPLC								
Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Phenols								
Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	23	< 0.05	0.23	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	30	< 0.05	0.24	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	230	< 0.05	2.1	0.94	< 0.05
Anthracene	mg/kg	0.05	MCERTS	57	< 0.05	0.47	0.20	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	280	< 0.05	3.9	1.4	< 0.05
Pyrene	mg/kg	0.05	MCERTS	180	< 0.05	3.2	1.1	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	130	< 0.05	2.4	0.61	< 0.05
Chrysene	mg/kg	0.05	MCERTS	94	< 0.05	2.3	0.60	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	110	< 0.05	3.4	0.86	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	54	< 0.05	1.5	0.26	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	84	< 0.05	2.6	0.61	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	50	< 0.05	1.4	0.33	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	17	< 0.05	0.35	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	52	< 0.05	1.5	0.39	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	1390	< 0.80	25.6	7.28	< 0.80

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Analytical Report Number: 18-87090

Project / Site name: Colt Industrial, Havant

Lab Sample Number				970477	970478	970479	970480	970481
Sample Reference				BH201	BH202A	HP203	HP203	HP204
Sample Number				ES1	ES1	ES1	ES2	ES1
Depth (m)				0.25-0.25	0.50-0.50	0.15-0.15	0.50-0.50	0.15-0.15
Date Sampled				21/05/2018	22/05/2018	21/05/2018	21/05/2018	21/05/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	32	7.6	7.4	6.8	5.8
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.57	0.73	0.56	0.42	0.31
Boron (water soluble)	mg/kg	0.2	MCERTS	1.0	0.6	1.1	1.1	0.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	29	19	17	12
Copper (aqua regia extractable)	mg/kg	1	MCERTS	36	8.1	12	12	8.0
Lead (aqua regia extractable)	mg/kg	1	MCERTS	150	36	61	950	21
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.3	0.3	< 0.3	0.6	0.4
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	10	17	12	8.9	7.8
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	28	41	27	22	20
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	120	34	66	240	34
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH Texas (C8 - C10)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Texas (C10 - C12)	mg/kg	1	MCERTS	12	< 1.0	5.0	< 1.0	< 1.0
TPH Texas (C12 - C16)	mg/kg	10	MCERTS	240	< 10	< 10	< 10	< 10
TPH Texas (C16 - C21)	mg/kg	10	MCERTS	1600	11	24	15	< 10
TPH Texas (C21 - C40)	mg/kg	10	MCERTS	2600	72	110	40	< 10
TPH Texas (C6 - C40)	mg/kg	10	NONE	4400	83	140	55	< 10

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Analytical Report Number: 18-87090

Project / Site name: Colt Industrial, Havant

Lab Sample Number				970482	970483	970484	970485	970486
Sample Reference				HP204	WS201	WS202	WS203	WS204
Sample Number				ES2	ES1	ES2	ES1	ES1
Depth (m)				0.50-0.50	0.45-0.45	0.60-0.60	0.30-0.30	0.50-0.50
Date Sampled				21/05/2018	22/05/2018	22/05/2018	21/05/2018	22/05/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	12	14	21	19	7.9
Total mass of sample received	kg	0.001	NONE	1.2	1.4	1.2	1.2	1.2
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.4	9.2	7.8	8.7	11.2
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	670	810	600	460	1800
Sulphide	mg/kg	1	MCERTS	< 1.0	2.5	< 1.0	< 1.0	36
Phenols by HPLC								
Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Phenols								
Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	0.26	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	0.21	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	1.9	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	2.5	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	16	0.24	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	1.3	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	0.38	13	0.31	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	0.31	10	0.24	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	3.6	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	4.2	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	4.3	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	1.9	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	3.5	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	1.5	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.33	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	1.8	< 0.05	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	66.8	< 0.80	< 0.80	< 0.80

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Analytical Report Number: 18-87090

Project / Site name: Colt Industrial, Havant

Lab Sample Number				970482	970483	970484	970485	970486
Sample Reference				HP204	WS201	WS202	WS203	WS204
Sample Number				ES2	ES1	ES2	ES1	ES1
Depth (m)				0.50-0.50	0.45-0.45	0.60-0.60	0.30-0.30	0.50-0.50
Date Sampled				21/05/2018	22/05/2018	22/05/2018	21/05/2018	22/05/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	11	28	< 1.0	3.7
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.67	0.35	0.70	< 0.06	0.19
Boron (water soluble)	mg/kg	0.2	MCERTS	1.0	0.7	3.2	0.4	1.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.4	0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	14	29	3.1	9.9
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	15	19	3.1	7.6
Lead (aqua regia extractable)	mg/kg	1	MCERTS	210	25	56	2.6	12
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	14	11	18	2.6	5.9
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	32	27	42	4.1	13
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	62	33	46	9.8	14
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH Texas (C8 - C10)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Texas (C10 - C12)	mg/kg	1	MCERTS	< 1.0	3.4	< 1.0	< 1.0	2.0
TPH Texas (C12 - C16)	mg/kg	10	MCERTS	< 10	37	< 10	< 10	< 10
TPH Texas (C16 - C21)	mg/kg	10	MCERTS	< 10	140	10	< 10	13
TPH Texas (C21 - C40)	mg/kg	10	MCERTS	17	230	31	< 10	110
TPH Texas (C6 - C40)	mg/kg	10	NONE	17	410	41	< 10	130

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Analytical Report Number: 18-87090

Project / Site name: Colt Industrial, Havant

Lab Sample Number				970487	970488	970489		
Sample Reference				WS205	WS206	WS207		
Sample Number				ES1	ES1	ES1		
Depth (m)				0.30-0.30	0.15-0.15	0.30-0.30		
Date Sampled				22/05/2018	22/05/2018	22/05/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	47	< 0.1		
Moisture Content	%	N/A	NONE	8.9	4.3	15		
Total mass of sample received	kg	0.001	NONE	1.2	1.2	1.4		
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-	-		
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected		
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	10.6	8.5	9.0		
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1		
Total Sulphate as SO_4	mg/kg	50	MCERTS	1700	330	930		
Sulphide	mg/kg	1	MCERTS	1.2	< 1.0	1.5		
Phenols by HPLC								
Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10		
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10		
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30		
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20	< 0.20		
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10		
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10		
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10		
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30		
Total Phenols								
Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3	< 1.3		
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.09		
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.30	0.21		
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.48	0.22		
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.13		
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.14		
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.27	< 0.05		
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.09	< 0.05		
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.26	< 0.05		
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.21	< 0.05		
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05		
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.41	< 0.05		
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	2.02	< 0.80		

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Analytical Report Number: 18-87090

Project / Site name: Colt Industrial, Havant

Lab Sample Number				970487	970488	970489		
Sample Reference				WS205	WS206	WS207		
Sample Number				ES1	ES1	ES1		
Depth (m)				0.30-0.30	0.15-0.15	0.30-0.30		
Date Sampled				22/05/2018	22/05/2018	22/05/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.5	6.8	6.0		
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.47	0.55	0.36		
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	0.5	0.6		
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.7	< 0.2		
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	23	16		
Copper (aqua regia extractable)	mg/kg	1	MCERTS	10	19	20		
Lead (aqua regia extractable)	mg/kg	1	MCERTS	50	25	100		
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3		
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	11	27	8.7		
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	1.9	< 1.0		
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	28	25	19		
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	24	40	84		
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1		
TPH Texas (C8 - C10)	mg/kg	10	MCERTS	< 10	< 10	< 10		
TPH Texas (C10 - C12)	mg/kg	1	MCERTS	1.6	< 1.0	< 1.0		
TPH Texas (C12 - C16)	mg/kg	10	MCERTS	< 10	< 10	< 10		
TPH Texas (C16 - C21)	mg/kg	10	MCERTS	< 10	< 10	17		
TPH Texas (C21 - C40)	mg/kg	10	MCERTS	38	< 10	30		
TPH Texas (C6 - C40)	mg/kg	10	NONE	39	< 10	47		

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Analytical Report Number: 18-87090

Project / Site name: Colt Industrial, Havant

Lab Sample Number				970490	970491	970492		
Sample Reference				BH201	BH202A	WS204		
Sample Number				ES1	ES1	ES1		
Depth (m)				0.25-0.25	0.50-0.50	0.50-0.50		
Date Sampled				21/05/2018	22/05/2018	22/05/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.8	8.3	8.0		
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0		
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1	< 1	< 1		
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200	< 200		
Sulphate as SO_4	µg/l	100	ISO 17025	24300	27100	3230		
Sulphate as SO_4	mg/l	0.1	ISO 17025	24.3	27.1	3.2		
Total Sulphur	µg/l	15	NONE	8100	9000	1100		
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0		
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Resorcinol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Cresols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Naphthols	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Isopropylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Phenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Trimethylphenol	µg/l	0.5	NONE	< 0.5	< 0.5	< 0.5		
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5	< 3.5	< 3.5		
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01		
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01	< 0.01		
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2	< 0.2		

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Analytical Report Number: 18-87090

Project / Site name: Colt Industrial, Havant

Lab Sample Number				970490	970491	970492		
Sample Reference				BH201	BH202A	WS204		
Sample Number				ES1	ES1	ES1		
Depth (m)				0.25-0.25	0.50-0.50	0.50-0.50		
Date Sampled				21/05/2018	22/05/2018	22/05/2018		
Time Taken				None Supplied	None Supplied	None Supplied		
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	1.1	ISO 17025	15	2.8	< 1.1		
Boron (dissolved)	µg/l	10	ISO 17025	22	21	< 10		
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	< 0.08	< 0.08		
Chromium (hexavalent)	µg/l	5	NONE	< 5.0	< 5.0	< 5.0		
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.6	2.3	0.8		
Copper (dissolved)	µg/l	0.7	ISO 17025	8.9	7.1	13		
Lead (dissolved)	µg/l	1	ISO 17025	4.1	< 1.0	< 1.0		
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5	< 0.5		
Nickel (dissolved)	µg/l	0.3	ISO 17025	2.2	< 0.3	0.8		
Selenium (dissolved)	µg/l	4	ISO 17025	4.2	< 4.0	< 4.0		
Zinc (dissolved)	µg/l	0.4	ISO 17025	7.7	1.9	8.9		
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10	< 10		

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Analytical Report Number : 18-87090

Project / Site name: Colt Industrial, Havant

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
970477	BH201	ES1	0.25-0.25	Brown loam and clay with rubble and brick.
970478	BH202A	ES1	0.50-0.50	Light brown loam and sand with vegetation and rubble.
970479	HP203	ES1	0.15-0.15	Light brown loam and sand with vegetation and rubble.
970480	HP203	ES2	0.50-0.50	Brown loam and sand with brick and gravel
970481	HP204	ES1	0.15-0.15	Light brown loam and sand with gravel and rubble.
970482	HP204	ES2	0.50-0.50	Brown loam and clay with rubble and brick.
970483	WS201	ES1	0.45-0.45	Brown loam and clay with chalk and brick.
970484	WS202	ES2	0.60-0.60	Brown clay and loam with chalk and gravel
970485	WS203	ES1	0.30-0.30	Brown loam and clay with chalk and brick.
970486	WS204	ES1	0.50-0.50	Brown loam and clay with chalk and brick.
970487	WS205	ES1	0.30-0.30	Light brown loam and clay with rubble and chalk.
970488	WS206	ES1	0.15-0.15	Brown loam and sand with vegetation and stones.
970489	WS207	ES1	0.30-0.30	Brown loam and sand with brick and rubble.

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Analytical Report Number : 18-87090

Project / Site name: Colt Industrial, Havant

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
PRO (Soil)	Determination of hydrocarbons C6-C10 by headspace GC-MS.	In-house method based on USEPA8260	L088-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025

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Analytical Report Number : 18-87090

Project / Site name: Colt Industrial, Havant

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discreet analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
Total Sulphur in leachates	Determination of total sulphur in leachates by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	NONE
TPH Texas (Soil)	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method	L064-PL	D	ISO 17025
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH201	1	S	18-87090	970477	c	Sulphide in soil	L010-PL	c
BH201	1	S	18-87090	970477	c	Total cyanide in soil	L080-PL	c
BH202A	1	S	18-87090	970478	c	Sulphide in soil	L010-PL	c
BH202A	1	S	18-87090	970478	c	Total cyanide in soil	L080-PL	c
HP203	1	S	18-87090	970479	c	Sulphide in soil	L010-PL	c
HP203	1	S	18-87090	970479	c	Total cyanide in soil	L080-PL	c
HP203	2	S	18-87090	970480	c	Sulphide in soil	L010-PL	c
HP203	2	S	18-87090	970480	c	Total cyanide in soil	L080-PL	c
HP204	1	S	18-87090	970481	c	Sulphide in soil	L010-PL	c
HP204	1	S	18-87090	970481	c	Total cyanide in soil	L080-PL	c
HP204	2	S	18-87090	970482	c	Sulphide in soil	L010-PL	c
HP204	2	S	18-87090	970482	c	Total cyanide in soil	L080-PL	c
WS201	1	S	18-87090	970483	c	Sulphide in soil	L010-PL	c
WS201	1	S	18-87090	970483	c	Total cyanide in soil	L080-PL	c
WS202	2	S	18-87090	970484	c	Sulphide in soil	L010-PL	c
WS202	2	S	18-87090	970484	c	Total cyanide in soil	L080-PL	c
WS203	1	S	18-87090	970485	c	Sulphide in soil	L010-PL	c
WS203	1	S	18-87090	970485	c	Total cyanide in soil	L080-PL	c
WS204	1	S	18-87090	970486	c	Sulphide in soil	L010-PL	c
WS204	1	S	18-87090	970486	c	Total cyanide in soil	L080-PL	c
WS205	1	S	18-87090	970487	c	Sulphide in soil	L010-PL	c
WS205	1	S	18-87090	970487	c	Total cyanide in soil	L080-PL	c
WS206	1	S	18-87090	970488	c	Sulphide in soil	L010-PL	c
WS206	1	S	18-87090	970488	c	Total cyanide in soil	L080-PL	c
WS207	1	S	18-87090	970489	c	Sulphide in soil	L010-PL	c
WS207	1	S	18-87090	970489	c	Total cyanide in soil	L080-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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Analytical Report Number : 18-89320

Project / Site name:	Colt Industrial, Havant	**Samples received on:**	06/06/2018
Your job number:	GL20590	**Samples instructed on:**	18/06/2018
Your order number:		**Analysis completed by:**	20/06/2018
Report Issue Number:	1	**Report issued on:**	20/06/2018
Samples Analysed:	1 leachate sample - 12 soil samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983745	983746	983747	983748	983749
Sample Reference				HP201	HP201	TP202	TP202	TP204
Sample Number				ES1	ES2	ES1	ES4	ES1
Depth (m)				0.20-0.20	0.50-0.50	0.40-0.40	2.00-2.00	0.30-0.30
Date Sampled				05/06/2018	05/06/2018	05/06/2018	05/06/2018	05/06/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	11	13	11	14	13
Total mass of sample received	kg	0.001	NONE	1.2	0.98	1.2	1.2	1.2
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Chrysotile-Hard/Cement Type Material	Chrysotile	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Detected	Detected	Not-detected	-	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	< 0.001	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	< 0.001	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	8.2	8.1	7.9	-	9.5
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	-	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	760	520	640	-	790
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	24	-	< 1.0
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.6	-	-	-	0.1
Phenols by HPLC								
Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	-	< 0.10
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	-	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	-	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20	< 0.20	-	< 0.20
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	-	< 0.10
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	-	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	-	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	-	< 0.30
Total Phenols								
Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3	< 1.3	-	< 1.3

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983745	983746	983747	983748	983749
Sample Reference				HP201	HP201	TP202	TP202	TP204
Sample Number				ES1	ES2	ES1	ES4	ES1
Depth (m)				0.20-0.20	0.50-0.50	0.40-0.40	2.00-2.00	0.30-0.30
Date Sampled				05/06/2018	05/06/2018	05/06/2018	05/06/2018	05/06/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.31	< 0.05	< 0.05	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.18	< 0.05	0.31	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.24	0.42	0.19	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	5.1	5.3	2.0	-	0.71
Anthracene	mg/kg	0.05	MCERTS	1.5	1.6	0.49	-	0.14
Fluoranthene	mg/kg	0.05	MCERTS	10	9.1	3.1	-	0.71
Pyrene	mg/kg	0.05	MCERTS	8.3	7.5	2.2	-	0.41
Benzo(a)anthracene	mg/kg	0.05	MCERTS	4.9	4.8	1.6	-	< 0.05
Chrysene	mg/kg	0.05	MCERTS	5.2	4.4	1.3	-	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	6.3	5.5	1.2	-	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.9	2.5	0.80	-	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.2	5.0	0.99	-	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.3	2.1	0.47	-	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.61	0.60	< 0.05	-	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.9	2.5	0.50	-	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	54.9	51.1	15.1	-	1.97
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	12	26	-	13
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.71	0.80	2.0	-	1.3
Boron (water soluble)	mg/kg	0.2	MCERTS	1.7	0.3	5.7	-	1.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.4	< 0.2	< 0.2	-	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	26	26	41	-	42
Copper (aqua regia extractable)	mg/kg	1	MCERTS	28	19	25	-	14
Lead (aqua regia extractable)	mg/kg	1	MCERTS	240	83	38	-	22
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	-	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	20	18	30	-	26
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	-	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	34	42	88	-	63
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	140	110	77	-	52

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983745	983746	983747	983748	983749
Sample Reference				HP201	HP201	TP202	TP202	TP204
Sample Number				ES1	ES2	ES1	ES4	ES1
Depth (m)				0.20-0.20	0.50-0.50	0.40-0.40	2.00-2.00	0.30-0.30
Date Sampled				05/06/2018	05/06/2018	05/06/2018	05/06/2018	05/06/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
Toluene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
p & m-xylene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
o-xylene	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	ISO 17025	< 0.1	< 0.1	< 0.1	-	< 0.1
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	4.2	< 2.0	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	< 8.0	< 8.0	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	29	< 8.0	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	< 8.4	< 8.4	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	41	< 10	-
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	-	-	41	< 10	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	< 0.001	< 0.001	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	1.6	< 1.0	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	8.2	< 2.0	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	20	< 10	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	46	< 10	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	< 8.4	< 8.4	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	76	< 10	-
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	-	-	76	< 10	-
TPH Texas (C8 - C10)	mg/kg	10	MCERTS	< 10	< 10	< 10	-	< 10
TPH Texas (C10 - C12)	mg/kg	1	MCERTS	< 1.0	< 1.0	2.0	-	< 1.0
TPH Texas (C12 - C16)	mg/kg	10	MCERTS	< 10	< 10	12	-	< 10
TPH Texas (C16 - C21)	mg/kg	10	MCERTS	21	43	27	-	< 10
TPH Texas (C21 - C40)	mg/kg	10	MCERTS	88	170	81	-	< 10
TPH Texas (C6 - C40)	mg/kg	10	NONE	110	220	120	-	< 10

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983750	983751	983752	983753	983754
Sample Reference				TP205	TP206	TP207	TP208	TP209
Sample Number				ES1	ES1	ES1	ES1	ES1
Depth (m)				0.35-0.35	0.30-0.30	0.60-0.60	0.60-0.60	0.20-0.20
Date Sampled				05/06/2018	05/06/2018	06/06/2018	05/06/2018	04/06/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	6.0	10	17	19	9.4
Total mass of sample received	kg	0.001	NONE	1.3	0.86	1.4	0.50	1.2
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile-Hard/Cement Type Material	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Not-detected	Not-detected
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-	-	-	-
Asbestos Quantification Total	%	0.001	ISO 17025	-	-	-	-	-
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.9	11.6	8.9	8.6	8.3
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO_4	mg/kg	50	MCERTS	150	4400	150	140	150
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Organic Carbon (TOC)	%	0.1	MCERTS	< 0.1	-	-	-	-
Phenols by HPLC								
Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
Total Phenols								
Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3	< 1.3	< 1.3	< 1.3

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983750	983751	983752	983753	983754
Sample Reference				TP205	TP206	TP207	TP208	TP209
Sample Number				ES1	ES1	ES1	ES1	ES1
Depth (m)				0.35-0.35	0.30-0.30	0.60-0.60	0.60-0.60	0.20-0.20
Date Sampled				05/06/2018	05/06/2018	06/06/2018	05/06/2018	04/06/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.3	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.12	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.6	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	1.4	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.68	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.91	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.84	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.53	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.76	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.33	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	0.38	< 0.05	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	8.85	< 0.80	< 0.80
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	13	12	1.2	3.1	5.2
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.10	0.40	0.25	0.28	0.06
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	0.8	< 0.2	< 0.2	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	9.4	20	17	19	6.4
Copper (aqua regia extractable)	mg/kg	1	MCERTS	4.0	11	3.6	2.2	3.9
Lead (aqua regia extractable)	mg/kg	1	MCERTS	4.0	60	4.7	3.1	5.9
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	4.8	14	10	12	3.6
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	16	30	24	25	10
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	10	43	28	62	9.1

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983750	983751	983752	983753	983754
Sample Reference				TP205	TP206	TP207	TP208	TP209
Sample Number				ES1	ES1	ES1	ES1	ES1
Depth (m)				0.35-0.35	0.30-0.30	0.60-0.60	0.60-0.60	0.20-0.20
Date Sampled				05/06/2018	05/06/2018	06/06/2018	05/06/2018	04/06/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-	-
p & m-xylene	µg/kg	1	MCERTS	-	-	-	-	-
o-xylene	µg/kg	1	MCERTS	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-	-
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	ISO 17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	-	-	-	-	-
TPH Texas (C8 - C10)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Texas (C10 - C12)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH Texas (C12 - C16)	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH Texas (C16 - C21)	mg/kg	10	MCERTS	< 10	21	< 10	< 10	< 10
TPH Texas (C21 - C40)	mg/kg	10	MCERTS	< 10	190	13	< 10	< 10
TPH Texas (C6 - C40)	mg/kg	10	NONE	< 10	210	13	< 10	< 10

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983755	983756			
Sample Reference				TP210	TP211			
Sample Number				ES1	ES1			
Depth (m)				0.20-0.20	0.20-0.20			
Date Sampled				04/06/2018	04/06/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1			
Moisture Content	%	N/A	NONE	9.4	8.5			
Total mass of sample received	kg	0.001	NONE	1.0	1.2			
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	-			
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected			
Asbestos Quantification (Stage 2)	%	0.001	ISO 17025	-	-			
Asbestos Quantification Total	%	0.001	ISO 17025	-	-			
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	7.7	7.6			
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1			
Total Sulphate as SO_4	mg/kg	50	MCERTS	600	370			
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0			
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	-			
Phenols by HPLC								
Catechol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Resorcinol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Cresols (o-, m-, p-)	mg/kg	0.3	ISO 17025	< 0.30	< 0.30			
Total Naphthols (sum of 1- and 2- Naphthol)	mg/kg	0.2	ISO 17025	< 0.20	< 0.20			
2-Isopropylphenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Phenol	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Trimethylphenol (2,3,5-)	mg/kg	0.1	ISO 17025	< 0.10	< 0.10			
Total Xylenols and Ethylphenols	mg/kg	0.3	ISO 17025	< 0.30	< 0.30			
Total Phenols								
Total Phenols (HPLC)	mg/kg	1.3	ISO 17025	< 1.3	< 1.3			

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983755	983756			
Sample Reference				TP210	TP211			
Sample Number				ES1	ES1			
Depth (m)				0.20-0.20	0.20-0.20			
Date Sampled				04/06/2018	04/06/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Speciated PAHs								
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	0.15			
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.57			
Pyrene	mg/kg	0.05	MCERTS	< 0.05	0.55			
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	0.34			
Chrysene	mg/kg	0.05	MCERTS	< 0.05	0.50			
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.43			
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	0.23			
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.38			
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	0.17			
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05			
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	0.27			
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	3.59			
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	20	19			
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.53	0.54			
Boron (water soluble)	mg/kg	0.2	MCERTS	1.5	0.9			
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2			
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	18	22			
Copper (aqua regia extractable)	mg/kg	1	MCERTS	77	37			
Lead (aqua regia extractable)	mg/kg	1	MCERTS	190	62			
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.9	0.8			
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	13	16			
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0			
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	31	38			
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	170	77			

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983755	983756			
Sample Reference				TP210	TP211			
Sample Number				ES1	ES1			
Depth (m)				0.20-0.20	0.20-0.20			
Date Sampled				04/06/2018	04/06/2018			
Time Taken				None Supplied	None Supplied			
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	ug/kg	1	MCERTS	-	-			
Toluene	µg/kg	1	MCERTS	-	-			
Ethylbenzene	µg/kg	1	MCERTS	-	-			
p & m-xylene	µg/kg	1	MCERTS	-	-			
o-xylene	µg/kg	1	MCERTS	-	-			
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-			
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	mg/kg	0.1	ISO 17025	< 0.1	< 0.1			
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	MCERTS	-	-			
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	MCERTS	-	-			
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	MCERTS	-	-			
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	MCERTS	-	-			
TPH-CWG - Aliphatic > EC35 - EC44	mg/kg	8.4	NONE	-	-			
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aliphatic (EC5 - EC44)	mg/kg	10	NONE	-	-			
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.001	MCERTS	-	-			
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	MCERTS	-	-			
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	MCERTS	-	-			
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aromatic > EC35 - EC44	mg/kg	8.4	NONE	-	-			
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	MCERTS	-	-			
TPH-CWG - Aromatic (EC5 - EC44)	mg/kg	10	NONE	-	-			
TPH Texas (C8 - C10)	mg/kg	10	MCERTS	< 10	< 10			
TPH Texas (C10 - C12)	mg/kg	1	MCERTS	< 1.0	< 1.0			
TPH Texas (C12 - C16)	mg/kg	10	MCERTS	< 10	< 10			
TPH Texas (C16 - C21)	mg/kg	10	MCERTS	< 10	< 10			
TPH Texas (C21 - C40)	mg/kg	10	MCERTS	13	10			
TPH Texas (C6 - C40)	mg/kg	10	NONE	13	10			

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Analytical Report Number: 18-89320
Project / Site name: Colt Industrial, Havant
Your Order No:

Certificate of Analysis - Asbestos Quantification

Methods:

Qualitative Analysis

The samples were analysed qualitatively for asbestos by polarising light and dispersion staining as described by the Health and Safety Executive in HSG 248.

Quantitative Analysis

The analysis was carried out using our documented in-house method A006 based on HSE Contract Research Report No: 83/1996: Development and Validation of an analytical method to determine the amount of asbestos in soils and loose aggregates (Davies et al, 1996) and HSG 248. Our method includes initial examination of the entire representative sample, then fractionation and detailed analysis of each fraction, with quantification by hand picking and weighing.

The limit of detection (reporting limit) of this method is 0.001 %.

The method has been validated using samples of at least 100 g, results for samples smaller than this should be interpreted with caution.

Both Qualitative and Quantitative Analyses are UKAS accredited.

Sample Number	Sample ID	Sample Depth (m)	Sample Weight (g)	Asbestos Containing Material Types Detected (ACM)	PLM Results	Asbestos by hand picking/weighing (%)	Total % Asbestos in Sample
983746	HP201	0.50-0.50	150	Hard/Cement Type Material	**Chrysotile**	< 0.001	**< 0.001**

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983757				
Sample Reference				TP202				
Sample Number				ES1				
Depth (m)				0.40-0.40				
Date Sampled				05/06/2018				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	7.5				
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0				
Free Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1				
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200				
Sulphate as SO_4	µg/l	100	ISO 17025	22500				
Sulphate as SO_4	mg/l	0.1	ISO 17025	22.5				
Total Sulphur	µg/l	15	NONE	7500				
Sulphide	µg/l	5	NONE	< 5.0				
Phenols by HPLC								
Catechol	µg/l	0.5	NONE	< 0.5				
Resorcinol	µg/l	0.5	NONE	< 0.5				
Ethylphenol & Dimethylphenol	µg/l	0.5	NONE	< 0.5				
Cresols	µg/l	0.5	NONE	< 0.5				
Naphthols	µg/l	0.5	NONE	< 0.5				
Isopropylphenol	µg/l	0.5	NONE	< 0.5				
Phenol	µg/l	0.5	NONE	< 0.5				
Trimethylphenol	µg/l	0.5	NONE	< 0.5				
Total Phenols								
Total Phenols (HPLC)	µg/l	3.5	NONE	< 3.5				

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983757				
Sample Reference				TP202				
Sample Number				ES1				
Depth (m)				0.40-0.40				
Date Sampled				05/06/2018				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01				
Fluorene	µg/l	0.01	ISO 17025	< 0.01				
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01				
Anthracene	µg/l	0.01	ISO 17025	< 0.01				
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Pyrene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Chrysene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01				
Total PAH								
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2				
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	1.1	ISO 17025	< 1.1				
Boron (dissolved)	µg/l	10	ISO 17025	110				
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08				
Chromium (hexavalent)	µg/l	5	NONE	< 5.0				
Chromium (dissolved)	µg/l	0.4	ISO 17025	2.7				
Copper (dissolved)	µg/l	0.7	ISO 17025	9.8				
Lead (dissolved)	µg/l	1	ISO 17025	6.4				
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5				
Nickel (dissolved)	µg/l	0.3	ISO 17025	8.7				
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0				
Zinc (dissolved)	µg/l	0.4	ISO 17025	15				

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Analytical Report Number: 18-89320

Project / Site name: Colt Industrial, Havant

Lab Sample Number				983757				
Sample Reference				TP202				
Sample Number				ES1				
Depth (m)				0.40-0.40				
Date Sampled				05/06/2018				
Time Taken				None Supplied				
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	µg/l	1	ISO 17025	< 1.0				
Toluene	µg/l	1	ISO 17025	< 1.0				
Ethylbenzene	µg/l	1	ISO 17025	< 1.0				
p & m-xylene	µg/l	1	ISO 17025	< 1.0				
o-xylene	µg/l	1	ISO 17025	< 1.0				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10				
Petroleum Hydrocarbons								
TPH1 (C10 - C40)	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10				

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Analytical Report Number : 18-89320

Project / Site name: Colt Industrial, Havant

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
983745	HP201	ES1	0.20-0.20	Brown loam and clay with gravel and vegetation.
983746	HP201	ES2	0.50-0.50	Brown loam and clay with gravel and vegetation.
983747	TP202	ES1	0.40-0.40	Brown clay and sand with gravel.
983748	TP202	ES4	2.00-2.00	Brown clay and sand with gravel.
983749	TP204	ES1	0.30-0.30	Light brown clay and sand with gravel.
983750	TP205	ES1	0.35-0.35	Light brown sand.
983751	TP206	ES1	0.30-0.30	Light brown clay and sand with rubble.
983752	TP207	ES1	0.60-0.60	Brown sand.
983753	TP208	ES1	0.60-0.60	Brown sand.
983754	TP209	ES1	0.20-0.20	Brown loam and sand with gravel and vegetation.
983755	TP210	ES1	0.20-0.20	Brown loam and sand with gravel and vegetation.
983756	TP211	ES1	0.20-0.20	Brown loam and sand with gravel and vegetation.

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Analytical Report Number : 18-89320

Project / Site name: Colt Industrial, Havant

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Asbestos Quantification - Gravimetric	Asbestos quantification by gravimetric method - in house method based on references.	HSE Report No: 83/1996, HSG 248, HSG 264 & SCA Blue Book (draft).	A006-PL	D	ISO 17025
Boron in leachate	Determination of boron in leachate. Sample acidified and followed by ICP-OES.	In-house method based on MEWAM	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Free cyanide in leachate	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	NONE
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically.	In-house method based on BS1377 Part 2, 1990, Chemical and Electrochemical Tests	L019-UK/PL	W	NONE
NRA Leachate Prep	10:1 extract with de-ionised water shaken for 24 hours then filtered.	In-house method based on National Rivers Authority	L020-PL	W	NONE
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	ISO 17025
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Phenols, speciated, in leachate, by HPLC	Determination of speciated phenols by HPLC.	In house method based on Blue Book Method.	L030-PL	W	NONE
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE

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Analytical Report Number : 18-89320

Project / Site name: Colt Industrial, Havant

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphate in leachates	Determination of sulphate in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Sulphide in leachate	Determination of sulphide in leachate by ion selective electrode.	In-house method	L010-PL	W	NONE
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Thiocyanate in leachate	Determination of thiocyanate in water by discreet analyser (colorimetry).	In house method based on SMWW 4500-CN-M.	L082-PL	W	ISO 17025
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
Total Sulphur in leachates	Determination of total sulphur in leachates by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	NONE
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding.	L076-PL	D	NONE
TPH Texas (Soil)	Determination of dichloromethane/hexane extractable hydrocarbons in soil by GC-MS.	In-house method	L064-PL	D	ISO 17025
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method	L088/76-PL	W	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
HP201	1	S	18-89320	983745	c	Sulphide in soil	L010-PL	c
HP201	1	S	18-89320	983745	c	Total cyanide in soil	L080-PL	c
HP201	2	S	18-89320	983746	c	Sulphide in soil	L010-PL	c
HP201	2	S	18-89320	983746	c	Total cyanide in soil	L080-PL	c
TP202	1	S	18-89320	983747	c	Sulphide in soil	L010-PL	c
TP202	1	S	18-89320	983747	c	Total cyanide in soil	L080-PL	c
TP204	1	S	18-89320	983749	c	Sulphide in soil	L010-PL	c
TP204	1	S	18-89320	983749	c	Total cyanide in soil	L080-PL	c
TP205	1	S	18-89320	983750	c	Sulphide in soil	L010-PL	c
TP205	1	S	18-89320	983750	c	Total cyanide in soil	L080-PL	c
TP206	1	S	18-89320	983751	bc	Phenols, speciated, in soil, by HPLC	L030-PL	b
TP206	1	S	18-89320	983751	bc	Speciated EPA-16 PAHs in soil	L064-PL	b
TP206	1	S	18-89320	983751	bc	Sulphide in soil	L010-PL	c
TP206	1	S	18-89320	983751	bc	TPH Texas (Soil)	L064-PL	b
TP206	1	S	18-89320	983751	bc	Total cyanide in soil	L080-PL	c
TP207	1	S	18-89320	983752	c	Sulphide in soil	L010-PL	c
TP207	1	S	18-89320	983752	c	Total cyanide in soil	L080-PL	c
TP208	1	S	18-89320	983753	c	Sulphide in soil	L010-PL	c
TP208	1	S	18-89320	983753	c	Total cyanide in soil	L080-PL	c
TP209	1	S	18-89320	983754	c	Sulphide in soil	L010-PL	c
TP209	1	S	18-89320	983754	c	Total cyanide in soil	L080-PL	c
TP210	1	S	18-89320	983755	c	Sulphide in soil	L010-PL	c
TP210	1	S	18-89320	983755	c	Total cyanide in soil	L080-PL	c
TP211	1	S	18-89320	983756	c	Sulphide in soil	L010-PL	c
TP211	1	S	18-89320	983756	c	Total cyanide in soil	L080-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

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Analytical Report Number : 18-90472

Project / Site name:	Colt, Havant	**Samples received on:**	25/06/2018
Your job number:	GL20590	**Samples instructed on:**	27/06/2018
Your order number:		**Analysis completed by:**	04/07/2018
Report Issue Number:	1	**Report issued on:**	04/07/2018
Samples Analysed:	6 water samples		

Signed:

Jordan Hill
Reporting Manager
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 18-90472

Project / Site name: Colt, Havant

Lab Sample Number				989889	989890	989891	989892	989893
Sample Reference				BH4	WS204	BH7	BH1	BH201
Sample Number				EW1	EW1	EW1	EW1	EW1
Depth (m)				3.00-3.00	2.50-2.50	0.50-0.50	0.50-0.50	8.00-8.00
Date Sampled				21/06/2018	21/06/2018	21/06/2018	21/06/2018	21/06/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	6.9	11.7	7.0	6.9	6.9
Total Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Free Cyanide	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200	< 200	< 200	< 200	< 200
Sulphate as SO_4	µg/l	45	ISO 17025	124000	48800	48200	3280	76600
Elemental Sulphur	mg/l	0.02	NONE	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Phenols								
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10	< 10	< 10	< 10	< 10
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	0.87	1.23	0.58	3.57	0.59
Boron (dissolved)	µg/l	10	ISO 17025	47	21	120	240	59
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	< 0.02	< 0.02	< 0.02	0.04
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	11	< 5.0	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	11	< 0.2	0.5	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	5.0	5.5	0.8	< 0.5	0.9
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	0.6	< 0.2	0.3	< 0.2
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	2.6	0.6	5.8	5.9	2.0
Selenium (dissolved)	µg/l	0.6	ISO 17025	0.9	2.8	4.5	2.5	2.0
Zinc (dissolved)	µg/l	0.5	ISO 17025	4.8	1.2	4.6	3.8	3.8

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Analytical Report Number: 18-90472

Project / Site name: Colt, Havant

Lab Sample Number				989889	989890	989891	989892	989893
Sample Reference				BH4	WS204	BH7	BH1	BH201
Sample Number				EW1	EW1	EW1	EW1	EW1
Depth (m)				3.00-3.00	2.50-2.50	0.50-0.50	0.50-0.50	8.00-8.00
Date Sampled				21/06/2018	21/06/2018	21/06/2018	21/06/2018	21/06/2018
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
Toluene	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
p & m-xylene	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
o-xylene	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	µg/l	10	ISO 17025	-	-	< 10.0	-	-
TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	-	< 10	-	-
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	-	< 10	-	-
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	-	< 10	-	-
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	-	< 10	-	-
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	-	< 10	-	-
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	-	< 1.0	-	-
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	-	< 10	-	-
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	-	< 10	-	-
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	-	< 10	-	-
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	-	< 10	-	-
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	-	< 10	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

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The results included within the report are representative of the samples submitted for analysis.

Analytical Report Number: 18-90472

Project / Site name: Colt, Havant

Lab Sample Number				989894				
Sample Reference				WS205				
Sample Number				EW1				
Depth (m)				2.50-2.50				
Date Sampled				21/06/2018				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
General Inorganics								
pH	pH Units	N/A	ISO 17025	11.1				
Total Cyanide	µg/l	10	ISO 17025	< 10				
Free Cyanide	µg/l	10	ISO 17025	< 10				
Thiocyanate as SCN	µg/l	200	ISO 17025	< 200				
Sulphate as SO_4	µg/l	45	ISO 17025	213000				
Elemental Sulphur	mg/l	0.02	NONE	< 0.02				
Sulphide	µg/l	5	NONE	< 5.0				
Total Phenols								
Total Phenols (monohydric)	µg/l	10	ISO 17025	< 10				
Speciated PAHs								
Naphthalene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01				
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01				
Fluorene	µg/l	0.01	ISO 17025	< 0.01				
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01				
Anthracene	µg/l	0.01	ISO 17025	< 0.01				
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Pyrene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Chrysene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01				
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01				
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01				
Total PAH								
Total EPA-16 PAHs	µg/l	0.16	ISO 17025	< 0.16				
Heavy Metals / Metalloids								
Arsenic (dissolved)	µg/l	0.15	ISO 17025	6.04				
Boron (dissolved)	µg/l	10	ISO 17025	100				
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02				
Chromium (hexavalent)	µg/l	5	ISO 17025	37				
Chromium (dissolved)	µg/l	0.2	ISO 17025	37				
Copper (dissolved)	µg/l	0.5	ISO 17025	11				
Lead (dissolved)	µg/l	0.2	ISO 17025	1.5				
Mercury (dissolved)	µg/l	0.05	ISO 17025	0.33				
Nickel (dissolved)	µg/l	0.5	ISO 17025	1.3				
Selenium (dissolved)	µg/l	0.6	ISO 17025	11				
Zinc (dissolved)	µg/l	0.5	ISO 17025	3.6				

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Analytical Report Number: 18-90472

Project / Site name: Colt, Havant

Lab Sample Number				989894				
Sample Reference				WS205				
Sample Number				EW1				
Depth (m)				2.50-2.50				
Date Sampled				21/06/2018				
Time Taken				None Supplied				
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Monoaromatics								
Benzene	µg/l	1	ISO 17025	-				
Toluene	µg/l	1	ISO 17025	-				
Ethylbenzene	µg/l	1	ISO 17025	-				
p & m-xylene	µg/l	1	ISO 17025	-				
o-xylene	µg/l	1	ISO 17025	-				
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	-				
Petroleum Hydrocarbons								
Petroleum Range Organics (C6 - C10)	µg/l	10	ISO 17025	-				
TPH1 (C10 - C40)	µg/l	10	NONE	< 10				
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	-				
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	-				
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	-				
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	-				
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	-				
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	-				
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	-				
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	-				
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	-				
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	-				
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	-				
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	-				
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	-				
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	-				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	-				
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	-				

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Analytical Report Number : 18-90472

Project / Site name: Colt, Havant

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Elemental sulphur in water	Determination of elemental sulphur in water by extraction in dichloromethane followed by HPLC.	In-house method based on Secondsite Property Holdings Guidance for Assessing and Managing Potential	L021-PL	W	NONE
Free cyanide in water	Determination of free cyanide by distillation followed by colorimetry.Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Monohydric phenols in water	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	W	ISO 17025
PRO (Waters)	Determination of hydrocarbons C6-C10 by headspace GC-MS. Accredited Matrices SW, PW. GW.	In-house method based on USEPA8260	L088-PL	W	ISO 17025
Speciated EPA-16 PAHs in water	Determination of PAH compounds in water by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards. Accredited matrices: SW PW GW	In-house method based on USEPA 8270	L102B-PL	W	ISO 17025
Sulphate in water	Determination of sulphate in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW, PrW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode.	In-house method	L029-PL	W	NONE
Thiocyanate in water	Determination of thiocyanate in water by discreet analyser (colorimetry). Accredited matrices SW, GW, PW.	In house method based on SMWW 4500-CN-M. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Sample ID	Other_ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
BH1	1	W	18-90472	989892	cd	Sulphide in water	L029-PL	d
BH1	1	W	18-90472	989892	cd	pH at 20oC in water (automated)	L099-PL	c
BH201	1	W	18-90472	989893	cd	Sulphide in water	L029-PL	d
BH201	1	W	18-90472	989893	cd	pH at 20oC in water (automated)	L099-PL	c
BH4	1	W	18-90472	989889	c	pH at 20oC in water (automated)	L099-PL	c
BH7	1	W	18-90472	989891	cd	BTEX and MTBE in water (Monoaromatics)	L073B-PL	d
BH7	1	W	18-90472	989891	cd	PRO (Waters)	L088-PL	d
BH7	1	W	18-90472	989891	cd	Sulphide in water	L029-PL	d
BH7	1	W	18-90472	989891	cd	TPHCWG (Waters)	L070-PL	d
BH7	1	W	18-90472	989891	cd	pH at 20oC in water (automated)	L099-PL	c
WS204	1	W	18-90472	989890	c	pH at 20oC in water (automated)	L099-PL	c
WS205	1	W	18-90472	989894	cd	Sulphide in water	L029-PL	d
WS205	1	W	18-90472	989894	cd	pH at 20oC in water (automated)	L099-PL	c

Key: a - No sampling date b - Incorrect container
c - Holding time d - Headspace e - Temperature

APPENDIX D

LABORATORY TESTING

SPT Calibration Report

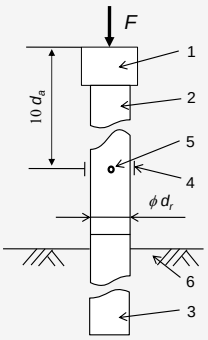
www.equipegroup.com

Hammer Energy Measurement Report

Type of Hammer		PREMIER
Client		GEOTECHNICAL SERVICES
Test No		EQU2030
Test Depth (m)		8.70
Mass of hammer	m =	63.5kg
Falling height	h =	0.76m
E_{theor} =	$m \times g \times h$ =	473J

Characteristics of the instrumented rod

Diameter	d_r =	0.052 m
Length of instrumented rod		0.558 m
Area	A =	11.61 cm²
Modulus	E_a =	206843 MPa



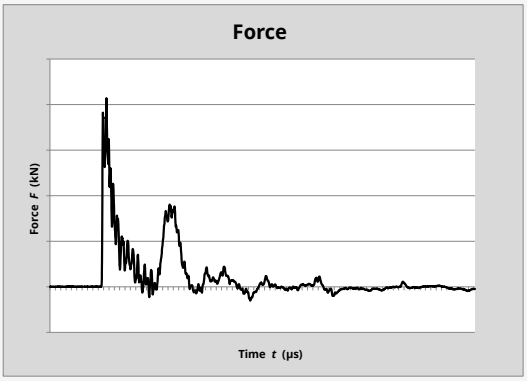
Key

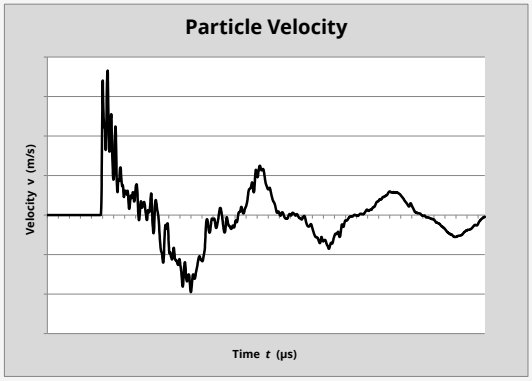
1 Anvil
2 Part of instrumented rod
3 Drive Rod
4 Strain Gauge
5 Accelerometer
6 Ground

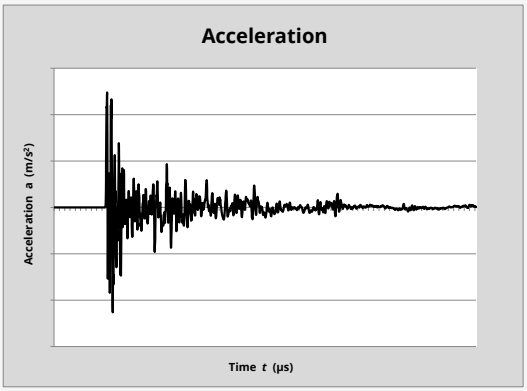
F Force
d_r Diameter of rod

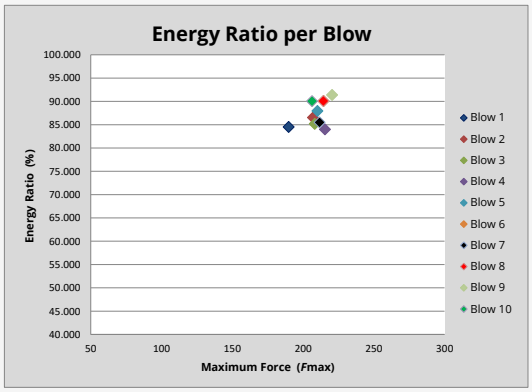
Fig. B.1 and B.2
BS EN ISO 22476-3 : 2005 + A1 : 2011

DATE OF TEST	VALID UNTIL	HAMMER ID
29/01/2018	29/01/2019	382709









Observations:
1.

E_{meas} =	**0.415**	kN-m
E_{theor} =	**0.473**	kN-m

Energy Ratio = $\frac{E_{meas}}{E_{theor}}$ (E_r) **87.82%**

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Equipe SPT Analyzer Operators: JML

Prepared by: **Checked by:** **Date:** 01/02/2018

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SPT Calibration Report

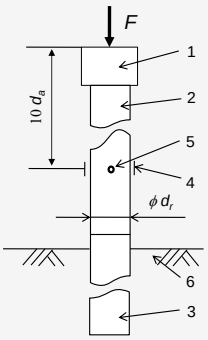
www.equipegroup.com

Hammer Energy Measurement Report

Type of Hammer		ARCHWAY
Client		SI DRILLING
Test No		EQU1986
Test Depth (m)		8.70
Mass of the hamn	m =	63.5kg
Falling height	h =	0.76m
E_{theor} =	$m \times g \times h$ =	473J

Characteristics of the instrumented rod

Diameter	d_r =	0.052 m
Length of instrumented rod		0.558 m
Area	A =	11.61 cm²
Modulus	E_a =	206843 MPa



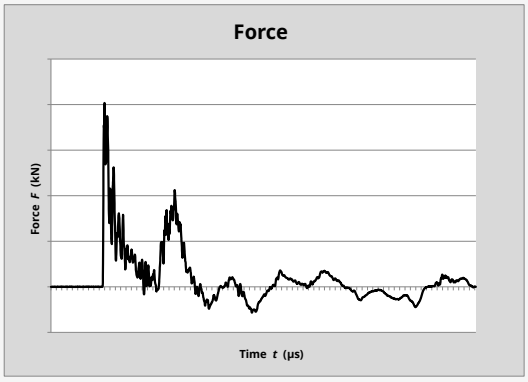
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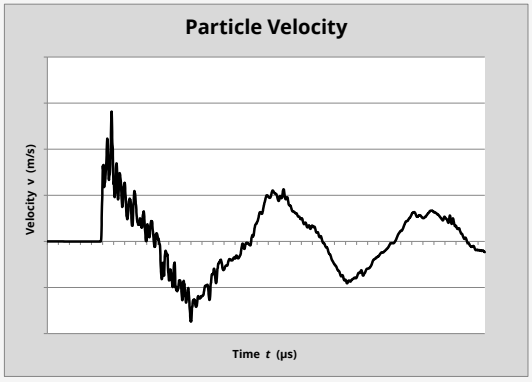
1 Anvil
2 Part of instrumented rod
3 Drive Rod
4 Strain Gauge
5 Accelerometer
6 Ground

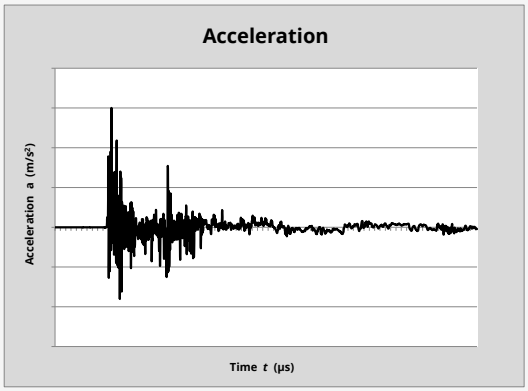
F Force
d_r Diameter of rod

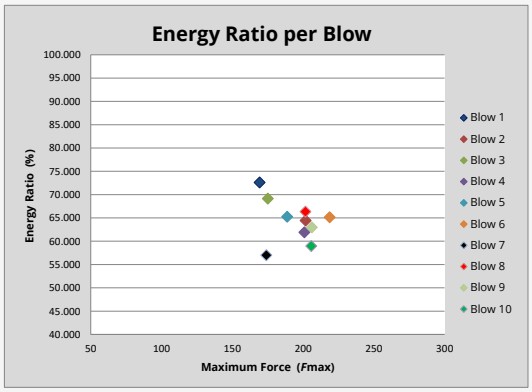
Fig. B.1 and B.2
BS EN ISO 22476-3 : 2005 + A1 : 2011

DATE OF TEST	VALID UNTIL	HAMMER ID
29/12/2017	29/12/2018	SI03









Observations:
1.

E_{meas} =	**0.303**	kN-m
E_{theor} =	**0.473**	kN-m

Energy Ratio = $\frac{E_{meas}}{E_{theor}}$ (E_r) **64.15%**

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Equipe SPT Analyzer Operators: KS

Prepared by: **Checked by:** **Date:** 04/01/2018

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