

Ms Vanessa Coldwell

190 Henley Road
Caversham
RG4 5LN

AG3108-20-AJ90

7th April 2020

For the attention of Vanessa Coldwell

Dear Vanessa

Re: 190 Henley Road, Caversham.

Further to your instruction on the 17th January 2020, we have pleasure in presenting the results and our assessment of the geotechnical ground investigation undertaken on the plot of land to the rear of 190 Henley Road, Caversham. This letter report has been prepared on behalf of Vanessa Coldwell (the Client) in order to confirm the prevailing ground conditions beneath the site and provide further information for design purposes. A geoenvironmental investigation and assessment of the site was beyond the scope of this work. It is noted that there are no specific Conditions relating to the site in the Planning Permission, ref 181305, dated 12th September 2019.

The terms of reference/ brief for the works were developed by Applied Geology Ltd based on an initial review of readily available desk study data for the site and our experience of another site, in close proximity on Henley Road and are outlined in our proposal email dated 8th January 2020.

BACKGROUND

Based on the information provided it is understood the proposals for the site comprise the demolition of the existing double garages occupying the site and construction of a detached 2/3 storey residential property, as shown on Drawing No 3490/400, Rev A, dated October 2019 (by Shaun Tanner Architecture and Planning). The design of the proposed development reflects the general scale and rhythm of existing houses along All Hallows Road.

It is understood that the Client purchased the site in 2019 and has obtained full planning permission for the proposed development under application number 181305, which was granted on 12th September 2019 subject to compliance of eighteen conditions. Applied Geology have reviewed the associated conditions and none relate to the assessment of potentially contaminated land or other ground investigation aspects, hence the information provided is for geotechnical assessment/design purposes alone.

Applied Geology is not aware of any existing reports relating to the site.

SITE DESCRIPTION AND WALKOVER

The site is located to the rear of 190 Henley Road in the Caversham suburb of Reading, approximately 2km north-east of Reading town centre. The Ordnance Survey grid reference for the centre of the site is 472826, 175237 as shown on the Site Location Plan in Appendix A.



The site is roughly rectangular in shape measuring 22m by 9m at the longest and widest extents covering an area of approximately 173m². The site is relatively flat.

A preliminary site walkover was carried out on the 19th December 2019 prior to the intrusive investigation, at which time the site remained part of 190 Henley Road. The central part of the site was occupied by a set of domestic double garages, with areas of shingle/gravel and soft landscaping to the east (front) and west (rear), respectively. Vehicular and pedestrian access was achieved via gated entrance off All Hallows Road to the east. Areas of hardstanding were limited to the pathways either side of the garages, whilst a concrete floor slab was present internally. Semi-mature trees and plants were noted around the periphery of the site.

The surrounding area was dominated by typical suburban land use, with residential properties or roads marking all site boundaries. An operational fuel station was noted c.30m beyond the western boundary of the site and a relatively large lime tree was noted on the pavement adjacent to the entrance of the proposed property.

SITE/DEVELOPMENT HISTORY

Historic mapping suggests that the site and the immediate area had been subject to historic shallow workings for sand and gravel, as indicated on historic Ordnance Survey mapping between at least 1879 and 1932. During this time a chalk pit was also shown directly south of the site off Henley Road, suggesting chalk to be present at shallow depths. Collectively, the workings were labelled as 'old' by 1913 and then assumed left disused until 1932 at which point the former sand and gravel pit was redeveloped into residential properties (including 190 Henley Road) and the chalk pit was set aside as an area of soft landscaping. Between 1968 and 1972, plans indicate the existing plot of land associated with 190 Henley Road was extended into an 'L' shaped plot with access off All Hallows Road. On plans of this time the existing domestic garages and site configuration is similar to that of the present day. There are no further significant onsite changes recorded.

ANTICIPATED GEOLOGY

Reference to the relevant 1:50,000 scale British Geological Survey (BGS) published geological information (sheet 268 'Reading') indicates Superficial Deposits covering the site and surrounding area in the form of Lynch Hill Gravel Member. The Lynch Hill Gravel Member is a Quaternary Period fourth river terrace deposit of the River Thames and is described as 'sand and gravel, locally with lenses of silt, clay or peat'. Solid geology beneath the site comprises the Seaford and Newhaven Chalk Formations (Undifferentiated) part of the Cretaceous upper White Chalk Sub-Group generally described as 'Chalk with: discrete marl bands, nodular Chalk, sponge-rich and flint seams throughout'.

As the site and immediate area were formerly part of a sand and gravel quarry, it is likely that the Lynch Hill Gravel Member was largely extracted as part of these operations and so if present, it is likely to be nominal in thickness within the main quarry areas. Some undisturbed Lynch Hill Gravel deposits may be main remain in areas at the margins of former workings. Although not mapped, Made Ground soils are likely to be present across the site due to the former quarrying and current site use.

The table below provides further details of the anticipated geological succession.

Geological Unit	Description	Estimated thickness (m)
Lynch Hill Gravel Member (<i>Quaternary Period</i>)	Sand and gravel, locally with lenses of silt, clay or peat, which rests unconformably on bedrock.	<2m
Seaford and Newhaven Chalk Formations (Undifferentiated) (<i>Cretaceous Period</i>)	Chalk, with or without flint and discrete limestone, marl (calcareous mudstone), sponge, calcarenite, phosphatic, hardground and fossil-rich beds.	100's of metres

A search of available (archived) borehole records held by the BGS indicate that there are four borehole records within 1km of the site. The nearest is c.300m to the north at Micklands Primary School, whilst the remaining three are located c. 400 to 600m to the north-east off Hawthorne Road. These boreholes were advanced to depths of 4 or 5m and indicate a ground profile of topsoil (0.20 to 0.50m below ground level (bgl)) over Superficial Deposits comprising firm gravelly silts/clays (1.30 to 4.30m), over medium dense to dense sandy gravels of flint, which were generally proven to the base of the investigation (5.00m). Chalk was only encountered in the furthest borehole at a depth of 3.20m bgl. Groundwater was not encountered in any of these boreholes and so it is assumed to be at depths in excess of 5m in the underlying chalk. These borehole logs are presented in Appendix B.

These findings generally accord with our experience of ground conditions across the immediate area, where previous investigations to the south of Henley Road have encountered a ground profile of Topsoil (0.15 to 0.60m) and/or Made Ground (0.30 to 1.10m) directly underlain by Head/Alluvium (0.60 to 4.20m) over competent Chalk (20.50m). Further towards the floodplain of the River Thames the depth to the top of the Chalk is deeper (in the order of 6 to 8m) as Superficial Deposits of the Kempton Park Gravel Member are encountered between the Head/Alluvium and Chalk. Our knowledge of the area suggests that if present at all, the Lynch Hill Gravel Member is localised to the north of Henley Road.

CHALK SOLUTION FEATURES

In view of the prevailing ground conditions (chalk assumed to be at shallow depths beneath the site) it is normal practice to review readily available information regarding the potential risk of dissolution features (swallow holes, solution pipes etc.) and any associated ground subsidence.

According to historic Ordnance Survey mapping (reviewed above), the site and wider environment have been subject to surface quarrying for both sand and gravel (likely the Lynch Hill Gravel Member) and chalk. However, there is no information to suggest that deeper underground mining has occurred within the boundaries of the site or the immediate area.

Reference to the Department of Environment 'Instability due to natural underground cavities map', dated September 1993 and our knowledge of the area, the nearest recorded solution features and/or mining cavities are located c. 700m west and 1.5km north-east of the site. These records relate to a solution pipe and mining cavity/adit respectively. Thus, suggesting there are no recorded solution/cavity features within the boundary of the site or immediate area.

BGS guidance suggests that if Superficial Deposits (particularly clay) overlie Chalk formations then the potential risk for dissolution features/cavities to develop at this interface can increase. The superficial Lynch Hill Gravel Member were likely extracted during quarrying operations across the site and the immediate area and therefore, any dissolution features/cavities would have been exposed and recorded at this time. Furthermore, due to the likely removal of Superficial Deposits the potential risk of undiscovered shallow dissolution features is reduced somewhat.

Based on the factors above and the BGS dissolution of soluble rocks risk mapping database, the risk from ground subsidence as a result of dissolution features/cavities is determined as 'very low'. The BGS definition of this stipulates that there are 'significant soluble rocks present but no special actions are required and increased construction costs are unlikely. Similarly, an increase in financial risk due to potential problems with soluble rocks is unlikely'.

SITE WORK

General

The following scope of fieldwork was undertaken:

- 4 No Driven Continuous Sampling boreholes (ref DCS1 to DCS4) to a final depth of 5.45m bgl;
- 1 No Hand dug pits (ref. HP1) to a final depth of 1.20m bgl.

Fieldwork was generally carried out, where relevant, in accordance with BS5930 (2015) "Code of Practice for Site Investigations" and was supervised by an experienced Geoenvironmental Engineer.

The boreholes and hand pit records are included in Appendix C of this report, together with an SPT summary and calibration certificate.

Service plans were obtained prior to the commencement of works and the exploratory positions were scanned using a CAT and signal generator by a suitable qualified engineer before advancing. The boreholes were initially advanced to 1.20m using insulated hand digging tools.

The techniques adopted for the intrusive investigation were chosen based on the aims of the investigation, the anticipated ground conditions and the access restrictions faced.

The Driven Continuous Sampling (DCS) boreholes and hand dug pits were positioned within the footprint of the proposed residential dwelling and representative bulk and disturbed samples were collected from all strata to allow geotechnical laboratory testing.

An Exploratory Hole Location Plan is presented as Drawing AG3108-20-02 in Appendix A. The exploratory hole locations were located approximately by reference to physical features present on site and within the vicinity of the site at the time of the investigation.

Laboratory Testing

Geotechnical laboratory testing was undertaken by specialist laboratory Terra Tek Site Investigation and Laboratory Services (UKAS lab no. 0126) on selected samples and comprised the following:

- 5 No BRE SD1 greenfield suite tests;
- 5 No BRE SD1 brownfield suite tests.

The chalk encountered was noted to be unsuitable for Saturated Moisture Content (SMC) testing due to a lack of large clasts / fragments.

The laboratory test results are presented in Appendix D.

GROUND CONDITIONS

Strata encountered

The investigation has recorded Made Ground over Chalk, with Possible Lynch Hill Gravel Member/Made Ground encountered locally in DCS3 and DCS4 at the front of the garages. In areas of existing soft landscaping where Topsoil has been encountered from surface above the generalised Made Ground soils this has been labelled as Made Ground/Topsoil as the material has been placed. There was no obvious visual or olfactory evidence of significant contamination observed during the ground investigation.

Full details of the strata encountered, samples taken and in-situ test results are given on the borehole records presented in Appendix B, however, the salient features are discussed in the following sections. A generalised ground profile is presented below to summarise the information.

Stratum	Depth to top of Strata (m bgl)	Depth to base of Strata (m bgl)	Comments
Made Ground/Topsoil	GL	0.35 to 0.50	Recorded in areas of soft landscaping (DCS1 and DCS2).
Concrete	GL	0.15	Recorded in HP1 only as positioned within existing garages.
Made Ground	GL to 0.50	0.50 to 1.20	Recorded in all locations. Base not recorded in HP1 (1.2m bgl).
Possible Lynch Hill Gravel Member/ Made Ground	0.50 to 0.65	1.50 to 1.70	Recorded in DCS 3 and DCS4 only at the front of the garages.
Chalk	0.80 to 1.70	Base no proven	Recorded in all locations except HP1. Base not proven

Made Ground/Topsoil

Where we have identified a predominantly Topsoil material with occasional to rare anthropogenic inclusions over Made Ground, we have identified this to be Made Ground/Topsoil. This stratum was encountered from surface in areas of existing soft landscaping (DCS1 and DCS2) and recorded to depths of 0.35m and 0.50m bgl. This stratum was recorded as dark brown sandy gravelly clays and/or sandy clayey gravels with occasional to rare roots and rootlets. The gravel content comprised subangular to angular flint, brick and quartzite.

Hardstanding & Made Ground

A concrete floor slab was encountered across the internal floor space of the existing garages and was proven to 0.15m bgl in HP1. Metal reinforcement was not recorded. The concrete was noted to overlie a 250mm aggregate base comprising brick and concrete gravels and cobbles. The concrete was penetrated using a hand-held mechanical breaker.

Made Ground soils were encountered in all the exploratory holes across the site from surface or beneath hardstanding and/or Made Ground/Topsoil and was proven to depths of 0.50 to 1.20m bgl with a great thickness noted beneath the existing garages (HP1), where the base of the Made Ground was not proven. The strata generally comprised dark orangish brown to brown clayey/silty sandy gravels of fine to coarse angular to subangular flint, quartzite, coal, chalk, and rare fragments of brick and slate. The origin of the Made Ground is considered to be a product of the site development and also possibly related to reworked sand and gravel and / or overburden from the former sand and gravel pit.

Possible Lynch Hill Gravel Member / Made Ground

Strata considered to possibly represent remnant Lynch Hill Gravel Member was encountered in DCS3 and DCS4 at depths of between 0.50 to 1.70m and 0.65 to 1.40m bgl, respectively. These soils were noted as comprising dark orangish brown to light brown gravelly sand and clayey gravels of flint with rare inclusions of brick and coal. Whilst these soils may represent the Lynch Hill Gravel Member, they were noted to be particularly reworked. As such, it is not possible to confirm whether these soils are the Lynch Hill Gravel Member or in fact Made Ground, as so for the purposes of this investigation these soils have been labelled as Possible Lynch Hill Gravel Member / Made Ground.

As mentioned in the earlier sub-sections of this report, the site and the immediate area was formerly part of a sand and gravel quarry extracting the Lynch Hill Gravel Member and so its localised presence and reworked nature at the site is to be expected.

The results of two in-situ Standard Penetration Tests (SPTs) in the Made Ground returned SPT 'N' values of 7 and 14.

Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated)

Chalk was recorded in all exploratory holes (except HP1) and was encountered at shallow depths ranging from 0.80 and 1.70m bgl and proven to the base of the exploratory holes (5.45m bgl).

The drilling method employed (driven continuous sampling) severely disrupts any structure present in the Chalk strata, leading to the recovery of disturbed samples. As such, full engineering descriptions and the assignment of Chalk grades (as per CIRIA C574) has not been possible due to the techniques used.

The boreholes generally encountered disturbed white Chalk (with yellow brown staining) recovered as a soft to firm gravelly silt matrix, with fine to medium subangular low to medium density Chalk clasts. Occasional gravels and cobbles of flint were encountered from 3m.

Eighteen in-situ SPT tests were carried out in the Chalk with the bulk of the tests (14no.) recording 'N' values of between N=18 and 36. However, a low value of 4 was recorded in DCS3 at 2m bgl whilst three higher results of N=40, 45 and 50 were also recorded from DCS2 at 3m bgl, DCS1 at 1.2m bgl and DCS3 at 3m bgl respectively. An SPT 'N' value against depth plot is presented in Appendix A and although there is some scatter a general increase in strength (SPT N value) with depth is apparent for the main bulk of the results (14no.).

Groundwater

Groundwater was not encountered during the formation of the exploratory holes.

ENGINEERING CONSIDERATIONS

Foundation Design

Based on the information provided, it is understood that the proposed development will comprise construction of a new detached 2/3 storey residential property with associated private garden space and access off All Hallows Road.

At this stage no specific information relating to the building load has been provided, however, it is assumed the proposed dwelling will comprise a conventional brick and block or timber frame construction and hence, be a relatively lightly loaded structure. It is also anticipated that a concrete ground bearing floor slab or block and beam floor will be preferred / required.

Variable ground conditions have been identified across the location of the proposed building including Made Ground directly underlain by Chalk and Made Ground underlain by possible Lynch Hill Gravel Member/ Made Ground underlain by Chalk. The Made Ground and Possible Lynch Hill Gravel Member/ Made Ground are considered to be too variable in material content and strength to constitute a reliable bearing horizon. Given the variable ground conditions identified and uncertainty regarding some of the Made Ground Soils (i.e. do they comprise natural in-situ Lynch Hill Gravel Member or reworked natural materials associated with historic workings) and the relative shallow depth to a reliable founding stratum, it is recommended that foundations should be placed directly on Chalk. Chalk was generally encountered at shallow depths (0.80 to 1.70m bgl) beneath the proposed building footprint (excluding HP1) and this stratum is considered suitable to support lightly loaded conventional shallow spread foundations.

Foundations must be placed below any Made Ground/ possible Made Ground, Lynch Hill Gravel Member, disturbed ground and also beneath any soft or loose natural materials. The ground conditions include soils of low shrinkage potential, hence a minimum foundation depth of 0.75m bgl will apply, however borehole data suggests that the depth to chalk strata would exceed this minimum in any case. Strip / trench fill foundations up to 1m wide bearing wholly on chalk and competently designed to the above requirements may adopt an allowable bearing pressure of up to 125kN/m² (75kN / metre run for 0.6m wide trench fill). This is based on the lower bound values within BS8004: 1986 Table 2 and CIRIA C574 for a Grade D (structureless) chalk and using engineering judgement taking in to account observations of the strata and both in-situ and laboratory test results. At such bearing pressures, settlements are considered to be within typical requirements (<25mm). It is recommended that any Chalk that becomes 'puttied' by mechanical excavation be removed by hand trimming if necessary and the exposed formation be blinded immediately after excavation.

The desk-based review indicates that the risk of solution features/cavities within the Chalk is low to very low with no recorded natural solution/cavity occurrences within 0.5km of the site. No evidence of potential solution features/cavities were noted in any of the exploratory holes during the intrusive investigation.

If conditions, significantly at variance to those described herein are encountered, specialist geotechnical advice should be sought to make appropriate assessment and recommendations.

Floor Slab

Given the presence of Made Ground and Possible Lynch Hill Gravel Member/ Made Ground to depths of between 0.8m and 1.7m bgl a suspended design is recommended for the ground floor slab. Reference to NHBC guidance / requirements also supports this as these state that suspended ground floor slabs should be adopted where Made Ground exceeds 600mm in thickness. A conventional suspended block and beam floor would meet this requirement, though a suspected cast in-situ solution would also be feasible.

Should ground levels be reduced or Made Ground removed such that Made Ground is less than 600mm thick then a ground bearing slab may be adopted, subject to proof rolling, removal of soft spots and replacement with a suitable compacted granular material.

The site is not within a radon affected area and hence, radon protection measure are not required.

Pavement Design

Any organic subsoil including Topsoil should be removed from below any proposed hardstanding.

Based on review of soil type, construction conditions and reference to IAN 73/06, an equilibrium CBR value of 3-4% is recommended for the chalk where exposed at formation. Owing to the inherent variability of the Made Ground an equilibrium CBR value of 2% is recommended for this stratum.

The Made Ground should be considered to be frost susceptible and as such should not be present within the top 450mm of pavement construction. It should be noted that chalk is susceptible to frost heave in winter months and so it is recommended that these soils are not present within the top 450mm of road pavement construction (hardstanding).

Stability of excavations

Whilst no instability was noted during the formation of the boreholes/hand pit, it is considered possible for instability to be encountered within granular horizons of Made Ground and the Possible Lynch Hill Gravel Member/ Made Ground. Service trench/ foundation excavations advanced into and through this material may be prone to instability and may need to be graded back and a stable angle of batter should be designed by an appropriately qualified temporary works engineer or competent person to suit the required depth and the ground and groundwater (if present) conditions.

Significant groundwater ingress is not expected within the anticipated depths of excavation; however, it is recommended that some provision is made for sump pumping to deal with surface water run off entering excavations.

Buried Concrete

As defined by BRE Special Digest 1, Concrete Aggressive Ground, 2005 the Design Sulphate Class and the Aggressive Chemical Environment for Concrete (ACEC) has been assessed for the majority of the strata encountered. Following the results of the geotechnical testing, the characteristic values for each stratum have been determined and are detailed in the table below:

Strata	No of samples tested	Water Soluble Sulphate (mg/l) ^{*1}	pH	Design Sulphate Class	ACEC ^{*2}
Made Ground	4	600	6.0	DS-2	AC-1s
Lynch Hill Gravel Member	2	30	8.0	DS-1	AC-1s
Undifferentiated Chalk	4	40	8.4	DS-1	AC-1s

Notes:

*1: Characteristic values are rounded to the nearest 100mg/l (where significantly above detection i.e. >50mg/l).

*2: Assumes static groundwater.

In accordance with the guidance in BRE SD1 the characteristic values for each stratum have been determined based on the highest result where less than 5 samples tested or the mean average of the highest 2no results where 5 to 9 samples have been tested.

Given that foundations will need to extend through and be in contact with Made Ground buried concrete should be designed for a sulphate class of DS-2 and ACEC class of AC-1s.

Should you have any queries please do not hesitate to contact us.

Yours sincerely

For and on behalf of Applied Geology Ltd

Prepared by:

Checked by:



M Southworth BSc MSc FGS
Project Geologist

J B Cartwright BEng (Hons) MSc FGS
Managing Director

General Notes

APPENDICES

Appendix A - Drawings

Appendix B - Desk Study Information

Appendix C - Logs

Appendix D - Test results and Statistical Analysis Data Sheet

GENERAL NOTES

- A) The assessment made in this report is based on the site terrain and ground conditions revealed by the various field investigations undertaken and also any other relevant data for the site including previous site investigation reports (if available) and desk study data. There may be special conditions appertaining to the site, however, which have not been revealed by the investigation and which have not, therefore, been taken into account in the report. The assessment may be subject to amendment in the light of additional information becoming available. It must be recognised that many of the Environmental Searches obtained during the course of the desk study are often lengthy. Applied Geology have, where appropriate and in the interests of simplicity, only reproduced the summary of the searches within the report. A full copy of all the search data is held at the Applied Geology office and is available for inspection if required.
- B) The services provided are defined within our proposal and are carried out in line with the terms of appointment between Applied Geology and the Client.
- C) Where any data supplied by the Client or other external source, including that from previous site investigations, has been used it has been assumed that the information is correct. No responsibility can be accepted by Applied Geology for inaccuracies within this data.
- D) Whilst the report may express an opinion on possible configurations of strata between or beyond the exploratory locations, or on the possible presence of features based on either visual, verbal or published evidence this is for guidance only and no liability can be accepted for the accuracy.
- E) Comments on groundwater (and landfill gas) conditions are based on observations made during the course of the present and past investigations or with reference to published data unless otherwise stated. It should be noted, however, that groundwater (and landfill gas) levels vary due to seasonal (or atmospheric conditions) or other effects.
- F) The copyright of this report and other plans (and documents prepared by Applied Geology) is owned by Applied Geology and no such report, plan or document may be reproduced, published or adapted without the written consent of Applied Geology. Complete copies of the report may, however, be made and distributed by the Client as an expedient in dealing with matters related to its submission.
- G) This report is prepared and written in the context of the proposals stated in the introduction to the report and should not be used in a differing context. Furthermore, new information, improved practices and legislation may necessitate an alteration to the report in whole or in part after its submission. Therefore with any change in circumstances or after the expiry of one year from the date of the report, the report should be referred to Applied Geology for re-assessment and if necessary, re-appraisal.
- H) The survey was conducted and this report was prepared for the sole internal use and reliance of the Client. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Applied Geology. If an unauthorised third party comes into possession of this report they rely on it at their peril and Applied Geology owes them no duty of care and skill.
- I) Ground conditions should be monitored during the construction of the works and the recommendations of the report re-evaluated in the light of this data by the supervising geotechnical or geo-environmental engineers.
- J) Unless specifically stated, the investigation has not taken into account the possible effects of mineral extraction.
- K) The works performed are not a comprehensive site characterisation and should not be construed as being such.
- L) The findings of the geo-environmental risk assessment are based on information obtained from a variety of sources which Applied Geology believe to be correct. Applied Geology cannot and does not guarantee the authenticity or reliability of the information it has relied upon.
- M) The report represents the findings and opinions of experienced geo-environmental consultants. Applied Geology does not provide legal advice and the advice of lawyers may be required.
- N) Conditions at the site are subject to change from the time of the site inspection.
- O) It is possible that researches carried out by Applied Geology, whilst fully appropriate for a phase 1 desk study, failed to indicate the existence of important information sources. Assuming such indicators actually exist, their information could not have been considered in the formulation of Applied Geology findings and opinions.
- P) The economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, depends on very many factors in addition to geotechnical considerations and hence its evaluation is outside the scope of this report.
- Q) Applied Geology operates as a Consultancy and does not operate its own laboratory for soil testing, this work being sub contracted to known and respected, generally UKAS accredited, laboratories. Applied Geology can therefore not be held responsible for the testing carried out.

APPENDIX A



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APPLIED GEOLOGY

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Client:

VANESSA COLDWELL

Project:

190 HENLEY ROAD, CAVERSHAM

Drawn By:

JS

Checked By:

KM

Paper Size:

A4

Scale:

NTS

Date:

07.02.2020

NGR:

472826 175237

Title:

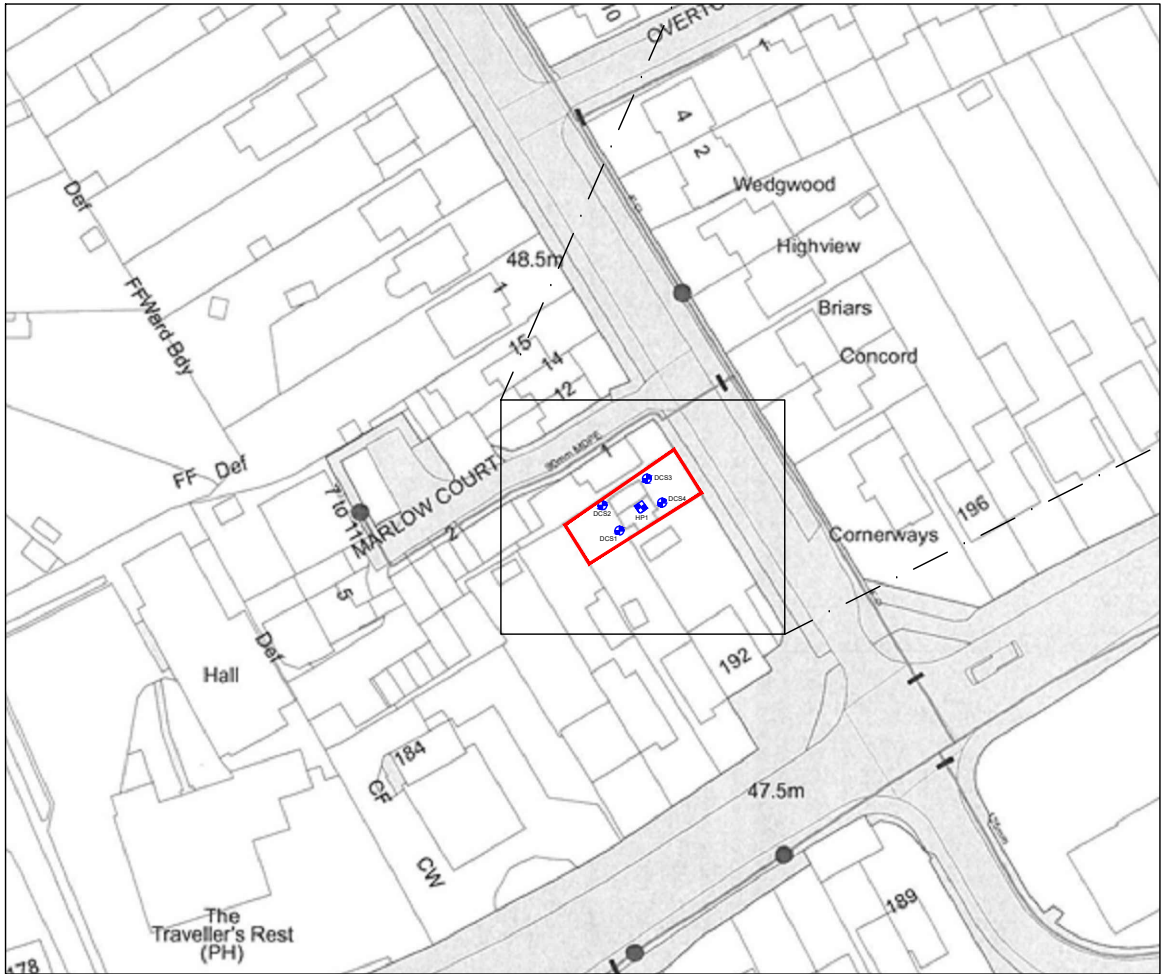
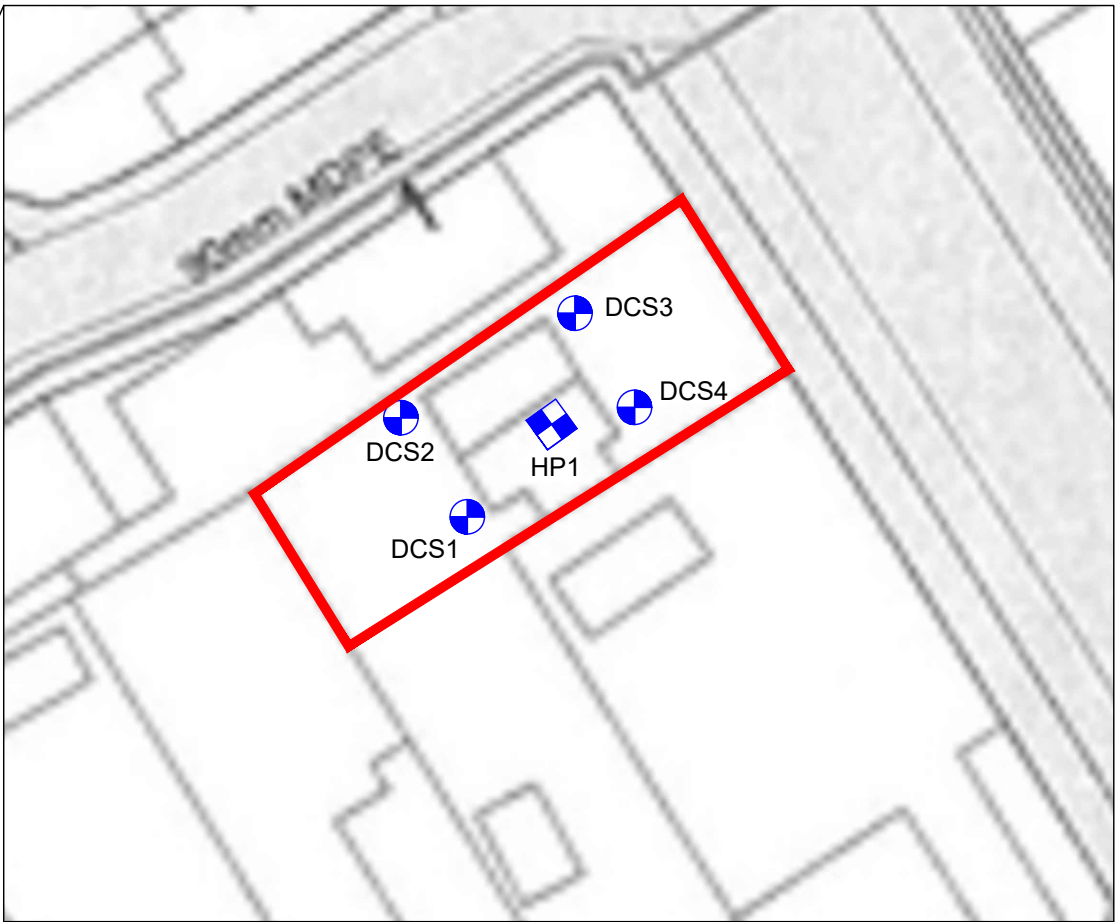
SITE LOCATION PLAN

Drawing No:

AG3108-20-01

Revision:

0



KEY:

 Hand Dug Pit
HP1

 Driven Continuous Sampling Borehole
DCS1

Drawing based on Thames water plan dated 21/01/2020.

APPLIED GEOLOGY

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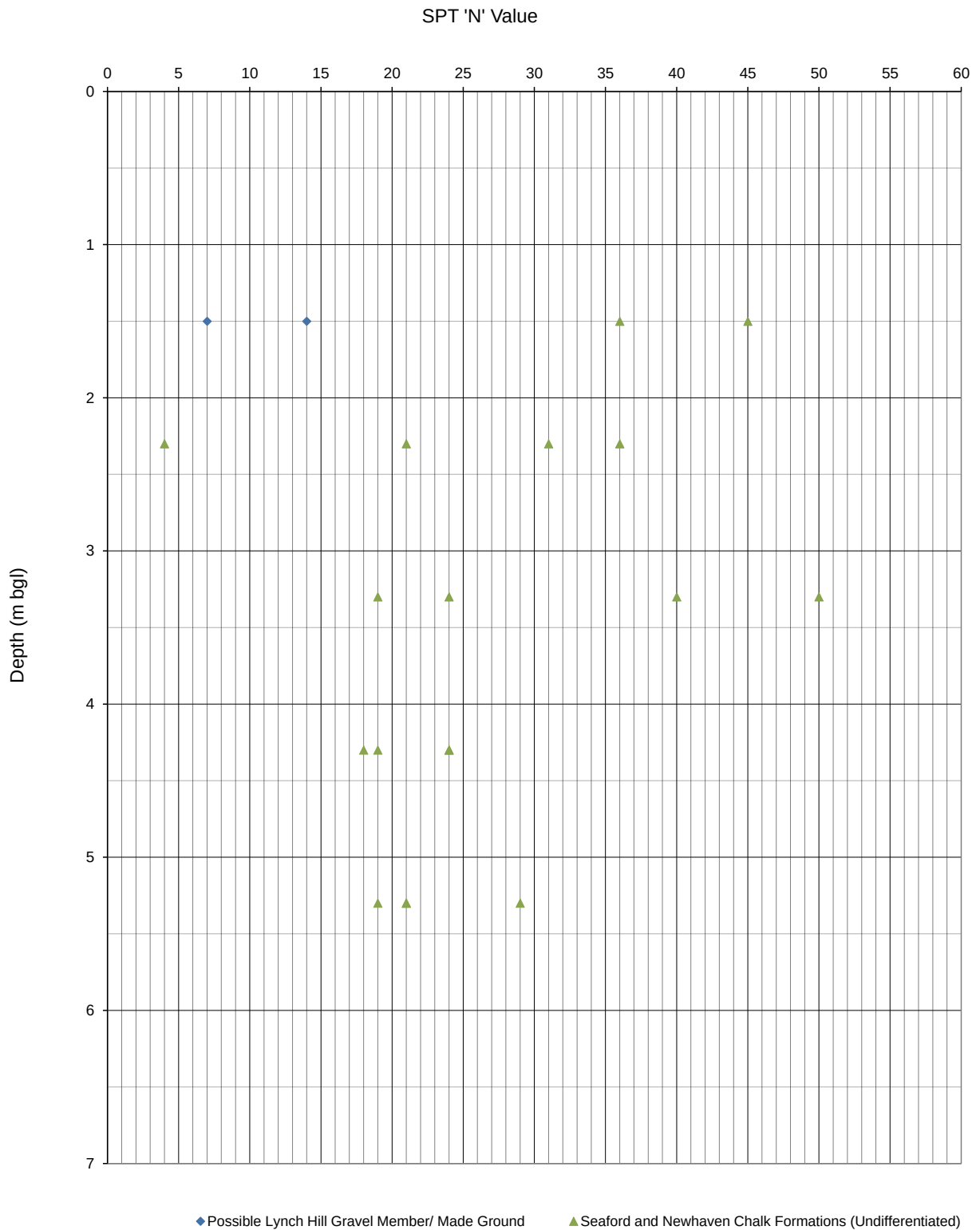
Client: VANESSA COLDWELL

Project: 190 HENLEY ROAD, CAVERSHAM

Title: EXPLORATORY HOLE LOCATION PLAN

Drawn By: JS	Checked By: KM	Paper Size: A3
Scale: NTS	Date: 07.02.2020	
Drawing No: AG3108-20-02		Revision: 0

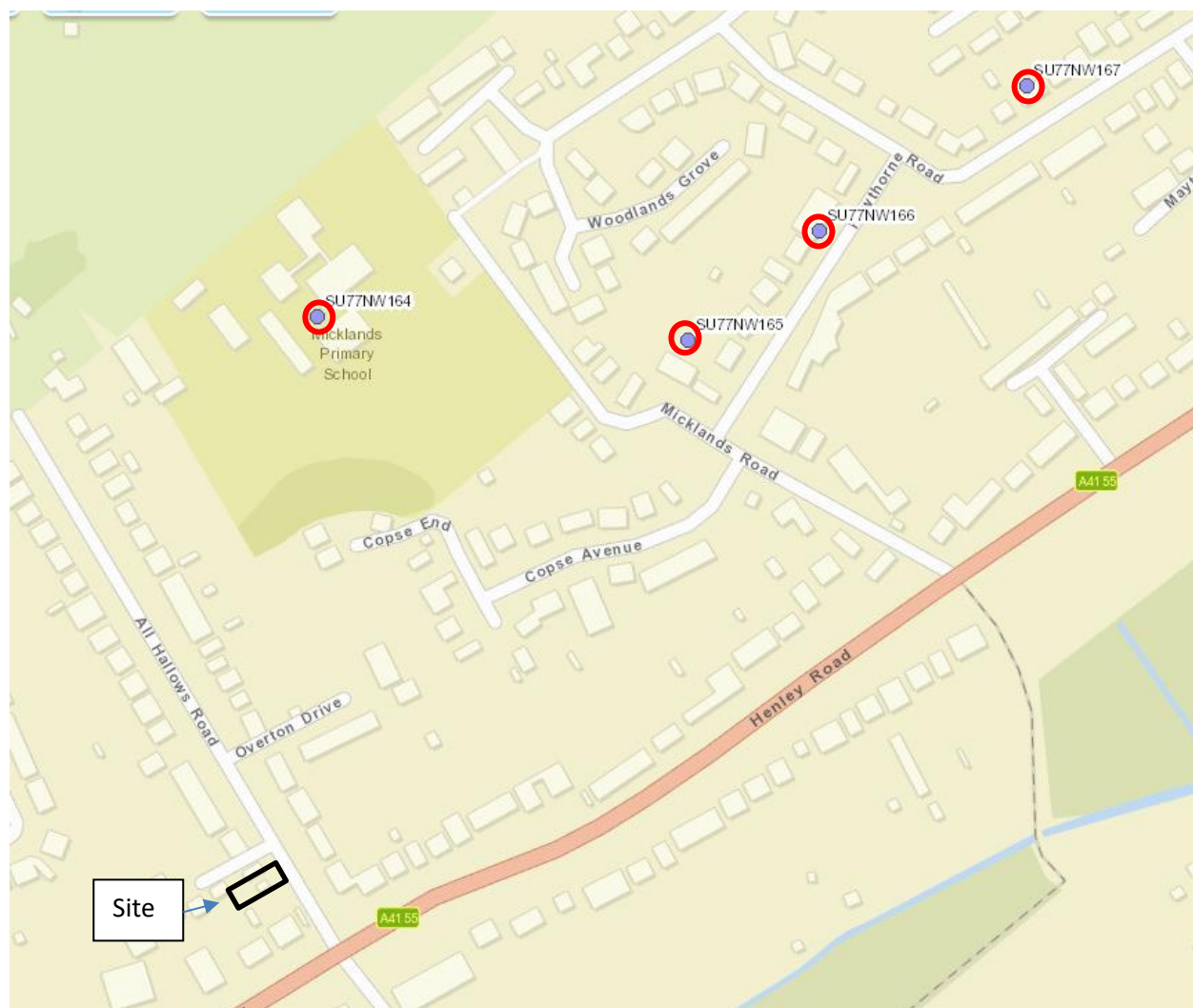
Uncorrected SPT 'N' Value versus depth



Notes:

Client:	Vanessa Coldwell	APPLIED GEOLOGY
Project:	190 Henley Road, Caversham	
Project No.	AG3108-20	

APPENDIX B



PAGE: 2		JOB 1754				BOREHOLE S1	
DATE: 28.09.00		WOODS ROAD - CAVERSHAM					
DESCRIPTION	DEPTH	LEGEND	SAMPLE		THICKNESS	SPT	REMARKS
	LEVEL m		m	TYPE			
TOPSOIL	0.00	X X X X X			0.20		
Medium dense brown silty CLAY with some... flinty gravel	0.20	X X X X X			0.35		
Dense silty sandy GRAVEL.....	0.55	X X X X X			0.65		--1754 /S1 / 0.8B
Firm brown/light brown very sandy clayey.. SILT with occasional fine gravel	1.20	X X X X X	B	0.80			--1754 /S1 / 1.3B
		X X X X X	B	1.30			--1754 /S1 / 1.8B
		X X X X X	B	1.80			--1754 /S1 / 2.3B
Firm brown sandy clayey SILT becoming..... gravelly	2.00	X X X X X	B	2.30			--1754 /S1 / 2.8B
		X X X X X	B	2.80			--1754 /S1 / 3.3B
		X X X X X	B	3.30			--1754 /S1 / 3.8B
		X X X X X	B	3.80			--1754 /S1 / 4.3B
Dense brown very sandy GRAVEL.....	4.30	X X X X X	B	4.30			--1754 /S1 / 4.8B
		X X X X X	B	4.80			--1754 /S1 / 5.3B
	5.00	X X X X X					Borehole remained dry
 TERRAMECH INVESTIGATIONS LIMITED 183 LONG LANE TILEHURST READING			REMARKS:				
U100=100mm dia. UNDISTURBED SAMPLE U38=38mm dia. UNDISTURBED SAMPLE D=SMALL DISTURBED SAMPLE B=BULK SAMPLE W=WATER SAMPLE SPT=STANDARD PENETRATION TEST CPT=CONE PENETRATION TEST							

Contains British Geological Survey materials © NERC 2020

Contains British Geological Survey materials © NERC 2020

BGS ID: 15032759 : BGS Reference: SU77NW167 Grid ref : 473240, 175680

[illegible]

APPENDIX C

BOREHOLE LOG - DRIVEN CONTINUOUS SAMPLING

DCS1

Project 190 Henley Road, Caversham

Project No.

AG3108-20

Client Vanessa Coldwell

Sheet

1 of 2

Start 29/01/2020

Coordinates

Scale

1:25

End 29/01/2020

Ground Level

Total Depth

5.45m

Sample / Test Type	Depth (m)	Result	Dia./ Rec.	Level (mAoD)	Strata Depth (thickness) (m)	Description of Strata	Legend	GW	Install
ES	0.40				(0.35)	Grass over dark brown slightly gravelly CLAY with frequent rootlets. Gravel is fine to coarse subangular to subrounded flint frequent cobbles of subangular to subrounded flint. (MADE GROUND/TOPSOIL)			
B	0.60				0.35	Orangish brown clayey/silty sandy GRAVEL. Gravel is fine to coarse subangular flint, quartzite and chalk. Rare fine subangular fragments of coal. (MADE GROUND)			
D	0.60				(0.60)				
D	0.95				0.95	White CHALK with occasional yellow brown staining on clasts. Recovered as soft to firm gravelly silt, clasts are fine to medium subangular low to medium density chalk. (SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED))			
B	1.20	N = 45							
S	1.20								
D	1.60		101mm /80%						
S	2.00	N = 36							
D	2.50		92mm /100%						
B	3.00	N = 24							
S	3.00								
D	3.70		79mm /100%		(4.50)				
S	4.00	N = 24							
D	4.80		70mm /100%						
S	5.00	N = 21							

Continued next sheet

Installation:

Remarks: Hand dug service inspection pit excavated to 1.20m bgl. Below 1.00m bgl liners coming out damp, chalk is damp within liners. Borehole backfilled with gravel on completion.

Groundwater Strikes					Drilled: DH
Depth Strike	Rose to	Remarks	Cased	Sealed	
					Logged: KM
					Checked: AP

BOREHOLE LOG - DRIVEN CONTINUOUS SAMPLING

DCS1

Project190 Henley Road, Caversham

ClientVanessa Coldwell

Start29/01/2020

End29/01/2020

Coordinates

Ground Level

Project No.

Sheet

Scale

Total Depth

AG3108-20

2 of 2

1:25

5.45m

Sample / Test Type	Depth (m)	Result	Dia./ Rec.	Level (mAoD)	Strata Depth (thickness) (m)	Description of Strata	Legend	GW	Install
					5.45	White CHALK with occasional yellow brown staining on clasts. Recovered as soft to firm gravelly silt, clasts are fine to medium subangular low to medium density chalk. (SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED))			
						End of Borehole at 5.45m			

Installation:
Remarks: Hand dug service inspection pit excavated to 1.20m bgl. Below 1.00m bgl liners coming out damp, chalk is damp within liners. Borehole backfilled with gravel on completion.

Groundwater Strikes					Drilled: DH Logged: KM Checked: AP
Depth Strike	Rose to	Remarks	Cased	Sealed	

BOREHOLE LOG - DRIVEN CONTINUOUS SAMPLING

DCS2

Project 190 Henley Road, Caversham

Project No.

AG3108-20

Client Vanessa Coldwell

Sheet

1 of 2

Start 29/01/2020

Coordinates

Scale

1:25

End 29/01/2020

Ground Level

Total Depth

5.45m

Sample / Test Type	Depth (m)	Result	Dia./ Rec.	Level (mAoD)	Strata Depth (thickness) (m)	Description of Strata	Legend	GW	Install
B ES	0.20 0.20				(0.50)	Grass over dark brown slightly sandy clayey GRAVEL with rare large roots. Gravel is fine to coarse angular to subrounded flint, brick and quartzite. (MADE GROUND/TOPSOIL)			
D B	0.60 0.70				0.50 (0.30) 0.80	Dark brown clayey/silty sandy GRAVEL. Gravel is fine to coarse subangular flint, quartzite and rare fine to medium angular fragments of brick and coal. (MADE GROUND)			
S D B	1.20 1.30 1.50	N = 36				White CHALK with occasional orangish brown staining on clasts. Recovered as soft to firm gravelly silt. Clasts are fine to medium low to medium density chalk. (SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED))			
B S D	2.00 2.00 2.20	N = 31	101mm /80%						
B S	3.00 3.00	N = 40	92mm /100%						
D	3.40		79mm /80%		(4.65)				
S D	4.00 4.20	N = 18							
S	5.00	N = 19	70mm /90%						
Continued next sheet									

Installation:

Remarks: Hand dug service inspection pit excavated to 1.20m bgl. Becoming saturated with depth. Borehole backfilled with gravel on completion.

Groundwater Strikes					Drilled: DH Logged: KM Checked: AP
Depth Strike	Rose to	Remarks	Cased	Sealed	

BOREHOLE LOG - DRIVEN CONTINUOUS SAMPLING

DCS2

Project

Client

Start

End

190 Henley Road, Caversham

Vanessa Coldwell

29/01/2020

29/01/2020

Coordinates

Ground Level

Project No.

Sheet

Scale

Total Depth

AG3108-20

2 of 2

1:25

5.45m

Sample / Test Type	Depth (m)	Result	Dia./ Rec.	Level (mAoD)	Strata Depth (thickness) (m)	Description of Strata	Legend	GW	Install
					5.45	White CHALK with occasional orangish brown staining on clasts. Recovered as soft to firm gravelly silt. Clasts are fine to medium low to medium density chalk. (SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED))			
						End of Borehole at 5.45m			

Installation:
Remarks: Hand dug service inspection pit excavated to 1.20m bgl. Becoming saturated with depth. Borehole backfilled with gravel on completion.

Groundwater Strikes					Drilled: DH Logged: KM Checked: AP
Depth Strike	Rose to	Remarks	Cased	Sealed	

BOREHOLE LOG - DRIVEN CONTINUOUS SAMPLING

DCS3

Project 190 Henley Road, Caversham

Project No.

AG3108-20

Client Vanessa Coldwell

Sheet

1 of 2

Start 29/01/2020

Coordinates

Scale

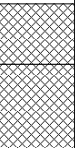
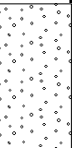
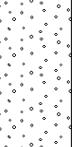
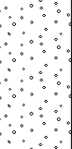
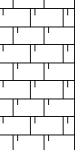
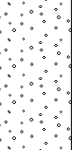
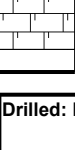
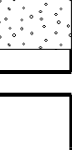
1:25

End 29/01/2020

Ground Level

Total Depth

5.45m

Sample / Test Type	Depth (m)	Result	Dia./ Rec.	Level (mAoD)	Strata Depth (thickness) (m)	Description of Strata	Legend	GW	Install
B	0.10	N = 7			(0.20)	Gravel on surface overlying dark brown slightly sandy gravelly CLAY. Gravel is fine to coarse subangular to subrounded flint and quartzite and rare fine angular fragments of brick. (MADE GROUND) Dark brown clayey/silty sandy GRAVEL. Gravel is fine to coarse subangular to subrounded flint, quartzite and rare angular fragments of brick, slate and coal. (MADE GROUND) Dark orangish brown clayey GRAVEL of angular to subangular flint. (POSSIBLE LYNCH HILL GRAVEL MEMBER/MADE GROUND)			
ES	0.10				0.20				
B	0.30				(0.30)				
D	0.30				0.50				
B	0.50								
					(1.20)				
B	1.20	N = 4	101mm /60%		1.70	White CHALK with occasional to frequent yellowish brown staining on clasts. Recovered as soft to firm gravelly silt. Clasts are fine to medium angular to subangular low to medium density chalk. (SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED))			
C	1.20								
D	1.30								
		N >50	79mm /60%		(3.75)	From 2.70m to 2.90m bgl: rootlets present. Between 3.20m and 3.50m bgl: large flint cobble.			
B	1.70								
S	2.00	N = 19	70mm /100%						
D	2.80	N = 21	70mm /100%						
S	3.00								
		N = 21	70mm /100%						
D	3.80								
C	4.00	N = 21	70mm /100%						
D	4.10								
B	4.20								
		N = 21	70mm /100%						
C	5.00	N = 21	70mm /100%						
Continued next sheet									

Installation:

Remarks: Hand dug service inspection pit excavated to 1.20m bgl. Below 1.70m bgl liners and chalk is coming out damp. Borehole backfilled with gravel on completion.

Groundwater Strikes					Drilled: DH Logged: KM Checked: AP
Depth Strike	Rose to	Remarks	Cased	Sealed	

BOREHOLE LOG - DRIVEN CONTINUOUS SAMPLING

DCS3

Project

Client

Start

End

190 Henley Road, Caversham

Vanessa Coldwell

29/01/2020

29/01/2020

Coordinates

Ground Level

Project No.

Sheet

Scale

Total Depth

AG3108-20

2 of 2

1:25

5.45m

Sample / Test Type	Depth (m)	Result	Dia./ Rec.	Level (mAoD)	Strata Depth (thickness) (m)	Description of Strata	Legend	GW	Install
					5.45	White CHALK with occasional to frequent yellowish brown staining on clasts. Recovered as soft to firm gravelly silt. Clasts are fine to medium angular to subangular low to medium density chalk. (SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED))			
						End of Borehole at 5.45m			

Installation:
Remarks: Hand dug service inspection pit excavated to 1.20m bgl. Below 1.70m bgl liners and chalk is coming out damp. Borehole backfilled with gravel on completion.

Groundwater Strikes					Drilled: DH Logged: KM Checked: AP
Depth Strike	Rose to	Remarks	Cased	Sealed	

BOREHOLE LOG - DRIVEN CONTINUOUS SAMPLING

DCS4

Project	190 Henley Road, Caversham	Project No.	AG3108-20
Client	Vanessa Coldwell	Sheet	1 of 2
Start	29/01/2020	Coordinates	Scale 1:25
End	29/01/2020	Ground Level	Total Depth 5.45m

Sample / Test Type	Depth (m)	Result	Dia./ Rec.	Level (mAoD)	Strata Depth (thickness) (m)	Description of Strata	Legend	GW	Install
B ES D	0.30 0.30 0.50				(0.65)	Gravel on surface overlying dark brown clayey GRAVEL. Gravel is fine to very coarse subangular to angular flint and quartzite. Rare fine to coarse angular to subangular brick and coal. (MADE GROUND) <i>At 0.35m bgl: large root.</i>			
B D	0.70 0.70				0.65 (0.75)	Dark orangish brown silty/clayey sandy GRAVEL. Gravel is fine to coarse subrounded flint, quartzite and rare fine angular fragments of brick and coal. (POSSIBLE LYNCH HILL GRAVEL MEMBER/MADE GROUND)			
C D	1.20 1.40	N = 14			1.40 (0.10) 1.50	Light brown gravelly SAND. Gravel is fine to coarse subangular to angular flint. (POSSIBLY LYNCH HILL GRAVEL MEMBER/MADE GROUND)			
B D S	1.70 1.80 2.00	N = 21	101mm /80%			White CHALK with frequent yellowish staining around clasts at 1.70m to 2.00m bgl. Recovered as soft to firm gravelly silt. Clasts are fine to coarse angular medium density chalk. (SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED)) <i>Between 1.50m and 2.40m bgl: clasts are fine to medium angular low to medium density below 2.40m bgl. Below 2.00m bgl: yellowish staining less frequent.</i>			
D	2.50		79mm /100%						
B S D	3.00 3.00 3.20	N = 19			(3.95)				
			70mm /100%						
S D	4.00 4.50	N = 24							
			70mm /80%			<i>At 4.50m to 4.60m bgl: rare to occasional gravel of subangular flint.</i>			
S	5.00	N = 29							
						Continued next sheet			

Installation:
Remarks: Hand dug service inspection pit excavated to 1.20m bgl. Liner and chalk slightly damp with depth. Borehole backfilled with gravel on completion.

Groundwater Strikes					Drilled: DH Logged: KM Checked: AP
Depth Strike	Rose to	Remarks	Cased	Sealed	

BOREHOLE LOG - DRIVEN CONTINUOUS SAMPLING

DCS4

Project190 Henley Road, Caversham

ClientVanessa Coldwell

Start29/01/2020

End29/01/2020

Coordinates

Ground Level

Project No.

Sheet

Scale

Total Depth

AG3108-20

2 of 2

1:25

5.45m

Sample / Test Type	Depth (m)	Result	Dia./ Rec.	Level (mAoD)	Strata Depth (thickness) (m)	Description of Strata	Legend	GW	Install
					5.45	White CHALK with frequent yellowish staining around clasts at 1.70m to 2.00m bgl. Recovered as soft to firm gravelly silt. Clasts are fine to coarse angular medium density chalk. (SEAFORD CHALK FORMATION AND NEWHAVEN CHALK FORMATION (UNDIFFERENTIATED))			
						End of Borehole at 5.45m			

Installation:
Remarks: Hand dug service inspection pit excavated to 1.20m bgl. Liner and chalk slightly damp with depth. Borehole backfilled with gravel on completion.

Groundwater Strikes					Drilled: DH Logged: KM Checked: AP
Depth Strike	Rose to	Remarks	Cased	Sealed	

SPT SUMMARY SHEET

Project: 190 Henley Road, Caversham
Client: Vanessa Coldwell
Project No: AG3108-20

Borehole No.	Borehole depth (m)	Bottom depth (m)	Casing depth (m)	Water Level (m)	Equipment ref.	Seating Drive		Test Drive					Test Type	N Value
						Blows	Pen (mm)	Blows		Pen (mm)		Total Pen (mm)		
DCS1	1.20	1.65			110.119	6 13	75 75	13 11	11 10	75 75	75 75	300	S	45
DCS1	2.00	2.45			110.119	6 7	75 75	10 9	8 9	75 75	75 75	300	S	36
DCS1	3.00	3.45			110.119	4 6	75 75	6 8	4 6	75 75	75 75	300	S	24
DCS1	4.00	4.45			110.119	4 6	75 75	6 8	5 5	75 75	75 75	300	S	24
DCS1	5.00	5.45			110.119	3 4	75 75	4 5	6 6	75 75	75 75	300	S	21
DCS2	1.20	1.65			110.119	6 7	75 75	8 9	9 10	75 75	75 75	300	S	36
DCS2	2.00	2.45			110.119	6 7	75 75	8 7	7 9	75 75	75 75	300	S	31
DCS2	3.00	3.45			110.119	3 3	75 75	6 16	12 6	75 75	75 75	300	S	40
DCS2	4.00	4.45			110.119	3 4	75 75	4 4	5 5	75 75	75 75	300	S	18
DCS2	5.00	5.45			110.119	4 3	75 75	5 4	5 5	75 75	75 75	300	S	19
DCS3	1.20	1.65			110.119	1 1	75 75	2 1	2 2	75 75	75 75	300	C	7
DCS3	2.00	2.45			110.119	1 1	75 75	1 1	1 1	75 75	75 75	300	S	4
DCS3	3.00	3.23			110.119	5 4	75 75	51			75	S	>50	
DCS3	4.00	4.45			110.119	4 5	75 75	5 4	5 5	75 75	75 75	300	C	19
DCS3	5.00	5.45			110.119	5 5	75 75	6 5	5 5	75 75	75 75	300	C	21
DCS4	1.20	1.65			110.119	2 2	75 75	3 3	4 4	75 75	75 75	300	C	14
DCS4	2.00	2.45			110.119	4 5	75 75	5 7	5 4	75 75	75 75	300	S	21
DCS4	3.00	3.45			110.119	4 4	75 75	4 4	5 6	75 75	75 75	300	S	19
DCS4	4.00	4.45			110.119	5 6	75 75	6 7	5 6	75 75	75 75	300	S	24
DCS4	5.00	5.45			110.119	5 6	75 75	6 7	7 9	75 75	75 75	300	S	29

Notes:

1. Test carried out in general accordance with BS EN ISO 22476-3:2005
2. N values have not been subjected to any correction.
3. Test carried out using split spoon S, or solid cone C.



Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Dynamic sampling uk ltd
5-8 victory parkway
victory road
Derby
DE24 8ZF

Hammer Ref: 110.119
Test Date: 20/03/2019
Report Date: 20/03/2019
File Name: 110.119.spt
Test Operator: TS

Instrumented Rod Data

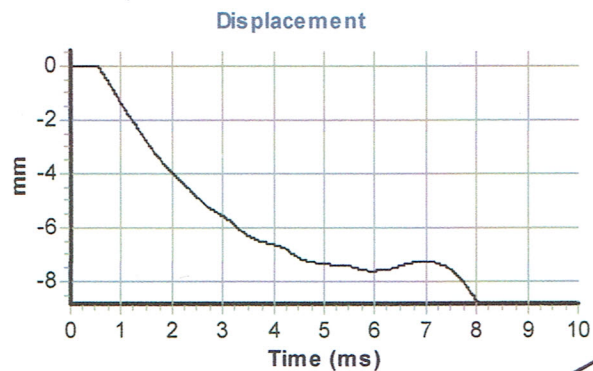
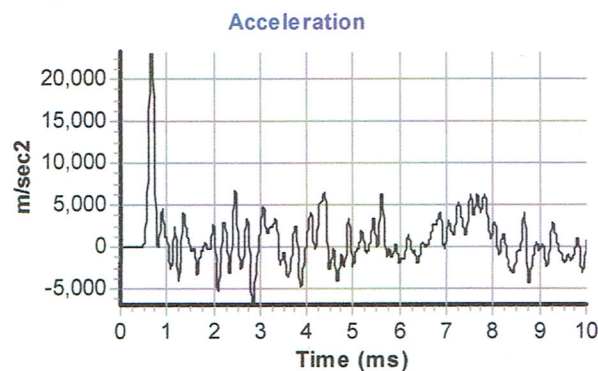
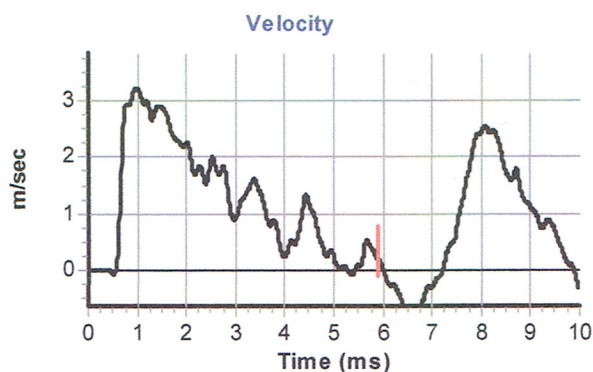
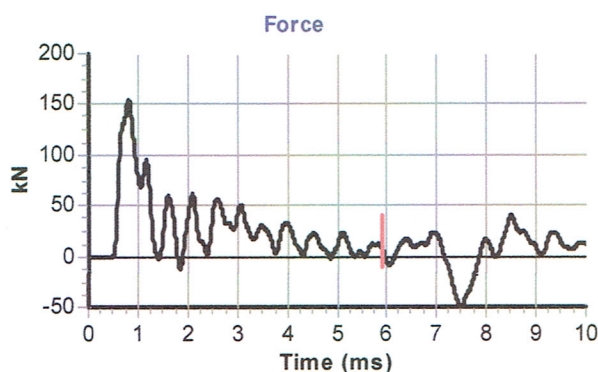
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 9603
Accelerometer No.2: 6457

Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
String Length L (m): 15.0

Comments / Location

Applied geology tested at Dynamic samplings yard.



Calculations

Area of Rod A (mm^2): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 373

Energy Ratio E_r (%): **79**

Signed: A.parker.

Title: Associate Director.

The recommended calibration interval is 12 months

TRIAL PIT LOG

HP1

Project 190 Henley Road, Caversham

Project No.

AG3108-20

Client Vanessa Coldwell

Sheet

1 of 1

Date 29/01/2020

Scale

1:25

Ground Level

Coordinates

Total Depth

1.20m

Sample / Test Type	Depth (m)	Result	Level (mAoD)	Strata Depth (thickness) (m)	Ease of Dig	Description of Strata	Legend	GW
B	0.05			(0.15)		Concrete.		
D	0.10			0.15		(MADE GROUND)		
D	0.20			(0.25)		Reddish brown slightly sandy GRAVEL. Gravel is fine to coarse subangular to subrounded brick and concrete.		
B	0.30			0.40		(MADE GROUND)		
B	0.50					Dark orangish brown sandy GRAVEL. Gravel is fine to coarse subangular to subrounded flint and quartzite and rare fine to medium angular brick.		
ES	0.50					(MADE GROUND)		
				(0.80)				
				1.20		End of Trial Pit at 1.20m		

Method: Hand dug

Groundwater: Groundwater not encountered.

Stability: Stable.

Remarks: Pit backfilled with arisings and capped with concrete on completion.

Length: 0.30m

Width: 0.30m

Logged: KM

Checked: AP

Exploratory Hole Log Key Sheet

Sample Test Notation			Backfill Symbols		Legend Symbols	
D	Small Disturbed sample			Sand		Topsoil
B	Bulk Disturbed sample			Gravel		Made Ground
ES	Environmental sample			Concrete		Concrete
U	Undisturbed U100 sample			Bentonite		Clay
UT	Undisturbed UT100 sample			Arisings		Silt
C	Core sample			Grout		Sand
W	Water sample					Gravel
In Situ Test Notation			Installation Symbols			Peat
S	Standard Penetration Test			Plain Standpipe		Cobbles
S (C)	Standard Penetration Test (cone)			Slotted Standpipe		Boulders
HV	Hand Shear Vane Test			Piezometer		Mudstone
PID	Photoionization Detector Test			Vibrating Wire Piezometer		Siltstone
MEXE	Mexecone Cone Penetrometer Test			Inclinometer		Sandstone
PP	Pocket Penetrometer Test			Extensometer (with magnet locations)		Limestone
K	Permeability Test					Chalk
Results Notation			Groundwater (GW)			Coal
Cu	Shear Strength	kN/m ²				Breccia
N	SPT N Value	-				Conglomerate
PID	VOC Concentration	ppm				Shale
()	U/UT Blow Count	-				Igenous Rock
Rotary Core Notation						Metamorphic Rock
TCR	Total Core Recovery			Rise	NR NR	No Recovery
SCR	Solid Core Recovery			Groundwater Strike - with Recorded Rise	NR NR	No Recovery
RQD	Rock Quality Designation			Strike		
FI	Fracture Index			Groundwater Strike - No Recorded Rise		
If	Fracture Spacing					
NI	Non Intact					
NR	No Recovery					
NA	Not Applicable					
Ease of Dig						
VE	Very Easy					
E	Easy					
M	Moderate					
H	Hard					
VH	Very Hard					
General Notes						
1. Details of the standpipe/piezometer are given on the log. The 'Install' column shows a graphical representation of the installed including depth of instruments including slotted section or piezometer depth, and backfill details. 2. Standard Penetration Test is defined in BS EN ISO 17892. Total N value is shown on the logs, full details of the test increments, equipment references, water and casing levels shown on the SPT Summary Sheet.						
Note: Most soils comprise a mixture of particle sizes. The soil type is graphically represented on the log and may be a combination of these symbols.						

APPENDIX D

Applied Geology Ltd

Unit 23 Abbey Park

Stareton

Kenilworth

Warwickshire

CV8 2LY

For the attention of Melissa Southworth

Report No: **B24163**

Issue No **01**

LABORATORY TEST REPORT

Project Name		190 HENLEY ROAD, CAVERSHAM	
Project Number		B24163	Date samples received 04/02/2020
Your Ref		AG3108-20	Date written instructions received 04/02/2020
Purchase Order		15384	Date testing commenced 04/02/2020
Please find enclosed the results as summarised below			
Figure / Table	Test Quantity	Description	ISO 17025 Accredited
1	7	BRE Suite - Soil	Yes
App S1	~	Sample Descriptions - Soil	N/A
App S2	~	Deviating Samples - Soil	N/A
App S3	~	Summary of In-House Analytical Test Methods - Soil	N/A
Remarks :			
Issued by : Stephen Langman		Date of Issue : 18/02/2020	Key to symbols used in this report S/C : Testing was sub-contracted
Approved Signatories :  18/02/2020			
G Wilson (JMD/Laboratories Director), S Langman (Laboratory Coordinator)			
Unless we are notified to the contrary, samples will be disposed after a period of one month from this date. The results reported relate to samples received in the laboratory only. All results contained in this report are provisional unless signed by an approved signatory This report should not be reproduced except in full without the written approval of the laboratory. Under multisite accreditation the testing contained in this report may have been performed at another Terra Tek laboratory. The enclosed results remain the property of Terra Tek Limited and we reserve the right to withdraw our report if we have not received cleared funds in accordance with our standard terms and conditions Only those results indicated in this report are UKAS accredited and any opinions or interpretations expressed are outside the scope of UKAS accreditation. Feedback on the this report may be left via our website www.terratek.co.uk/contact-us			



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birmingham@terratek.co.uk

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Terra Tek Ltd is registered in Scotland No. 121594
Offices in Airdrie, Birmingham, Belfast and Chesham

Head Office : 62 Rochsolloch Road, Airdrie, ML6 9BG

TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES				Site 190 HENLEY ROAD, CAVERSHAM															Contract No AG3108-20			
				Client Engineer																		
Sample Identification				Lab Sample ID	Sulphate (water soluble in 2:1 extract) as SO4 g/l	pH																
Hole	Depth m	Sample Ref	Sample Type																			
DCS1	1.20-3.00		B	719754	0.03	8.4																
DCS2	1.50-2.00		B	719755	0.04	8.5																
DCS2	2.00-4.00		B	719756	0.02	8.4																
DCS4	1.70-3.00		B	719757	0.01	8.5																
DCS4	1.40		D	719758	0.03	8.3																
DCS3	1.30		D	719759	0.01	8.0																
HP1	0.50		D	719760	1.08	9.1																
Limits of Detection Terra Tek Analysis Method					0.01 TP169 M	~ TP019 M																
Accreditation M=Mcerts U=UKAS N=No accreditation																						
Originator	Checked & Approved		BRE SD1 SUITE - SOIL																		Tk Figure 1 Sheet 1 of 1	
DAB	S. Langman 18/02/2020																					

 TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES				Site 190 HENLEY ROAD, CAVERSHAM						Contract No E13009/1	
				Client							
				Engineer							
Sample Identification				Lab Sample ID	Date Sampled	Temperature on receipt °C	PRIMARY MATRIX	Secondary Matrix	Additional matrix	% Loss at 30C	% Retained 2mm
Exploratory Hole	Depth m	Sample Ref	Sample Type								
DCS1	1.20-3.00		B	719754	29/01/20	10.9	CHALK			19.9	12.2
DCS2	1.50-2.00		B	719755	29/01/20	10.9	CHALK			17.9	18.8
DCS2	2.00-4.00		B	719756	29/01/20	10.9	CHALK			20.0	12.1
DCS4	1.70-3.00		B	719757	29/01/20	10.9	CHALK			19.4	11.9
DCS4	1.40		D	719758	29/01/20	10.9	SAND	Fine to medium gravel		9.8	40.7
DCS3	1.30		D	719759	29/01/20	10.9	SAND with gravel	Fine to medium gravel		4.2	75.1
HP1	0.50		D	719760	29/01/20	10.9	SAND	Fine to medium gravel		4.9	53.1
Notes Terra Tek are accredited for clay, sand and loam matrix types only, where they constitute the major component of the sample. Other coarse granular materials such as gravel, are not accredited where they comprise the major component of the sample. Results are expressed on a dry-weight basis (samples dried at <30°C) except where stated. The laboratory removes any material > 2mm prior to analysis. The quantity and nature of the material is shown as the secondary and additional matrix types in the above table. Where a parameter cannot be determined in house it is our policy to use a UKAS/MCERTS accredited laboratory wherever possible. Terra Tek will assume responsibility for the quality of subcontracted tests and the performance of the subcontractor chosen. Where there is no known UKAS/MCERTS laboratory for a particular parameter, a laboratory listed within the Terra Tek Approved Subcontractors List, which is subject to performance assessment, will be selected.											
Originator	Checked & Approved	SAMPLE DESCRIPTIONS							Appendix S1		
DAB	<i>S. Langren</i> 18/02/2020										
										Sheet 1 of 1	

TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES				Site 190 HENLEY ROAD, CAVERSHAM		Contract No AG3108-20							
				Client									
				Engineer									
Sample Identification				Lab Sample ID	Date Sampled	Deviating conditions						Preservatives used	
Exploratory Hole	Depth m	Sample Ref	Sample Type			Sampling date has not been provided	Exceeded maximum holding time for selected test(s)	Presence of headspace in sample vial	Poorly fitting cap or lid	Damaged container			
DCS1	1.20-3.00		B	719754	29/01/20								
DCS2	1.50-2.00		B	719755	29/01/20								
DCS2	2.00-4.00		B	719756	29/01/20								
DCS4	1.70-3.00		B	719757	29/01/20								
DCS4	1.40		D	719758	29/01/20								
DCS3	1.30		D	719759	29/01/20								
HP1	0.50		D	719760	29/01/20								
NOTES 1 Results reported for samples classified as deviating may be compromised. Deviation types are shown as "X" or "Yes" in the table above. 2 The absence of "X" or "Yes" in the table above indicates no reported deviations. 3 Deviations due to use of incorrect sample container are shown on result tables. 4 Deviating results are indicated within result tables.													
Originator	Checked & Approved	DEVIATING SAMPLES - SOIL											Appendix S2
DAB	<i>S. Langman</i> 18/02/2020												
Sheet 1 of 1													

TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES		Site190 HENLEY ROAD, CAVERSHAM		Contract NoAG3108-20	
		Client			
		Engineer			
Method Code	Reference	Description of Method	ISO17025 Accredited	MCERTS Accredited	Wet/Dry Sample Tested
GP001	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Preparation of soil samples for chemical analysis	Yes	Yes	N/A
GP012	BS EN 12457-3: Characterisation of Waste - Compliance test for leaching of granular waste materials and sludges (two-stage batch test)	Preparation of soil samples for two-stage leachate test			Dry
TP019	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of pH in 2.5:1 water/soil extract using pH meter.	Yes	Yes	Dry
TP032	MAFF Book 427: The Analysis of Agricultural Materials: Method 8	Determination of water soluble boron by colorimetry	Yes		Dry
TP040	APHA/AWWA, 19th edition: Method 3500Cr-D	Determination of hexavalent chromium by colorimetry.	Yes		Dry
TP041	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of organic matter by titrimetry.	Yes		Dry
TP042	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of loss on ignition at 50-440°C by gravimetry	Yes	Yes	Dry
TP045	GACHAMJA A.M. Chromatography and Analysis: 1992 9-11 (modified)	Determination of polyaromatic hydrocarbons extractable in dichloromethane, by GC/MS	Yes	Yes	Dry
TP046	MEWAM method: Phenols in water and Effluents: 4-aminoantipyrine method	Determination of monohydric phenols by steam distillation/colorimetry	Yes	Yes	Dry
TP047	MEWAM method: Cyanide in Waters etc	Determination of free cyanide by steam distillation/colorimetry	Yes		Dry
TP048	MEWAM method: Cyanide in Waters etc	Determination of total cyanide by steam distillation/colorimetry.	Yes	Yes	Dry
TP049	MEWAM method: Cyanide in Waters etc	Determination of complex cyanide by calculation	Yes		Dry
TP050	MEWAM method: Determination of Thiocyanate ,1985	Determination of thiocyanate by colorimetry	Yes	Yes	Dry
TP051	USEPA Method 9030B	Determination of acid soluble sulphides by steam distillation/colorimetry.	Yes	Yes	Wet
TP067	TNRCC Method 1005: 2001 (modified)	Determination of pentane/acetone extractable petroleum hydrocarbons (C8 - C40) by GC/FID	Yes	Yes	Wet
TP072	In-house documented method	Determination of ammoniacal nitrogen by colorimetry			Dry
TP073	In-house documented method	Determination of anionic detergent (MBAS) by colorimetry			Dry
TP074	In-house documented method	Determination of water soluble fluoride by ion selective electrode			Dry
TP098	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of acid soluble chloride by titrimetry			Dry
TP099	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of water soluble chloride by titrimetry	Yes	Yes	Dry
Notes 1. Terra Tek (Birmingham) are MCERTS accredited for clay, sand & loam matrix types only, where they constitute the major component of the sample. Other coarse granular materials, ie gravel, are not accredited where they comprise the major component of the sample. 2. Results are expressed on a dry-weight basis (samples dried at 30°C ± 5°C) except where stated. 3. The laboratory removes any material >2mm prior to analysis. The quantity and nature of any material removed from samples is recorded and the information is available on request. 4. The laboratory records the date of analysis of each parameter. This information is available on request. 5. Where a parameter cannot be determined in house it is our policy to use a UKAS/MCERTS accredited laboratory wherever possible. Terra Tek will assume responsibility for the quality of subcontracted tests and the performance of the subcontractor chosen. Where there is no known UKAS/MCERTS laboratory for a particular parameter, a laboratory listed within the Terra Tek Approved Subcontractors list, which is subject to performance assessment, will be selected.					
Originator	Checked & Approved	SUMMARY OF IN-HOUSE ANALYTICAL TEST METHODS (SOIL)		Tk Appendix S3	
N/A	N/A				
Sheet 1 of 2					

TERRA TEK SITE INVESTIGATION AND LABORATORY SERVICES		Site190 HENLEY ROAD, CAVERSHAM		Contract NoAG3108-20	
		Client			
		Engineer			
Method Code	Reference	Description of Method	ISO17025 Accredited	MCERTS Accredited	Wet/Dry Sample Tested
TP100	Wisconsin DNR Modified GRO method, Method for Determining Gasoline Range Organics	Determination of Volatile Petroleum Hydrocarbons/GRO.	Yes	Yes	Wet
TP110	USEPA Methods 8082A & 3665A	Determination of Total & Speciated 7 PCB Congeners by GC/MS SIM	Yes	Yes	Wet
TP114	BS1377, Part 3, 1990: Soils for Civil Engineering Purposes.	Determination of carbonate in soil (rapid titration method)			Dry
TP126	TNRCC Method 1006 (modified)	Extracted petroleum hydrocarbons from TP067 split into aromatic and aliphatic fractions. Analysed by GC/FID.	Yes		Wet
TP129	In-house documented method	Determination of total sulphur by ICP-OES spectroscopy	Yes	Yes	Dry
TP134	In-house documented method	Determination of water soluble chloride by titrimetry	Yes	Yes	Dry
TP135	USEPA Methods 8100 & 8270D. In-house method TP045	Determination of polyaromatic hydrocarbons extractable in dichloromethane, by GC/MS (with concentration stage)			Dry
TP137	BS7755: Section 3.9: 1995/ISO 11466:1995	Determination of acid extractable metals in soil by ICP-OES	Selected	Selected	Dry
TP145	USEPA Methods 3550C & 8270D	Determination of Semi-Volatile Organic Compounds by GC/MS	Yes	Yes	Wet
TP147	USEPA Methods 8082A & 3665A	Determination of total & speciated WHO 12 PCB Congeners by GC/MS SIM.			Wet
TP150	USEPA Methods 8081B & 8141B	Determination of pesticides and herbicides in soil by GC/MS SIM			Dry
TP152	USEPA Method 556	Determination of carbonyls by GC/MS.			Wet
TP154	USEPA Method 5021. Wisconsin DNR modified GRO method	Determination of volatiles in by GC/MS headspace	Yes	Selected	Wet
TP158	USEPA Method 1671	Determination of glycols by GC/FID DI			Wet
TP169	In-house documented method	Determination of water soluble sulphate in 2:1 water/soil extract by ICP-OES spectroscopy	Yes	Yes	Dry
TP171	In-house documented method	Determination of acid soluble sulphate by ICP-OES spectroscopy	Yes	Yes	Dry
TP174	In-house documented method	Determination of Total Organic Carbon in soils by high temperature combustion & NDIR detection			Dry
TP178	In-house documented method	Determination of water soluble nitrate by ion selective electrode			Dry
Notes 1. Terra Tek (Birmingham) are MCERTS accredited for clay, sand & loam matrix types only, where they constitute the major component of the sample. Other coarse granular materials, ie gravel, are not accredited where they comprise the major component of the sample. 2. Results are expressed on a dry-weight basis (samples dried at 30°C ± 5°C) except where stated. 3. The laboratory removes any material >2mm prior to analysis. The quantity and nature of any material removed from samples is recorded and the information is available on request. 4. The laboratory records the date of analysis of each parameter. This information is available on request. 5. Where a parameter cannot be determined in house it is our policy to use a UKAS/MCERTS accredited laboratory wherever possible. Terra Tek will assume responsibility for the quality of subcontracted tests and the performance of the subcontractor chosen. Where there is no known UKAS/MCERTS laboratory for a particular parameter, a laboratory listed within the Terra Tek Approved Subcontractors list, which is subject to performance assessment, will be selected.					
Originator	Checked & Approved	SUMMARY OF IN-HOUSE ANALYTICAL TEST METHODS (SOIL)		Tk Appendix S3	
N/A	N/A				
Sheet 2 of 2					



Final Report

Report No.: 20-05102-1

Initial Date of Issue: 21-Feb-2020

Client Applied Geology

Client Address: Unit 23, Abbey Park
Stareton
Kenilworth
Warwickshire
CV8 2LY

Contact(s): Adam Perks
Lab Results
Melissa Southworth

Project AG3108-20 190 Henley Road,
Caversham

Quotation No.: Q17-09497

Order No.: 15444

No. of Samples: 3

Turnaround (Wkdays): 5

Date Approved: 21-Feb-2020

Approved By:


Details: Darrell Hall, Director

Date Received: 18-Feb-2020

Date Instructed: 18-Feb-2020

Results Due: 24-Feb-2020

Client: Applied Geology	Chemtest Job No.:				20-05102	20-05102	20-05102
Quotation No.: Q17-09497	Chemtest Sample ID.:				971372	971373	971374
	Sample Location:				DCS1	DCS2	DCS4
	Sample Type:				SOIL	SOIL	SOIL
	Top Depth (m):				0.60	0.60	0.70
	Date Sampled:				29-Jan-2020	29-Jan-2020	29-Jan-2020
Determinand	Accred.	SOP	Units	LOD			
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010	< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO ₄	M	2120	g/l	0.010	0.021	0.11	0.023
Moisture	N	2030	%	0.020	7.8	5.3	6.6
Soil Colour	N	2040		N/A	Brown	Brown	Brown
Other Material	N	2040		N/A	Stones	Stones	Stones
Soil Texture	N	2040		N/A	Sand	Sand	Sand
pH	M	2010		4.0	8.5	8.1	8.6
Chloride (Water Soluble)	U	2220	g/l	0.010	< 0.010	0.023	< 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010	< 0.010	< 0.010	< 0.010

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurement by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.

Report Information

Key

- U UKAS accredited
- M MCERTS and UKAS accredited
- N Unaccredited
- S This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
- SN This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
- T This analysis has been subcontracted to an unaccredited laboratory
- I/S Insufficient Sample
- U/S Unsuitable Sample
- N/E not evaluated
- < "less than"
- > "greater than"

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A - Date of sampling not supplied
- B - Sample age exceeds stability time (sampling to extraction)
- C - Sample not received in appropriate containers
- D - Broken Container
- E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt

All water samples will be retained for 14 days from the date of receipt

Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:

customerservices@chemtest.com