

Document Control

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APPENDIX

EXECUTIVE SUMMARY

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

BRIEF

This report describes the findings of a site investigation carried out by Geotechnical and Environmental Associates Limited (GEA) on the instructions of David Wilson Homes Southampton Limited with respect to the proposed residential development at this site. The purpose of the investigation has been to review previous work carried out by others, to assess the ground conditions, investigate the presence of contamination and to provide information to assist with the design of shallow spread foundations.

SITE HISTORY

The site history has been established, in part, by means of an archaeological appraisal report previously carried out by others, which indicates that the site has not been previously developed. This information has been supplemented through a study of historical Ordnance Survey maps, which indicate that whilst the area surrounding the site to the south and west has become progressively developed, predominantly with housing, the site itself has remained essentially unchanged and in use as agricultural land since at least 1879 to the present day.

GROUND CONDITIONS

A series of 91 trial pits was excavated across the accessible areas of the main residential development part of the site to depths of between 2.70 m and 3.50 m below ground level. The investigation encountered the broadly expected ground conditions, in that across the majority of the site, beneath the topsoil, variably firm and soft brown silty sandy clay with occasional flint cobbles was encountered to depths of up to 2.50 m, although generally to a depth of about 1.00 m. Underlying these superficial soils, highly variable chalk-derived Coombe Deposits were encountered and found to comprise a mixture of firm pale grey silty and clay with layers and pockets of sandy silt and silty sand with variable amounts of chalk and flint gravel throughout. These soils were proved to the maximum depth of investigation across the majority of the site, although in a number of trial pits, highly weathered but apparently undisturbed chalk was encountered at depths of between 1.20 m and 3.00 m.

Groundwater was encountered in the majority of the trial pits at depths of between 1.50 m and 3.00 m, with moderate to fast inflows noted from the more granular layers. Where trial pits were excavated within predominantly clay soils, groundwater has generally not been encountered other than as seepages at depths of below about 2.00 m. In a number of the trial pits the inflows of groundwater resulted in the trial pit sides becoming unstable and prone to collapse below a depth of about 1.50 m.

The results of contamination testing do not indicate the presence of elevated concentrations of a wide range of potential soil contaminants.

RECOMMENDATIONS

Moderately sized strip or pad foundations placed within the Brickearth clay or the underlying Coombe Deposits at a minimum depth of 1.00 m below ground level may be designed to apply a net allowable bearing pressure of 75kN/m². Alternatively consideration may be given to the use of ground improvement techniques such as vibro-replacement. Laboratory geotechnical test results indicate these soils to be of generally low to medium plasticity and whilst no evidence of any desiccation has been noted, foundation depths will need to be increased in the vicinity of trees in accordance with the NHBC guidelines. In view of the absence of contamination indicated by the results of the testing, remedial action with respect to contamination is not considered to be necessary.

Part 1: INVESTIGATION REPORT

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

1.0 INTRODUCTION

Geotechnical and Environmental Associates (GEA) has been commissioned by David Wilson Homes Southampton Limited to carry out a desk study and ground investigation of the proposed residential development area of the Felpham Development Site. The Felpham Development Site comprises the residential development area, together with areas of public open space, playing fields and the new Bognor Regis relief road.

The records of a number of previous phases of work have also been provided by the Client and have been referred to where appropriate in this report. It is understood that David Wilson Homes Southampton Limited have been assigned the benefit of the following reports;

- Archaeological Desk Based Assessment, by CgMs Consulting, reference RB/2472, dated December 2000;
- Factual Report on Site Investigation by DTS Raeburn, reference 11473, dated March 2003.

1.1 Proposed Development

The proposed residential development at this site will comprise the construction of a range of single and two storey houses as part a substantial new residential development, which will include areas of domestic gardens, driveways, access roads, areas of communal access soft landscaping and hard surfaced car parking areas. In addition, the development is to include a range of shops, neighbourhood facilities including a community centre, playing fields and a school.

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

1.2 Purpose of Work

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

- to supplement the previous work carried out by others and to further confirm the history and environmental setting of the site;
- to confirm the ground conditions and their engineering properties;
- to provide recommendations for the design of shallow spread foundations; and
- to provide an assessment of the presence of soil contamination.

1.3 Scope of Work

In order to meet the above objectives, desk study was carried out, followed by ground investigation. The desk study comprised:

- a review of the previous reports provided by the client
- a review of readily available geological maps;
- a review of Ordnance Survey (OS) maps and publicly available environmental data sourced from the Envirocheck database; and
- a site walkover survey in conjunction with the site work.

The ground investigation comprised, in summary, the following activities:

- a series of 91 trial pits excavated using a mechanical excavator to a depth of up to 3.50 m;
- insitu testing within a number of the trial pits to provide preliminary advice with regard to road pavement design;
- testing of selected soil samples for geotechnical and contamination purposes; and
- provision of a report presenting and interpreting the above data, together with our advice and recommendations with respect to the proposed development.

It was additionally proposed to carry out soakage testing across the site, although as a result of the heavily waterlogged ground conditions at the time of the investigation access was not possible for a water bowser, such that soakage testing was not carried out.

1.4 Limitations

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

2.0 THE SITE

2.1 Site Description

The site occupies an area that lies to the northeast of Bognor Regis, directly to the north of Felpham and to the southwest of the small village of Flansham in West Sussex. The overall site is irregular in shape with maximum dimensions of 2,300 m by 615 m, which corresponds with a site area measuring approximately 60 hectares.

This investigation has focused upon the residential development part that forms the eastern part of the main site and has maximum dimensions of 950 m by 420 m and an area of approximately 40 hectares.

The northern part of the southeastern boundary to the residential site is formed by the A259 Flansham Lane, with the southern part of this boundary being formed by a Local Authority maintained area of public open space and children's playground. The southern boundary to the residential development area is formed by a mixture of fence and hedgerows, beyond which is a public footpath and the rear gardens of residential properties. The western boundary is formed by the extent of Bognor Regis Golf Club, with the northern boundary of the residential development area formed by the relief road site.

The relief road site comprises an arc shaped area of land measuring between about 90 m and 200 m wide and approximately 3 km in length. The western end of this road line joins with the A29, with the eastern end joining with the A259 Flansham Lane.

The whole site is currently occupied by a number of low-lying fields that are divided by a network of fences, ditches, paths and mature hedgerows. There are a number of public footpaths that bisect the site, together with the rough farm access tracks, Stanover Lane and North Track, which cross the western part of the main residential development area. The relief road part of the site is also bisected by the mainline railway that carries trains from London to Bognor Regis, and the Lidsey Rife which, together with a network of ditches, flows southwards towards the coast.

The site ground level undulates but is sensibly level. The main central part of the residential development area is occupied by an area of pasture grazed by cattle, whilst the southern and southeastern fields are apparently disused and not actively farmed. The fields that occupy the northwestern part of the residential development area are variably disused or planted with wheat, whilst the majority of the relief road part of the site is planted with oil seed rape. The central part of this area comprising the fields adjoining the railway line, are currently in use as pasture for grazing cattle.

The site may additionally be approximately located by National Grid Reference 495490, 101115.

2.2 Site History

The site history has been researched by reference to historical Ordnance Survey (OS) maps, publicly available data provided by the Envirocheck database and information contained within the archaeological desk based study.

The earliest map studied dates from 1879 and shows the site to be occupied by open agricultural land in a rural setting with the villages of Felpham and Flansham shown to have been present, together with the railway and majority of the network of footpaths that bisect the site. Subsequent maps studied indicate that the site itself has remained essentially unchanged to the

present day, although the area surrounding the site has become progressively more developed, predominantly through the construction of housing developments.

The historical maps indicate the presence of a small brickworks excavation directly to the north of the site in 1940, although by the date of the next available map in 1961 this is shown to no longer be in use, with the topographic variation associated with the brick clay excavation evident to the present day, indicating that it has apparently not been infilled.

2.3 Other Information

A search of public registers and databases has been carried out and the findings have been summarised below, although more detailed information on the search is included within the previous reports.

The search has indicated that there are no active or historical licensed landfills, waste treatment or waste disposal sites within 1 km of the site. The search has indicated that the site is located in an area where less than 1% of homes are affected by radon emissions; which is the lowest classification given by the Health Protection Agency (HPA). The search also indicates that according to the British Geological Survey (BGS) there is not any need for radon protection.

The Geological Survey map of the area indicates the main residential development part of the site to be underlain by Brickearth deposits overlying Upper Chalk. The majority of the proposed relief road is also shown to be underlain by Brickearth over Upper Chalk, with Tidal River Alluvium, associated with the Lidsey Rife, present across the central part of this area. The former National Rivers Authority (NRA) Ground Water Vulnerability map indicates that the site is underlain by a major aquifer with soils of high to intermediate leaching potential. Information provided by DEFRA also indicates that the site is located within a Nitrate Vulnerable Zone.

The Environment Agency indicate that much of the residential development site and the majority of the relief road part of the site are located within areas that are considered to be at risk of flooding or extreme flooding from the sea or rivers.

The previous DTS ground investigation comprised a limited series of 15 trial pits, together with six cable percussion drilled boreholes, three CBR tests and three soakage tests across the residential development site, together with a comprehensive set of laboratory geotechnical and contamination tests. This work essentially confirmed the anticipated geology in that the superficial Brickearth clay was proved to depths of between 1.35 m and 2.90 m below ground level, beneath which Coombe Deposits were encountered and proved to extend to depths of between 1.85 m and 6.60 m. These soils were underlain by Upper Chalk which was proved to the maximum depth of investigation at 10.50 m.

2.4 Preliminary Risk Assessment

The historical and current usage of the site that has been established by the desk study and the site walkover indicates that it does not have a potentially contaminative history or current use. Concerns may be raised on agricultural land over the use of manure as a fertiliser and the potential for a build up of heavy metal contamination within the near surface soils, however as this site is located within a Nitrate Vulnerable Zone, the use of certain pesticides, fertilisers and organic manures is restricted such that this issue is not considered to be of particular concern at this site.

3.0 EXPLORATORY WORK

In order to meet the objectives described in Section 1.2 a series of 91 trial pits was excavated by means of a mechanical excavator across the majority of the residential development site to depths of up to 3.50 m below ground level, with all of the work carried out under the supervision of a geotechnical engineer from GEA.

At the time of investigation, access was not available to one of the fields that forms the central southern portion of the main residential development area. This work will be carried out once access is available and the results will form an addendum to this report.

Further work will also be carried out across the residential development site and along the line of the proposed relief road in order to provide supplementary data to assist with the design of roadways and pavements to an adoptable standard. In addition along the line of the proposed relief road additional investigation will be required in order to provide data to assist with the design of foundations to the bridges and associated embankments that will need to be constructed over the railway and Lidsey Rife.

3.1 Sampling Strategy

The trial pits were positioned to enable maximum coverage within the physical constraints of the site and the presence of underground services at the time of investigation, in order to recover samples for contamination and geotechnical testing. Representative samples of the soils encountered were taken to the laboratory for routine geotechnical testing and contamination analyses.

The trial pit records and results of the laboratory analyses are appended, together with a site plan indicating the exploratory positions. The coordinates of each position, which are indicated on each trial pit record, were established using a hand-held Garmin eTrex global positioning system (GPS) receiver, which is claimed by the manufacturer to provide an accuracy in the order of 5 m to 10 m, although relative accuracy between positions measured in a single day could be expected to be an order of magnitude higher.

The analytical suite of contamination testing was selected to identify a range of typical industrial contaminants for the purposes of general coverage. For this investigation the analytical suite included a range of metals, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), total cyanide and monohydric phenols. An initial TPH screen has been included within the suite of analyses, with a series of dependent options comprising more detailed hydrocarbon analyses and speciation carried out should the result of any TPH test exceed a relatively low screening value. This testing protocol has been adopted to ensure that any detailed hydrocarbon analyses are appropriately targeted. The contamination analyses were carried out at an MCERTs accredited laboratory with the majority of the testing suite accredited to MCERTs standards. Details of the MCERTs accreditation and test methods are included in the Appendix together with the analytical results.

4.0 GROUND CONDITIONS

The investigation has generally encountered the expected ground conditions, in that across the majority of the site, beneath a locally significant thickness of topsoil, variably firm and soft brown silty sandy clay with occasional flint cobbles was found to be underlain by a highly variable mixture of chalk derived deposits, with insitu chalk only encountered in a limited number of the trial pits.

4.1 Topsoil / Made Ground

A variable and in places a relatively significant thickness of topsoil was encountered in each of the trial pits, to depths of between 0.20 m and 0.60 m below ground level, and was found to comprise a brown sandy clay, with abundant gravel and rootlets. The thickness of the topsoil is considered to be consistent with the historical cultivation of this part of the site as agricultural land.

In Trial Pit Nos 22 and 28, which were excavated within the extreme western part of the residential development area, the topsoil was found to have been locally reworked with occasional fragments of brick to a depth of up to 0.80 m and has therefore been described as made ground.

No visual or olfactory evidence of contamination was observed within these soils. However, selected samples of the topsoil were submitted for laboratory contamination analyses, the results of which are discussed in Section 4.4.

4.2 Brickearth

Underlying the topsoil and the apparently localised made ground, these soils were found to comprise a variably firm and soft brown silty sandy clay with occasional flint gravel and cobbles. The Brickearth was encountered to depths of between 0.60 m and 2.50 m below ground level, with the lower levels found to contain occasional layers of fine silty sand, scattered fine chalk gravel and occasional carbonaceous material.

No visual or olfactory evidence of contamination was observed within these natural soils.

4.3 Coombe Deposits

Underlying the Brickearth, highly variable chalk-derived deposits were encountered and found to comprise a mixture of firm pale grey and pale yellowish white silt and clay with layers and pockets of sandy silt and silty sand with chalk and flint gravel. These soils were proved to the full depth of the majority of the trial pits, which extended to depths of between 2.30 m and 3.50 m.

4.4 Upper Chalk

In a limited number of the trial pits located across the northern and western part of the site, highly weathered but apparently undisturbed chalk was encountered at depths of between 1.20 m and 3.00 m below ground level.

The previous DTS ground investigation included a limited number of cable percussion boreholes, which were drilled to depths of up to 10.50 m and proved the presence of the underlying chalk strata at depths of between 1.85 m and 6.60 m. In these boreholes, the chalk was assessed as

being highly weathered and structureless, with the results of SPTs indicating the chalk to become progressively less weathered with depth below about 6 m.

4.5 Groundwater

Groundwater was encountered in the majority of the trial pits at depths of between 1.50 m and 3.00 m, with moderate to fast inflows noted from the more granular layers. Where trial pits were excavated within predominantly clay soils, groundwater has generally not been encountered other than occasional seepages at depths of below about 2.00 m.

At the time of the investigation, parts of the site were found to be heavily waterlogged and the various drainage ditches that bisect the site were found to be generally full of water. It is understood from discussions with the various farmers that during the winter months much of the site can be heavily waterlogged and locally flooded.

Groundwater monitoring standpipes were installed into a number of the previous boreholes and a limited programme of monitoring indicated a groundwater rest level at depths of 0.63 m and 1.00 m below ground level. Further monitoring has not been carried out to date as it was not possible to relocate the borehole standpipes during the field work.

4.6 Soil Contamination

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

The use of a risk-based approach, which is presented in Part 2 of this report, means that it is not appropriate to determine the significance of contamination test results by simply comparing individual contaminant concentrations to a single "trigger" or "target" concentration. The significance of the results is therefore considered in more detail in Part 2, whilst the table below sets out the range of values measured by 11 samples which were tested as part of this phase of investigation and indicates the statistically weighted average concentrations.

Determinant	Maximum concentration recorded (mg/kg)	Minimum concentration recorded (mg/kg)	Number of samples below detection limit	Normalised upper bound US ₉₅
Arsenic	10	6.3	None	8
Cadmium	<0.5	<0.5	All	<0.5
Chromium	38	23	None	31
Lead	34	<10	None	26
Mercury	<0.6	<0.6	All	<0.6
Selenium	<2.5	<2.5	All	<2.5
Copper	34	9.2	None	22
Nickel	24	13	None	20

Determinant	Maximum concentration recorded (mg/kg)	Minimum concentration recorded (mg/kg)	Number of samples below detection limit	Normalised upper bound US ₉₅
Zinc	89	40	None	66
Total Cyanide	<1	<1	All	<1
Total Phenols	<0.1	<0.1	All	<0.1
Total Organic Carbon (TOC)	1.7	0.71	None	1.2
Total PAH	None	None	All	None
Benzo(a)pyrene	<0.5	<0.5	All	<0.5
Sulphide	<10	<10	All	<10
Elemental Sulphur	<100	<100	All	<100
TPH	<25	<25	All	<25
<i>Note:</i> The use of the normalised upper bound for 95th percentile confidence aims to remove some of the uncertainty associated with calculation of an arithmetic sample mean of a relatively small number of samples. The US95 value is the upper bound of the range within which it can be stated with 95% confidence that the true mean concentration of the data set will fall.				

The findings of this statistical assessment concur with the findings of the previous phase of work which included a relatively broad suite of contamination analyses on eight soil samples recovered from across the site.

The significance of these results is considered in more detail in Part 2.

4.7 Soil Gas

Soil gas monitoring formed part of the previous phase of investigation and indicated the presence of slightly elevated concentrations of carbon dioxide, which is consistent with the installation of gas monitoring standpipes into chalk strata. The results are not considered to warrant concern with regard to soil gasses, particularly in the absence of any measured flow and any potential sources of soil gas such as nearby landfill sites.

Part 2: DESIGN BASIS REPORT

This section of the report provides an interpretation of the findings detailed in Part 1, in the form of a ground model, and then provides advice and recommendations for foundations and other aspects of the development.

5.0 INTRODUCTION

Consideration is being given to the development of this site through the construction of a substantial new housing development and a new relief road for Bognor Regis. The development within the main residential part of the site is to comprise a range of single and two-storey houses, together with domestic gardens, driveways, access roads, areas of communal soft landscaping and hard surfaced car parking. In addition, the development is to include a range of shops, neighbourhood facilities including a community centre, playing fields and a school. Details of the proposed foundation loads are not known at this stage, although they are expected to be light.

6.0 GROUND MODEL

The desk study has indicated that the site has not been previously developed and has been in use as agricultural land since at least 1879. On the basis of the ground investigation the ground conditions at the site can be characterised as follows.

- A variable thickness of topsoil has been proved to depths of between 0.20 m and 0.60 m, which is consistent with the historical agricultural use of the site. Made ground comprising reworked topsoil with brick fragments has been encountered within a limited number of trial pits within the extreme western part of the site;
- beneath the topsoil, superficial soils comprising a firm and soft Brickearth clay were encountered to depths of between 0.60 m and 2.50 whereupon a highly variable mixture of chalk derived deposits were encountered. These soils were found to comprise interbedded firm pale grey clay, silt and sand with chalk and flint gravel and were proved to the full depth of investigation at 3.50 m across the majority of the site;
- in a limited number of the trial pits and in the previous boreholes, these soils were found to be underlain by highly weathered Upper Chalk to the maximum depth of investigation at 10.50 m;
- groundwater was encountered in the majority of the trial pits at depths of between 1.50 m and 3.00 m, with moderate to fast inflows noted from the more granular layers. Monitoring of standpipes installed during the previous phase of work indicated groundwater rest levels at a depths of 0.63 m and 1.00 m, although these standpipes could not be relocated and re-monitored;
- the desk study has indicated that the site is largely within areas that are considered to be at risk of flooding or extreme flooding from the sea or rivers; and
- the results of the soil contamination testing have not indicated the presence of elevated concentrations of a wide range of soil contaminants.

6.1 Contaminants of Concern

The use of a risk-based approach has been adopted to provide an initial screening of the test results to assess the need for subsequent site specific risk assessments. To this end the results have been compared to a generic human health risk based guideline value which is either that of the CLEA¹ Soil Guideline Value where available, or is a Generic Guideline Value calculated using the CLEA UK Beta Version 1.0 software assuming a residential end use. Where contaminant concentrations are measured in excess of these values it is considered that there is a potential for there to be some risk to human health and hence site specific risk assessment, soil remediation or risk management may be required. Values measured at concentrations below these values are not deemed to require further consideration with regard to human health.

The tables of generic screening values derived by GEA and an explanation of how each value has been derived are included in the Appendix.

The proposed development of the site comprises the construction of a range of residential buildings and as such it is considered that the use of a “residential with plant uptake” end use provides a conservative assessment of the significance of any contaminants. On this basis no contaminants of concern have been identified.

7.0 ADVICE AND RECOMMENDATIONS

The near surface firm and soft clay soils of the Brickearth should provide a suitable bearing stratum for lightly loaded shallow spread foundations. Should more substantial foundation loads be envisaged, it is considered that deeper spread foundations extending into the underlying chalk derived deposits may be necessary, although such excavations may locally require excavation support and sump pumping. Alternatively, consideration could be given to the use of short driven piles or ground improvement.

7.1 Spread Foundations

Moderately sized strip or pad foundations bearing within the firm and soft brown Brickearth clay or, the underlying firm and locally soft pale grey and yellowish brown silt and clay of the Coombe Deposits, where encountered at a minimum depth of 1.00 m below ground level may be designed to apply a net allowable bearing pressure of 75 kN/m². This value incorporate an adequate factor of safety against bearing capacity failure and should ensure that settlement remains within normal tolerable limits.

Desiccated clay soils were not noted during the ground investigation, and the absence of desiccation has been confirmed by the results of the laboratory geotechnical tests. Foundations will however need to be deepened in the vicinity of existing and proposed trees and National House Building Council (NHBC) guidelines should be followed in this respect for medium shrinkability clay soils. Where trees are to be removed, the required founding depth should be determined on the basis of the existing tree height and where a tree is to be retained the final mature height should be adopted. Notwithstanding NHBC guidelines, all foundations should extend beyond the zone of any desiccation and in view of the overgrown nature of parts of the site and the seasonal cultivation of crops, it would be prudent to have foundation excavations inspected by a suitably

1 CLR 7 (2002) *Assessment of risks to human health from land contamination: an overview of the development of soil guideline values and related research*; CLR8 (2002) *Priority contaminants for the assessment of land*; CLR 9 (2002) *Contaminants in soil: collation of toxicological data and intake values*; CLR10 (2002) *The contaminated land exposure model (CLEA): technical basis and algorithms*, and reports CLR TOX1-25 and CLR SGV1-10,15 and 16; all DEFRA and Environment Agency.

experienced engineer. Due allowance should be made for future growth of the trees. The requirement for compressible material alongside foundations should be determined by reference to the NHBC guidelines.

7.2 Ground Improvement

In view of the presence of near surface firm and variably soft clay soils across much of the site resulting in a relatively low bearing capacity for shallow spread foundations, an alternative solution may be to adopt some form of ground improvement. The most appropriate ground improvement technique for this site would probably be vibro-replacement, which would involve the use of stone columns bearing within the underlying superficial soils or onto the chalk in order to increase their bearing capacity. In the use of this method a near surface net allowable bearing pressure of up to about 125 kN/m² is normally achievable.

A specialist contractor should be consulted to determine the suitability of ground improvement at this site. In particular consideration should be given to whether the locally soft superficial soils will provide sufficient lateral support to the stone columns.

7.3 Excavations

On the basis of the trial pit investigation, shallow excavations should remain dry and stable, although deeper excavations below about 1.50 m have been found to be locally unstable and prone to collapse.

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

7.4 Ground Floor Slabs

Following the removal of the topsoil, lightly loaded ground bearing floor slabs with formation level in the natural clay soils of the Brickearth should prove feasible, if required. Where buildings are to be constructed in the vicinity of trees that are to remain and if new trees are to be planted in close vicinity to the new buildings, then the floor slabs will need to be suspended over a void in accordance with NHBC guidelines.

7.5 Pavement Design

Following the removal of the topsoil, formation levels for hardstandings and access roads are likely to be within the Brickearth clay. On this basis, pavements may be designed on the basis of an assessed California Bearing Ratio (CBR) of about 2%, although the results of the laboratory tests indicate these soils should be considered as potentially frost susceptible and the pavement construction may need to be increased to protect against frost effects in any case.

Consideration may also be given to the use of ground improvement techniques such as lime stabilisation in order to improve the material characteristics of the near surface natural soils and avoid the requirement for bulk excavation and removal.

7.6 Surface Water Drainage

Soakage testing was not carried due to access limitations associated with the heavily waterlogged ground surface at the time of investigation. Soakage testing will be carried out as part of a further phase of work, once the development proposals have been finalised and access is available for a water bowser.

The previous exploratory work included soakage testing and has indicated that relatively deep soakaways may be viable, with assessed soakage rates of between 4.5×10^{-5} m/s and 6.2×10^{-5} m/s measured.

As soakaways will be discharging directly into a major aquifer, additional precautions are likely be required by the Environment Agency in order to permit discharge of surface waters from areas of car parking and roadways. It should also be noted that much of the site is located within an area considered to be at risk of flooding and that local knowledge indicates that the site is often flooded and waterlogged during the winter months. The design of any site drainage system will need to ensure sufficient storm water storage capacity is provided and it is understood that this is to be primarily accommodated by the construction of a number of new attenuation and storage ponds and swales. Care will need to be taken to ensure that these storage ponds are isolated from the shallow groundwater in order to ensure the effective attenuation of surface water entering the drainage system.

7.7 Effect of Sulphates

The results of testing carried out on selected samples have revealed generally low concentrations of soluble sulphate, corresponding to Class DS-1(AC-1s) of Table C2 of BRE Special Digest 1:2005. The guidelines contained in the above digest should be followed in the design of any new foundation concrete once the results of the further testing are available.

7.8 Contamination Risk Assessment

The desk study has indicated that the site does not have a potentially contaminative history and the results of the contamination tests have confirmed the absence of elevated concentrations of a range of potential soil contaminants. It is therefore considered that no remedial action is required with regard to the proposed development of the Phase I development area.

7.9 Waste Disposal

Any spoil arising from excavations or landscaping works will need to be disposed of to a licensed tip. Under the European Waste Directive landfills are classified as accepting inert, non-hazardous or hazardous wastes in accordance with Waste Acceptance Criteria (WAC) based upon the results of CEN method bulk leaching tests or percolation tests.

On the basis of the test results carried out, and the technical guidance provided by the Environment Agency² it is considered likely that excavation arisings comprising natural soils may be classified as an inert waste. This opinion with regard to the classification of the excavated soils is provided for guidance only and should be confirmed by the receiving landfill once the soils to be discarded have been identified. It should be noted however that the organic content of the

topsoil may preclude its classification as an inert waste and it may require classification as Non-Hazardous, although the topsoil may actually have an economic value for reuse on this site or

² Environment Agency 2003. *Hazardous Waste: Interpretation of the definition and classification of hazardous waste*. Technical Guidance WM2

potentially as topsoil for use on other development site, subject to the relevant authorisation.

If either an inert or hazardous waste classification is to be applied to spoil leaving this site, the results of the Waste Acceptance Criteria (WAC) testing may be required to confirm that the spoil arising from either the made ground or natural soils could be disposed of to landfill.

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

8.0 FURTHER WORK

Once access is available, further investigation by means of trial pitting is to be carried out across the remaining field that forms the central southern portion of the main residential development area and the records of this work will form an addendum to this report.

Further work will also be carried out across the residential development site and along the line of the proposed relief road in order to provide supplementary data to assist with the design of roadways and pavements to an adoptable standard. In addition, along the line of the proposed relief road, further investigation will be required in order to provide data to assist with the design of foundations to the bridges and associated embankments that will need to be constructed over the railway and Lidsey Rife. At this stage it is considered that the bridge abutments may well need to be supported upon piled foundations such that the further investigation works will also need to include deep cable percussion drilled boreholes.

Once access is available and the design of the site drainage system reaches a more advanced stage, further soakage testing should be carried out in order to provide more data to assist with the design of any soakaways.

APPENDIX

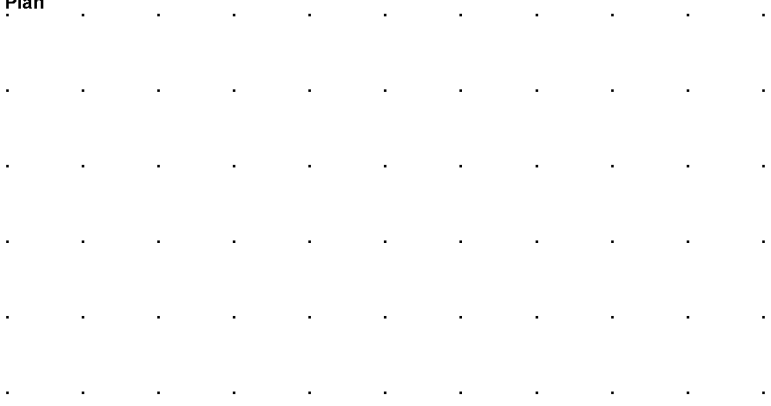
Trial Pit Records

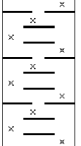
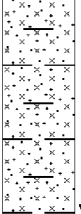
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: Geotechnical Test Results
: Chemical Analyses (Soil)

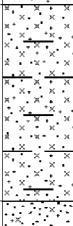
Envirocheck Summary

Historical Maps

Site Plan

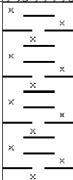
 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP1	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495595 E 101157 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D1				(0.40)	Topsoil (dark brown silty clay with rootlets)			
					0.40	Soft brown slightly silty slightly sandy CLAY			
2.10	D2				(0.80)				
					1.20	Firm pale grey and pale orange-brown mottled silty sandy CLAY with occasional chalk gravel			
3.40	D3				(2.30)				
					3.50	Complete at 3.50m			
Plan 						Remarks Groundwater was not encountered Trial pit sides locally unstable during excavation			

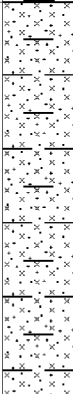
 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP2							
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097							
		Location 495569 E 101106 N		Dates 22/03/2007		Engineer		Sheet 1/1							
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water						
0.20	D1				(0.40) 0.40	Topsoil (dark brown silty clay with abundant rootlets)									
1.00	D2				(1.10) 1.10	Soft brown silty CLAY									
2.90	D3		Water strike(1) at 3.00m.		1.50 (1.50) 3.00	Pale grey and pale yellow mottled clayey sandy SILT with abundant gravel			▽1						
						Complete at 3.00m									
Plan .						Remarks Trial pit sides unstable									
										Scale (approx)		Logged By		Figure No.	
										1:50		AB		J07097.TP 2	

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP3	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495553 E 101055 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.90	D1				(0.40)	Topsoil (dark brown silty clay with abundant rootlets)			
					0.40	Soft brown silty slightly sandy CLAY			
1.90	D2				(1.40)				
					1.80				
2.80	D3				(1.30)	Pale grey and pale orange-brown clayey slightly sandy SILT with occasional chalk gravel			
3.20	D4				3.10				
					(0.20)	Pale grey and pale orange mottled clayey silty SAND with abundant gravel			
					3.30	Complete at 3.30m			
Plan						Remarks Groundwater was not encountered Trial pit sides stable			
. .									
						Scale (approx) 1:50		Logged By AB	
								Figure No. J07097.TP 3	

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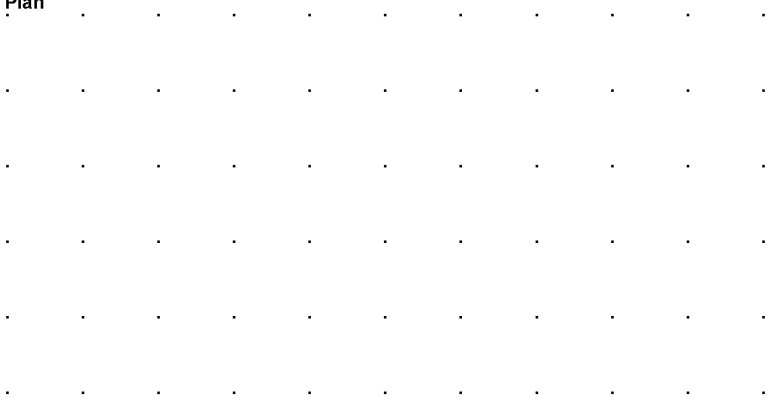
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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP6	
Excavation Method 13 tonne tracked mechanical excavator with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495467 E 101277 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D1				(0.30) 0.30	Topsoil (dark brown silty clay with occasional rootlets)			
0.80	D2				(1.30)	Firm brown silty CLAY			
1.80	D3				1.60 (1.40)	Pale grey and pale orange-brown clayey slightly sandy SILT with occasional chalk gravel - damp at 2.60 m with abundant scattered chalk fragments			
					3.00 (0.20) 3.20	White CHALK composed of angular clasts of low density chalk within white silt sized matrix of comminuted chalk (Dm)			
						Complete at 3.20m			
Plan						Remarks Groundwater not encountered Trial pit sides stable			
						Scale (approx) 1:50		Logged By AB	
								Figure No. J07097.TP 6	

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP7	
Excavation Method 13 tonne tracked mechanical excavator with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495421 E 101328 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.50	D1				(0.30) 0.30 (0.30) 0.60	Topsoil (dark brown silty clay with occasional rootlets and gravel) Firm dark brown silty CLAY Pale grey and pale yellow mottled clayey slightly sandy SILT with occasional chalk gravel becoming damp at 1.80 m with abundant scattered chalk and flint fragments		  	
1.00	D2								
1.80	D3				(2.60)				
3.10	D4				3.20	Complete at 3.20m			
Plan .						Remarks Groundwater not encountered Trial pit sides stable			
						Scale (approx) 1:50		Logged By AB	
								Figure No. J07097.TP 7	

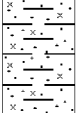
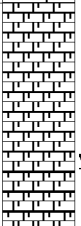
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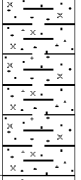
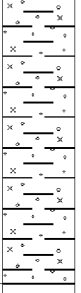
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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP10	
Excavation Method 13 tonne tracked mechanical excavator with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495437 E 101394 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D1					Topsoil (dark brown silty clay with occasional gravel and rootlets)			
						Firm brown silty CLAY with occasional scattered gravel			
						Pale grey and pale yellow mottled clayey slightly sandy SILT with occasional chalk gravel			
1.80	D2				(2.10)				
2.70	D3				3.00				
						Complete at 3.00m			
Plan 						Remarks Groundwater was not encountered Trial pit sides stable			

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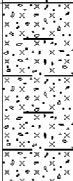
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Excavation Method 13 tonne tracked mechanical excavator with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495386 E 101167 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
1.00	D1				0.30	Topsoil (dark brown sandy clay with abundant fine flint gravel)			
					(1.90)	Soft but locally firm pale orange-brown very clayey SILT with layers of firm silty clay and scattered fine flint gravel and pockets of soft pale yellowish brown clayey silt with abundant chalk fragments			
2.50	D2				2.20	Soft pale yellowish brown silty CLAY with abundant fine chalk gravel and occasional flint cobbles			
					2.70				Complete at 2.70m
Plan					Remarks Trial pit sides stable Groundwater not encountered				
. .					Scale (approx) 1:50				
					Logged By DPB		Figure No. J07097.TP12		

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP13					
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097					
		Location 495444 E 101197 N		Dates 22/03/2007		Engineer		Sheet 1/1					
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water				
0.30	D1				(0.40) 0.40	Tosspoil (dark brown sandy silt with occasional fine flint gravel)							
1.00	D2				(0.80) 1.20	Firm orange-brown silty sandy CLAY with occasional flint gravel and pockets of pale yellowish brown clayey silt with abundant fine chalk gravel)							
2.00	D3		seepage(1) at 2.30m.		(1.50) 2.70	White CHALK composed of angular clasts of low density chalk within white silt sized matrix of comminuted chalk (Dc)			▽1				
						Complete at 2.70m							
Plan 						Remarks Trial pit sides unstable below 2.50 m							
												Scale (approx) 1:50	Logged By DPB

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP14	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495442 E 191153 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
1.00	D1				0.40	Tosspoil (dark brown sandy clayey silt with abundant fine chalk and flint gravel)			
					(1.20)	Firm dark orange-brown silty sandy CLAY with occasional flint gravel and scattered flint cobbles			
2.00	D2				1.60	Firm pale yellowish brown and brown with pale grey mottling silty CLAY with abundant fine chalk gravel and pockets of pale grey clayey silt			
3.00	D3				(1.90)				
					3.50	Complete at 3.50m			
Plan						Remarks Trial pit sides stable Groundwater not encountered			
. .						Scale (approx) 1:50			
						Logged By DPB		Figure No. J07097.TP14	

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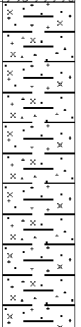
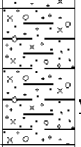
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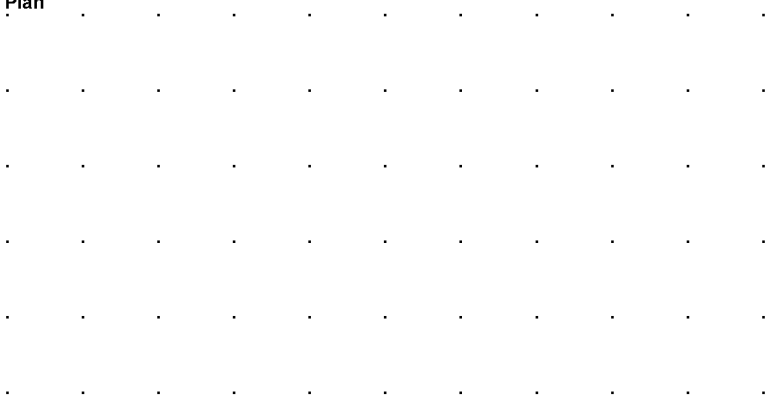
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Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 405502 E 101134 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
1.00	D1				(0.40)	Topsoil (dark brown sandy clay with scattered fine gravel)			
					0.40	Firm dark orange-brown silty slightly sandy CLAY			
2.00	D2				(0.80)				
					1.20	Firm and locally soft pale yellowish brown slightly clayey sandy SILT with abundant chalk and fine flint gravel			
2.50	D3				(1.20)				
					2.40	White CHALK composed of angular clasts of low density chalk within white silt sized matrix of comminuted chalk (Dm)			
					(0.60)				
					3.00	Complete at 3.00m			
Plan						Remarks Groundwater not encountered, although strata observed to be damp below 2.40 m Trial pit sides stable			
. .						Scale (approx) 1:50		Logged By DPB	
						Figure No. J07097.TP17			

Excavation Method JCB3CX with 600mm bucket		Dimensions				Ground Level (mOD)		Client Barratt Southampton Limited			Job Number J07097	
		Location 495730 E 101058 N				Dates 22/03/2007		Engineer			Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records		Level (mOD)	Depth (m) (Thickness)	Description			Legend	Water	
1.00	D1					(0.20)	Tospoil (dark brown sandy clay with abundant fine rootlets)					
						0.20	Firm brown sandy silty CLAY					
(1.20)												
												
												
												
						1.40	Firm pale grey with orange-brown mottling slightly clayey sandy SILT					
						(0.60)						
2.00	D2					2.00	Pale brown sandy slightly clayey chalk GRAVEL with occasional pockets of pale grey silty sand and occasional flint cobbles					
						(0.50)						
2.40	D3					2.50	Pale grey silty SAND with abundant chalk and flint gravel					
						(0.30)						
						2.80						
							Complete at 2.80m					
Plan						Remarks						
.						Trial pit sides stable						
.						Groundwater not encountered						
.												
.												
.												
.												
.						Scale (approx)		Logged By		Figure No.		
						1:50		DPB		J07097.TP18		

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP20							
Excavation Method JCB3CX with 600mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097							
		Location 495642 E 101114 N		Dates 22/03/2007		Engineer		Sheet 1/1							
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water						
0.20	D1		CBR 1.5		(0.30)	Topsoil (dark brown sandy silt with abundant fine rootlets)									
					0.30	Soft pale orange-brown silty slightly sandy CLAY									
0.60	D2				(0.50)										
					0.80	Firm pale grey mottled pale orange-brown sandy slightly clayey SILT with scattered fine chalk gravel becoming increasingly abundant below 2.00m with occasional flint cobbles									
1.20	D3				(2.10)										
2.00	D4				2.90										
						Complete at 2.90m									
Plan .						Remarks CBR refers to the result obtained from insitu CBR testing by means of a MEXE cone probe Trial pit sides stable Groundwater not encountered, but strata damp below 1.80 m									
										Scale (approx)		Logged By		Figure No.	
										1:50		DPB		J07097.TP20	

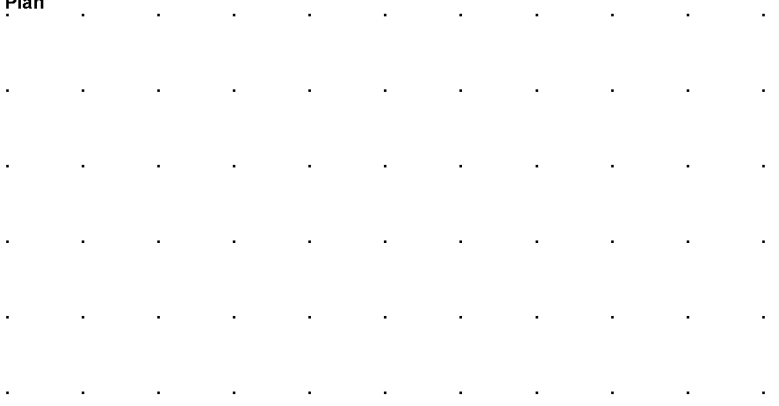
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Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495305 E 101035 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
1.20	D1				(0.30)	Topsoil (brown slightly silty slightly sandy clay with rootlets and gravel)			
					0.30	Firm brown and orange-brown silty sandy CLAY with occasional gravel, rootlets and carbonaceous deposits			
2.20	D2				(2.20)				
3.00	D3		medium(1) at 3.20m.		2.50	Soft pale brown silty sandy gravelly CLAY with chalk fragments and flint cobbles			▽1
					(0.90)				
					3.40	Complete at 3.40m			
Plan • • • • • • • • • •						Remarks Trial pit sides stable			
						Scale (approx) 1:50		Logged By BHW	
								Figure No. J07097.TP21	

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP22					
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097					
		Location 495294 E 100996 N		Dates 22/03/2007		Engineer		Sheet 1/1					
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water				
0.20	D1				(0.40)	Made Ground (orange-brown silty sandy clay topsoil with rootlets, brick fragments, flint cobbles and gravel)							
0.50	D2				0.40	Firm orange-brown silty sandy CLAY with occasional gravel							
					(0.80)								
					1.20	Firm pale brown and reddish brown mottled silty sandy friable CLAY with rare gravel and rootlets							
					(1.60)								
					2.80								
3.00	D3				(0.40)	Firm and locally soft pale grey and reddish brown mottled clayey sandy gravelly SILT with abundant chalk fragments and flint cobbles							
					3.20								
						Complete at 3.20m							
Plan 						Remarks Ground water not encountered Trial pit sides stable							
												Scale (approx) 1:50	Logged By BHW

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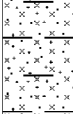
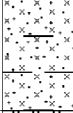
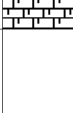
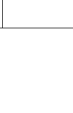
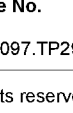
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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP25	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495301 E 100814 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
1.00	D1				(0.40) 0.40 (0.50) 0.90 (0.80)	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown clayey sand) Firm brown mottled orange-brown silty sandy locally friable CLAY with rootlets and occasional carbon deposits Firm pale grey and reddish brown mottled clayey sandy SILT with occasional chalk gravel and flint cobbles below 1.1 m	  		
2.00	D2		fast(1) at 2.10m.		1.70 (0.40) 2.10 (0.30) 2.40	Pale brown and orange-brown fine SAND with occasional gravel Firm grey and pale brown clayey sandy SILT with abundant gravel sized chalk fragments and occasional flint cobbles Complete at 2.40m	 	V1	
Plan .					Remarks Sides of trial pit unstable and collapsed to a depth of 1.8 m				
					Scale (approx) 1:50		Logged By BHW		Figure No. J07097.TP25

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP26					
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097					
		Location 495325 E 100903 N		Dates 22/03/2007		Engineer		Sheet 1/1					
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water				
0.30	D1				(0.40)	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown clayey sand)							
0.60	D2				0.40	Firm brown mottled orange-brown silty sandy locally friable CLAY with rootlets and occasional carbon deposits							
					(0.50)	Firm pale grey and reddish brown mottled clayey sandy SILT with occasional chalk gravel and flint cobbles below 1.1 m							
					0.90								
					(0.80)								
					1.70								
					(0.40)	Pale brown and orange-brown fine SAND with occasional gravel							
					2.10								
					(0.30)	Firm grey and pale brown clayey sandy SILT with abundant gravel sized chalk fragments and occasional flint cobbles							
					2.40								
						Complete at 2.40m							
Plan 						Remarks Groundwater not encountered Trial pit sides stable							
												Scale (approx) 1:50	Logged By BHW

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP28	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495357 E 100980 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D1				(0.30) 0.30 (0.50)	Made Ground (brown slightly silty slightly sandy clay topsoil with rootlets, gravel and occasional flint cobbles) Made Ground (orange-brown silty sandy clay with brick and flint cobbles)		 	
1.00	D2				0.80 (0.20) 1.00 (0.40)	Firm brown becoming orange-brown silty sandy locally friable CLAY with roots, occasional carbon deposits and traces of gravel			
1.50	D3				1.40 (0.20) 1.60	Soft pale grey and orange-brown clayey sandy SILT with traces of gravel Firm orange-brown silty sandy friable CLAY with rootlets		 	
2.00	D4				(1.70)	Firm grey and pale brown fissured silty sandy CLAY, becoming increasingly sandy below 2.8 m		                                 	
			moderate(1) at 3.30m.		3.30 (0.20) 3.50	Pale brown and orange-brown fine SAND with occasional gravel Complete at 3.50m		                            	
Plan .					Remarks Trial pit sides stable				
					Scale (approx) 1:50		Logged By BHW		Figure No. J07097.TP28

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP29	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495411 E 101037 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.10	D1		fast(1) at 1.90m.		(0.25) 0.25 (0.95) 1.20 (2.20) 3.40 (0.20) 3.60	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown clayey sand) Firm orange-brown silty sandy locally friable CLAY with roots, occasional carbon deposits and occasional flint cobbles Firm grey and pale brown clayey sandy SILT with abundant gravel sized chalk fragments and occasional flint cobbles White CHALK composed of angular clasts of low density chalk within white silt sized matrix of comminuted chalk (Dm) Complete at 3.60m		               	
Plan .						Remarks Sides of trial pit unstable below a depth of 2.1 m			
						Scale (approx) 1:50		Logged By BHW	
								Figure No. J07097.TP29	

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP34	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495436 E 100812 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.10	D1				(0.20) 0.20	Topsoil (dark brown silty clay with abundant rootlets)			
						Soft brown silty CLAY			
									
									
									
									
									
1.50	D2				(2.20)				
1.90	D3								
									
									
2.40	D4				2.40 (0.20) 2.60	Pale grey and pale orange-brown mottled clayey SILT with occasional chalk gravel and flint fragments			
						Complete at 2.60m			
Plan 						Remarks Groundwater was not encountered Trial pit sides stable			
						Scale (approx) 1:50	Logged By AB	Figure No. J07097.TP 34	

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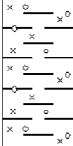
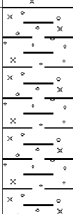
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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP44	
Excavation Method JCB3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495340 E 100870 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.40	D1				0.50	Topsoil (dark brown silty sandy clay with scattered fine gravel and abundant rootlets)			
1.00	D2				1.10	Soft orange-brown slightly silty CLAY with occasional flint cobbles			
2.00	D3		slow(1) at 2.40m.		1.60	Firm pale yellowish brown with pale grey mottling very silty CLAY locally grading into a clayey silt with occasional, becoming abundant flint and chalk gravel below 2.00 m			▽1
3.00	D4				3.00	Complete at 3.00m			
Plan 						Remarks Trial pit sides unstable below 2.40 m with the silt flowing below the groundwater level			

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP46	
Excavation Method JCB3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495480 E 100765 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.20	D1				(0.30)	Topsoil (dark brown silty sandy clay with scattered gravel and abundant rootlets)			
0.50	D2				0.30	Soft becoming firm orange-brown silty slightly sandy CLAY with occasional pale grey mottling and occasional flint cobbles below 1.00 m			
1.00	D3				(1.60)				
									
2.00	D4				1.90	Firm pale grey and orange-brown mottled clayey sandy SILT with fine chalk gravel			
					(0.80)				
2.80	D5				2.70	Orange-brown and yellowish orange brown very silty fine SAND with occasional chalk gravel			
					(0.30)				
					3.00	Complete at 3.00m			
Plan						Remarks Groundwater not encountered Trial pit sides unstable below 2.50 m			
. .						Scale (approx) 1:50			
						Logged By DPB		Figure No. J07097.TP46	

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP50	
Excavation Method 13 tonne tracked mechanical excavator with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 496238 E 100996 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.60	D1		seepage(1) at 0.90m.		(0.40) 0.40 (0.50) 0.90	Topsoil (dark brown sandy silty clay with abundant fine rootlets) Soft and locally firm pale orange-brown silty CLAY with occasional flint cobbles		 	
1.20	B2		seepage(2) at 1.40m.		0.90	Pale yellowish brown and pale grey mottled very silty clayey GRAVEL of fine flint and chalk fragments with occasional flint cobbles and layers of firm pale grey and orange-brown mottled very silty clay			V1 V2
2.50	D3		seepage(3) at 2.00m.		(2.10)				V3
					3.00	Complete at 3.00m			
Plan .						Remarks Trial pit sides unstable below 2.00 m			
						Scale (approx) 1:50		Logged By DPB	
								Figure No. J07097.TP50	

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP53	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495519 E 109441 N		Dates 22/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
1.00	D1		seepage(1) at 1.10m.		(0.30) 0.30 (0.80) 1.10 (0.50) 1.60 (1.20) 2.80	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel and rare flint cobbles) Firm orange-brown silty sandy locally friable CLAY with roots, occasional carbon deposits and traces of gravel Orange-brown fine SAND Pale brown clayey fine SAND with abundant gravel sized chalk fragments, occasional flint cobbles and pockets of reddish brown silt below 2.5 m	   	V1	
1.50	D2					Complete at 2.80m			
2.00	D3								
2.50	D4								
Plan .						Remarks Sides of trial pit unstable below a depth of 1.5 m			
						Scale (approx) 1:50		Logged By BHW	
								Figure No. J07097.TP53	

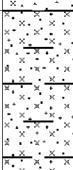
 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP54							
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097							
		Location 495510 E 100997 N		Dates 22/03/2007		Engineer		Sheet 1/1							
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water						
0.25	D1				(0.30) 0.30 (1.10) 1.40 (0.40) 1.80 (1.20)	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown clayey sand) Firm orange-brown silty sandy locally friable CLAY with occasional carbon deposits and rootlets to 1.1 m Soft pale grey and orange-brown clayey sandy SILT Firm pale brown clayey sandy SILT with abundant gravel sized chalk fragments and occasional flint cobbles		∇1 ∇2							
3.00	D2		seepage(1) at 1.80m. seepage(2) at 3.00m.		3.00 (0.20) 3.20	White CHALK composed of angular clasts of low density chalk within white silt sized matrix of comminuted chalk (Dm) Complete at 3.20m									
Plan <td colspan="4"> Remarks Sides of trial pit remained stable during excavation </td> <td colspan="2"> Scale (approx) 1:50 </td> <td colspan="2"> Logged By BHW </td> <td colspan="2"> Figure No. J07097.TP54 </td>						Remarks Sides of trial pit remained stable during excavation				Scale (approx) 1:50		Logged By BHW		Figure No. J07097.TP54	

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP56	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495619 E 100800 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
1.00	D1		moderate(1) at 1.80m.		(0.35) 0.35 (0.55) 0.90 (0.90) 1.80 (0.90) 2.70	Made Ground (brown slightly silty slightly sandy clay topsoil with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown clayey sand) Made Ground (orange-brown silty sandy clay with brick) Firm brown mottled orange-brown silty sandy CLAY with rootlets and occasional carbonaceous deposits Pale brown and pale grey clayey SAND with occasional gravel, flint cobbles and pockets of reddish brown silty sandy clay below 2.5 m	    	 1	
1.50	D2								
2.00	D3								
2.50	D4								
							Complete at 2.70m		
Plan .						Remarks Sides of trial pit unstable below a depth of 1.8 m			
						Scale (approx) 1:50		Logged By BHW	
								Figure No. J07097.TP56	

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP58	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495709 E 100865 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
1.00	D1				(0.30) 0.30 (0.70) 1.00 (0.70) 1.70	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown clayey sand) Firm orange-brown sandy locally friable CLAY with occasional carbon deposits and rootlets and rare flint cobbles below 0.8 m Soft pale grey and orange-brown clayey sandy SILT		  	
2.00	D2		seepage(1) at 1.90m.		(1.00) 2.70 (0.20) 2.90	Interbedded firm grey very sandy CLAY and orange-brown fine SAND Firm pale brown clayey sandy SILT with abundant gravel sized chalk fragments and occasional flint cobbles		 	∇1 
						Complete at 2.90m			
Plan						Remarks			
. .						Sides of trial pit unstable below a depth of 1.3 m Sides of trial pit collapsed to a depth of 2.7 m			
						Scale (approx)		Logged By	
						1:50		BHW	
								Figure No.	
								J07097.TP58	

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP59	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495656 E 100886 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.10	D1				(0.30) 0.30 (0.80) 1.10 (1.10)	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown clayey sand) Firm orange-brown silty sandy locally friable CLAY with occasional carbon deposits and rootlets Soft pale grey and orange-brown clayey sandy SILT with occasional flint cobbles		  	
2.00	D2				2.20 (0.40) 2.60 (0.50) 3.10	Soft pale yellowish brown clayey sandy SILT with chalk fragments Pale yellowish brown mottled pale grey slightly clayey fine SAND with occasional chalk fragments and flint cobbles		 	
						Complete at 3.10m			
Plan .						Remarks Ground water not encountered Trial pit sides stable			
						Scale (approx) 1:50		Logged By BHW	
								Figure No. J07097.TP59	

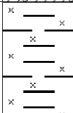
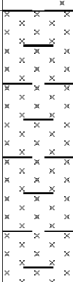
 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP60	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495600 E 100919 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.80	D1				0.40	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown silty sand)			
					1.00	Firm brown silty sandy locally friable CLAY with occasional carbon deposits and rootlets			
1.50	D2				1.40 (0.20)	Firm dark brown and reddish brown mottled silty slightly sandy CLAY			
					1.60	Firm orange-brown silty sandy locally friable CLAY			
					0.90				
					2.50	Firm orange-brown silty very sandy CLAY with occasional chalk fragments and flint cobbles			
					0.30	Firm pale brown clayey sandy SILT with abundant gravel sized chalk fragments and occasional flint cobbles			
3.00	D3		seepage(1) at 2.70m.		3.10	Complete at 3.10m			
Plan 					Remarks Trial pit sides stable				
					Scale (approx) 1:50		Logged By BHW		Figure No. J07097.TP60

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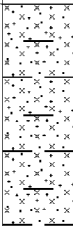
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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP64	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495712 E 100931 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D1				0.30	Topsoil (dark brown silty clay with abundant rootlets)			
					0.30	Firm brown silty CLAY			
0.90	D2				0.40	Pale grey and pale orange-brown mottled clayey SILT with occasional chalk gravel and flint cobbles			
					0.70				
					(2.10)				
2.40	D3				2.80	Complete at 2.80m			
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
									
Plan .						Remarks Groundwater was not encountered Trial pit sides unstable			
						Scale (approx) 1:50		Logged By AB	

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP65	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495746 E 100991 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
1.80	D1				(0.30)	Topsoil (dark brown silty clay with abundant rootlets)			
					0.30	Firm dark brown silty CLAY			
2.60	D2				(0.80)	Pale grey and pale orange-brown mottled clayey SILT with occasional chalk gravel and occasional flint cobbles			
					1.10				
					(1.80)				
					2.90	Complete at 2.90m			
Plan						Remarks Groundwater was not encountered Trial pit sides stable			
. .						Scale (approx) 1:50			
						Logged By AB		Figure No. J07097.TP 65	

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP68	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 496209 E 100835 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
			Water strike(1) at 1.50m.		(0.30) 0.30 (1.20) 1.50 (1.50) 3.00	Topsoil (dark brown silty clay with abundant rootlets) Firm brown CLAY Pale grey and pale orange-brown mottled clayey slightly sandy SILT with occasional chalk gravel becoming very clayey below 1.50 m and with abundant chalk gravel below 2.80 m Complete at 3.00m		  	
Plan .						Remarks Trial pit sides unstable			

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP72	
Excavation Method 13 tonne tracked mechanical excavator with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 496246 E 101090 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.50	D1				(0.20) 0.20 (0.80) 1.00 (0.40) 1.40 (1.80) 3.20	Topsoil (dark brown sandy clayey silt with scattered fine gravel) Firm pale orange-brown silty slightly sandy CLAY with occasional fine chalk and flint gravel Firm pale grey and orange-brown mottled very silty sandy CLAY with scattered chalk gravel Firm pale grey and pale orange-brown mottled sandy SILT with scattered chalk gravel and occasional flint cobbles, becoming increasingly abundant below 2.00 m		                                       	
1.20	D2								
1.50	D3								
2.50	D4								
Plan .						Remarks Groundwater was not encountered Trial pit sides stable			
						Scale (approx) 1:50		Logged By DPB	
								Figure No. J07097.TP72	

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP76							
Excavation Method 13 tonne tracked mechanical excavator with a 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097							
		Location 496025 E 100843 N		Dates 23/03/2007		Engineer		Sheet 1/1							
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water						
1.00	D1				0.30	Topsoil (dark brown sandy clayey silt with abundant fine flint gravel)									
						Soft orange-brown silty and locally very silty CLAY with occasional flint cobbles									
1.50	D2				(1.50)										
			seepage(1) at 1.80m.		1.80	Firm pale grey and pale yellowish brown mottled clayey SILT with abundant chalk and flint gravel and scattered flint cobbles			▽1						
2.00	D3				(1.20)				▽2						
			seepage(2) at 2.40m.		3.00										
						Complete at 3.00m									
Plan .						Remarks Trial pit sides unstable below 1.60 m									
										Scale (approx)		Logged By		Figure No.	
										1:50		DPB		J07097.TP76	

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP78	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.20	D1		CBR 1.5		(0.30)	Topsoil (dark brown silty clay with abundant rootlets)			
					0.30	Firm brown silty CLAY			
					(0.50)				
					0.80	Pale grey and pale orange-brown clayey silty GRAVEL			
					(1.70)				
					2.50	Pale grey and pale orange-brown mottled clayey SILT with occasional chalk gravel			
					(0.20)				
					2.70				
						Complete at 2.70m			
Plan						Remarks			
.						CBR refers to the result of insitu CBR testing by means of a MEXE cone probe			
.						Groundwater was not encountered			
.						Trial pit sides stable			
.									
.									
.									
						Scale (approx)	Logged By	Figure No.	
						1:50	AB	J07097.TP 92	

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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP82	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 495712 E 101031 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
1.80	D1				(0.30)	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel and occasional flint cobbles)			
					0.30	Firm brown silty sandy locally friable CLAY with occasional carbon deposits and rootlets			
					(0.70)				
					1.00	Soft pale grey and orange-brown clayey sandy SILT with occasional chalk fragments and flint cobbles			
					(1.20)				
					2.20	Firm grey very silty slightly sandy CLAY with chalk fragments and layers of orange-brown fine SAND			
3.00	D2				(0.80)				
					3.00		Firm grey silty CLAY		
					(0.20)				
					3.20	Complete at 3.20m			
Plan					Remarks				
.					Ground water not encountered Trial pit sides stable				
.									
.									
.									
.									
.									
					Scale (approx) 1:50		Logged By BHW		Figure No. J07097.TP82

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP83	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 496162 E 100831 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.90	D1		fast(1) at 1.50m.		(0.30) 0.30 (1.00) 1.30 (1.70) 3.00	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown clayey sand) Firm orange-brown silty sandy locally friable CLAY with occasional carbon deposits and rootlets Soft pale grey and orange-brown clayey sandy SILT with occasional chalk fragments and flint cobbles	                          		
2.50	D2				Complete at 3.00m				
Plan .						Remarks Sides of trial pit unstable below 1.5 m			
						Scale (approx) 1:50		Logged By BHW	

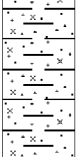
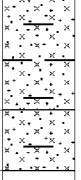
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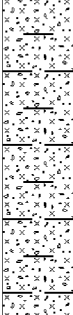
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 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP87	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 496072 E 100903 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
2.20	D1		fast(1) at 1.60m.		(0.30)	Made Ground (brown slightly silty slightly sandy clay topsoil with rootlets, gravel, occasional flint cobbles and traces of brick fragments)		▽1	
					0.30				
					(0.30)	Firm orange-brown silty sandy locally friable CLAY with occasional carbon deposits and rootlets			
					0.60				
					(1.00)	Soft pale grey and orange-brown clayey sandy SILT			
					1.60				
					(0.40)	Pale grey and pale brown silty sandy GRAVEL with pockets of pale grey clayey sandy silt			
					2.00				
					(1.00)	Firm pale brown clayey sandy SILT with abundant gravel sized chalk fragments and occasional flint cobbles			
					3.00				
Complete at 3.00m									
Plan					Remarks				
. .					Sides of trial pit unstable below a depth of 1.8 m Sides of trial pit collapsed to a depth of 2.6 m				
					Scale (approx)		Logged By		Figure No.
					1:50		BHW		J07097.TP87

Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 496064 E 100876 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
0.10	D1				0.30	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown clayey sand)			
1.00	D2				1.30	Firm orange-brown silty sandy locally friable CLAY with occasional carbon deposits and rootlets, becoming increasingly sandy with depth			
1.50	D3				1.60				
2.00	D4				1.30	Pale grey and pale brown silty sandy GRAVEL with abundant chalk fragments, occasional cobbles and pockets of pale grey clayey sandy silt and reddish brown silty clay			
					2.90				
						Complete at 2.90m			
Plan					Remarks				
					Ground water not encountered Sides of trial pit unstable below a depth of 1.6 m				
					Scale (approx)		Logged By		Figure No.
					1:50		BHW		J07097.TP88

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP89	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 496044 E 100832 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
			seepage(1) at 1.60m.		(0.30) 0.30 (1.20) 1.50 (1.30) 2.80 (0.40) 3.20	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown clayey sand) Firm orange-brown silty sandy locally friable CLAY with occasional carbon deposits, rootlets and chalk fragments Soft pale grey and orange-brown clayey sandy SILT with occasional flint cobbles, chalk fragments and pockets of orange-brown fine sand Interbedded firm grey clayey slightly sandy SILT with chalk fragments and orange-brown fine SAND Complete at 3.20m		   	
Plan .						Remarks Sides of trial pit unstable below a depth of 1.6 m			
						Scale (approx) 1:50		Logged By BHW	
						Figure No. J07097.TP89			

 Geotechnical & Environmental Associates				Tyttenhanger House Coursers Road St Albans AL4 0PG		Site Felpham Residential Development Site, Felpham, Bognor Regis, West Sussex		Trial Pit Number TP90	
Excavation Method JCB 3CX with 600 mm bucket		Dimensions		Ground Level (mOD)		Client Barratt Southampton Limited		Job Number J07097	
		Location 496055 E 100940 N		Dates 23/03/2007		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	
0.25	D1				(0.30) 0.30 (0.50) 0.80	Topsoil (brown slightly silty slightly sandy clay with rootlets, gravel, occasional flint cobbles and pockets of yellowish brown clayey sand) Firm brown silty sandy locally friable CLAY with occasional carbon deposits and rootlets Pale brown, orange-brown and off white clayey slightly sandy gravelly SILT with abundant chalk fragments	  		
1.50	D2				(2.10) 2.90	Complete at 2.90m			
Plan .						Remarks Ground water not encountered Trial pit sides stable			
						Scale (approx) 1:50	Logged By BHW	Figure No. J07097.TP90	

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Sample details				Description	Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			Other tests and comments
TP	Depth	No.	Type		MC	LL	PL	PI	<425 mic	Bulk	Dry	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	Organic Content	
No.	(m)				(%)	(%)	(%)	(%)	(%)	(Mg/m³)	(Mg/m³)	(kPa)	(kPa)	(kPa)		(g/l)	(%)	
TP2	2.00		D	Sample not received														
TP3	0.90		D	Very soft brown slightly sandy CLAY with traces of fine gravel	32													
TP4	0.60		D	Soft brown slightly sandy CLAY with traces of rootlets	22													
TP5	0.80		D	Sample not received														
TP6	0.80		D	Soft brown slightly sandy CLAY with traces of fine gravel	23													
TP7	0.50		D	Sample not received														
TP7	1.00		D	Very stiff mottled orange grey CLAY with traces of fine chalk fragments	19	33	20	13	99							8.6	0.03	
TP11	0.60		D	Sample not received														
TP11	1.00		D	Firm mottled dark orange brown slightly sandy CLAY with traces of fine to cobble sized flint gravel	23	47	19	28	97							7.6	<0.02	
TP12	1.00		D	Soft orange brown sandy CLAY with occasional	18													
TP13	1.00		D	Firm dark orange brown slightly sandy CLAY with traces of black staining	24	49	23	26	100							7.7	0.03	
TP15	1.00		D	Firm dark orange brown fine sandy CLAY with traces of fine gravel	22													

SUMMARY OF GEOTECHNICAL TESTING

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Sample details				Description	Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			Other tests and comments
TP	Depth	No.	Type		MC	LL	PL	PI	<425 mic	Bulk	Dry	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	Organic Content	
No.	(m)				(%)	(%)	(%)	(%)	(%)	(Mg/m³)	(Mg/m³)	(kPa)	(kPa)	(kPa)		(g/l)	(%)	
TP16	1.00		D	Firm dark orange brown slightly sandy CLAY	22	41	19	22	100						7.5	<0.02		
TP18	1.00		D	Firm mottled brown slightly sandy CLAY with traces of fine gravel and black staining	24													
TP19	1.00		D	Firm grey orange brown slightly sandy CLAY with traces of fine gravel and rootlets	23													
TP20	1.20		D	Soft to firm grey orange mottled very sandy clayey SILT with traces of fine to coarse gravel and chalk														Particle Size Distribution Test
TP21	1.20		D	Firm mottled dark orange brown slightly sandy CLAY	23	44	22	22	100						7.5	<0.02		
TP22	0.50		D	Sample not received														
TP23	1.00		D	Soft to firm mottled brown orange slightly sandy CLAY with traces of fine chalk fragments	20													
TP24	0.50		D	Soft brown slightly sandy CLAY with traces of fine gravel	23													
TP26	0.60		D	Sample not received														
TP28	2.00		D	Firm mottled brown and orange sandy CLAY with traces of fine siltstone fragments	20	32	20	12	100									
TP30	1.50		D	Firm mottled brown and orange sandy CLAY with traces of fine gravel and rootlets	27													
TP41	0.80		D	Sample not received														

SUMMARY OF GEOTECHNICAL TESTING	GEOLABS
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Sample details				Description	Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			Other tests and comments
TP	Depth	No.	Type		MC	LL	PL	PI	<425 mic	Bulk	Dry	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	Organic Content	
No.	(m)				(%)	(%)	(%)	(%)	(%)	(Mg/m³)	(Mg/m³)	(kPa)	(kPa)	(kPa)		(g/l)	(%)	
TP41	1.50		D	Firm dark orange brown slightly sandy CLAY with traces of rootlets		45	21	24	100									
TP42	1.00		D	Firm mottled grey orange slightly sandy CLAY traces of fine chalk fragments	18													
TP43	0.80		D	Firm dark orange slightly sandy CLAY with traces of rootlets	23													
TP44	1.00		D	Firm dark orange brown slightly sandy CLAY with traces of fine gravel	23	41	20	21	98						7.0	<0.02		
TP45	1.00		D	Soft orange brown and grey slightly sandy CLAY with traces of rootlets	26													
TP46	1.00		D	Soft to firm mottled brown grey brown CLAY	24													
TP47	1.00		D	Very soft mottled brown grey and orange sandy CLAY with abundant fine to coarse gravel and chalk fragments	20	22	16	6	74									
TP48	1.00		D	Soft mottled brown slightly sandy CLAY with traces of fine chalk fragments	26	34	19	15	99						8.5	<0.02	0.16	
TP49	1.00		D	Soft mottled orange brown slightly sandy CLAY with traces of fine to coarse gravel	15													
TP50	1.00		D	Soft light brown clayey very silty fine to coarse SAND and GRAVEL	19													
TP50	1.20		D	Soft light brown clayey silty fine to coarse SAND and GRAVEL														Particle Size Distribution Test
TP53	1.00		D	Soft orange brown clayey very silty fine to coarse SAND with traces of fine gravel														Particle Size Distribution Test

SUMMARY OF GEOTECHNICAL TESTING	GEOLABS
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Sample details				Description	Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			Other tests and comments
TP	Depth	No.	Type		MC	LL	PL	PI	<425 mic	Bulk	Dry	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	Organic Content	
No.	(m)				(%)	(%)	(%)	(%)	(%)	(Mg/m³)	(Mg/m³)	(kPa)	(kPa)	(kPa)		(g/l)	(%)	
TP56	1.00		D	Soft mottled orange brown slightly sandy CLAY	22										7.9	<0.02	0.18	
TP58	1.00		D	Soft mottled orange brown slightly sandy CLAY with traces of fine chalk fragments	26										8.5	<0.02		
TP60	0.80		D	Soft mottled orange brown slightly sandy CLAY	25												0.34	
TP71	1.00		D	Soft mottled brown and orange slightly sandy CLAY with traces of fine chalk fragments	21													
TP72	1.20		D	Soft light brown clayey fine SAND with occasional fine to medium chalk fragments	17	NP	NP	NP	94						8.2	0.21		Sample is Non-plastic
TP73	1.00		D	Firm mottled brown grey slightly sandy CLAY traces of fine chalk fragments	26													
TP74	1.20		D	Soft dark orange brown sandy CLAY traces of fine chalk fragments	19													
TP75	1.00		D	Soft brown slightly sandy CLAY traces of fine gravel and chalk fragments	22													
TP76	1.00		D	Soft mottled brown slightly sandy CLAY	27	44	19	25	100						7.9	<0.02		
TP83	0.90		D	Soft mottled brown CLAY with traces of rootlets	24	38	20	18	100						6.6	0.03	0.43	
TP88	1.00		D	Soft brown slightly sandy CLAY with traces of fine to medium gravel and rootlets	23	34	18	16	98								0.48	
TP90	1.50		D	Soft white mottled orange clayey sandy very silty PUTTY CHALK and fine to coarse CHALK fragments														Particle Size Distribution Test

SUMMARY OF GEOTECHNICAL TESTING	GEOLABS
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Sample details				Description	Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			Other tests and comments
TP No.	Depth (m)	No.	Type		MC (%)	LL (%)	PL (%)	PI (%)	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Shear Stress (kPa)	pH	2:1 W/S SO4 (g/l)	Organic Content (%)	
TP8	0.70		D	Sample not received														
TP9	0.70		D	Firm dark orange brown slightly sandy CLAY	23	43	22	21	100									
TP31	1.20		D	Firm mottled orange brown slightly sandy CLAY with traces of fine gravel and chalk fragments	23	45	19	26	99						8.2	<0.02		
TP32	0.70		D	Firm brown slightly sandy CLAY	24													
TP33	0.90		D	Soft mottled brown slightly sandy CLAY with traces of fine chalk fragments	24	40	20	20	99									
TP34	1.50		D	Soft mottled brown slightly sandy CLAY with traces of fine gravel and rootlets	28	37	20	17	99						8.2	<0.02		
TP35	0.60		D	Soft mottled brown slightly sandy CLAY with traces of fine to medium gravel and rootlets	23													
TP36	1.50		D	Soft to firm orange brown slightly sandy CLAY with traces of fine gravel	25	44	22	22	99						8.1	0.10		
TP37	1.00		D	Soft brown sandy CLAY with traces of fine chalk fragments and black staining	24													
TP39	0.60		D	Soft mottled brown slightly sandy CLAY with traces of fine gravel and rootlets	23	31	19	12	99						8.3	<0.02		
TP61	0.50		D	Soft brown slightly sandy CLAY with traces of black staining	23													
TP62	0.70		D	Soft brown slightly sandy CLAY with traces of fine gravel and rootlets	24													

SUMMARY OF GEOTECHNICAL TESTING	GEOLABS
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PROJECT NAME PROJECT NO:	FELPHAM, BOGNOR REGIS GEO / 11468	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Date</td> <td>08/05/2007</td> </tr> <tr> <td>Approved</td> <td>JSturges</td> </tr> <tr> <td>Page</td> <td>6 of 6</td> </tr> </table>	Date	08/05/2007	Approved	JSturges	Page	6 of 6
Date	08/05/2007							
Approved	JSturges							
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Sample details				Description	Classification Tests					Density Tests		Undrained Triaxial Compression Tests			Chemical Tests			Other tests and comments
TP	Depth	No.	Type		MC	LL	PL	PI	<425 mic	Bulk	Dry	Cell Pressure	Deviator Stress	Shear Stress	pH	2:1 W/S SO4	Organic Content	
No.	(m)				(%)	(%)	(%)	(%)	(%)	(Mg/m³)	(Mg/m³)	(kPa)	(kPa)	(kPa)		(g/l)	(%)	
TP63	0.65		D	Soft mottled brown slightly sandy CLAY with traces of fine gravel and rootlets	23													
TP66	1.30		D	Soft mottled brown slightly sandy CLAY with traces of fine siltstone fragments	26	42	23	19	99							8.2	0.02	
TP67	0.60		D	Soft to firm mottled brown slightly sandy CLAY	23													
TP77	1.00		D	Soft brown slightly sandy CLAY with traces of rootlets	24	40	20	20	100							7.2	<0.02	

SUMMARY OF GEOTECHNICAL TESTING	GEOLABS
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Dominic Brightman
Geotechnical & Environmental Associates
Tyttenhanger House
Coursers Road
St Albans
AL4 OPG

30 April 2007

TEST REPORT

Our Report Number: 07-30661

Your Order Reference: Instructions of 17/04/2007

9 soil samples submitted for analysis on 17/04/2007

Project Name: Felpham

Project Code: J07097

Laboratory analysis started on 24/04/2007

All laboratory analysis completed by 30 April 2007

Rexona Rahman
Analytical Reporting Manager
ALCONTROL TECHNICHEM

Sharon Googh
Project Co-Ordinator
ALCONTROL TECHNICHEM

Test methods are documented in house procedures or where appropriate standard methods. Non accredited tests (if applicable) are identified on each page. Procedures for sampling are outside the scope of the laboratory UKAS accreditation. Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation. All samples connected with this report , including any 'on hold', will be stored and disposed of according to company policy. A copy of this policy is available on request.

ALcontrol Technichem Table Of Results

Job Number : 07-30661
Matrix : Soil
Project Code: J07097

Project Name: Felpham
Client : Geotechnical Environmental Associates

Sample Reference	TP2	TP4	TP13	TP16	TP22	Method No	Units	LOD
Sample Depth (m)	0.20	0.20	0.30	0.25	0.20			
Date Sampled	-	-	-	-	-			
Date Scheduled	17/04/07	17/04/07	17/04/07	17/04/07	17/04/07			
Laboratory Reference No	222873	222874	222875	222876	222877			
Analysis								
Moisture Content (Dry Weight)	18.8	21.6	17.2	19.2	19.4		%	0.1
Moisture Content (Wet Weight)	15.8	17.7	14.7	16.1	16.3		%	0.1
Arsenic	7.1	9.0	8.4	10	6.3	069S TM	mg/kg	3
Boron (W/S)	0.6	0.5	< 0.5	0.6	< 0.5	016S TM	mg/kg	0.5
Cadmium	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	069S TM	mg/kg	0.5
Chromium	26	35	32	38	24	069S TM	mg/kg	10
Chromium (Hexavalent)	< 5	< 5	-	< 5	-	007S	mg/kg	5
Copper	10	31	34	28	9.2	069S TM	mg/kg	5
Lead	16	34	31	24	15	069S TM	mg/kg	10
Mercury	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	069S TM	mg/kg	0.6
Nickel	17	21	20	24	14	069S TM	mg/kg	4
Selenium	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	069S TM	mg/kg	2.5
Sulphate (Total Acid Soluble) as SO ₄	330	350	310	300	280	025a TM	mg/kg	200
Zinc	49	89	75	75	44	069S TM	mg/kg	10
Total Cyanide	< 1	< 1	< 1	< 1	< 1	061S TM	mg/kg	1
Organic Matter	1.9	1.6	1.6	1.2	1.3	092 ^I	%	0.2
Organic Carbon	1.1	0.91	0.92	0.71	0.78	092 TM	%	0.1
pH	6.4	5.4	5.3	5.4	4.7	009S TM	pH Units	
Acid Soluble Sulphide	< 10	< 10	< 10	< 10	< 10	008 TM	mg/kg	10
** RAPID TPH SUITE **								
TPH (C8-C40)	< 25	< 25	< 25	< 25	< 25	065 TM	mg/kg	25
Elemental Sulphur	< 100	< 100	< 100	< 100	< 100	032 TM	mg/kg	100
** RAPID PAH SUITE **								
Naphthalene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	022R TM	mg/kg	0.5
Benzo(a)pyrene	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	022R TM	mg/kg	0.5
Rapid PAH (Total 16)	ND	ND	ND	ND	ND	022R ^I	mg/kg	2
** PHENOLS SUITE **								
Phenol	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	020S TM	mg/kg	0.1
Total Monohydric Phenols	< 1	< 1	< 1	< 1	< 1	020S ^I	mg/kg	1

^I ISO 17025 accredited.

^M MCERTS accredited for sand, loam and clay.

ALcontrol Technichem Table Of Results

Job Number : 07-30661
Matrix : Soil
Project Code: J07097

Project Name: Felpham
Client : Geotechnical Environmental Associates

Sample Reference	TP26	TP28	TP48	TP71		Method No	Units	LOD
Sample Depth (m)	0.30	0.20	0.50	0.30				
Date Sampled	-	-	-	-				
Date Scheduled	17/04/07	17/04/07	17/04/07	17/04/07				
Laboratory Reference No	222878	222879	222880	222881				
Analysis								
Moisture Content (Dry Weight)	21.4	21.9	19.0	23.1			%	0.1
Moisture Content (Wet Weight)	17.6	18.0	16.0	18.8			%	0.1
Arsenic	6.7	6.5	6.8	8.1		069S TM	mg/kg	3
Boron (W/S)	0.5	< 0.5	0.6	0.5		016S TM	mg/kg	0.5
Cadmium	< 0.5	< 0.5	< 0.5	< 0.5		069S TM	mg/kg	0.5
Chromium	24	23	24	31		069S TM	mg/kg	10
Chromium (Hexavalent)	-	-	-	< 5		007S	mg/kg	5
Copper	9.8	10	9.8	15		069S TM	mg/kg	5
Lead	17	19	< 10	29		069S TM	mg/kg	10
Mercury	< 0.6	< 0.6	< 0.6	< 0.6		069S TM	mg/kg	0.6
Nickel	15	13	17	18		069S TM	mg/kg	4
Selenium	< 2.5	< 2.5	< 2.5	< 2.5		069S TM	mg/kg	2.5
Sulphate (Total Acid Soluble) as SO ₄	310	290	370	500		025a TM	mg/kg	200
Zinc	40	42	44	62		069S TM	mg/kg	10
Total Cyanide	< 1	< 1	< 1	< 1		061S TM	mg/kg	1
Organic Matter	1.4	1.5	1.2	3.0		092 ^I	%	0.2
Organic Carbon	0.79	0.86	0.71	1.7		092 TM	%	0.1
pH	4.5	4.6	8.0	4.5		009S TM	pH Units	
Acid Soluble Sulphide	< 10	< 10	< 10	< 10		008 TM	mg/kg	10
** RAPID TPH SUITE **								
TPH (C8-C40)	< 25	< 25	< 25	< 25		065 TM	mg/kg	25
Elemental Sulphur	< 100	< 100	< 100	< 100		032 TM	mg/kg	100
** RAPID PAH SUITE **								
Naphthalene	< 0.5	< 0.5	< 0.5	< 0.5		022R TM	mg/kg	0.5
Benzo(a)pyrene	< 0.5	< 0.5	< 0.5	< 0.5		022R TM	mg/kg	0.5
Rapid PAH (Total 16)	ND	ND	ND	ND		022R ^I	mg/kg	2
** PHENOLS SUITE **								
Phenol	< 0.1	< 0.1	< 0.1	< 0.1		020S TM	mg/kg	0.1
Total Monohydric Phenols	< 1	< 1	< 1	< 1		020S ^I	mg/kg	1

^I ISO 17025 accredited.

^M MCERTS accredited for sand, loam and clay.

ALcontrol Technichem

Table Of Results - Appendix

Project Name: Felpham
Client : Geotechnical Environmental Associates

Job Number : 07-30661

Project Code: J07097

Summary of methods contained within report :

Method No.	Reference	Description	Wet/Dry Analysis
065	In-house method	Determination of total petroleum hydrocarbons in soil samples using hexane:acetone extraction and GC-FID detection. Note: UKAS accreditation only applies to C8-C40 and excludes other carbon banding.	W
061S	In-house method based on Method 4500-CN, "Standard Methods for the Examination of Water and Waste Water", APHA AWWA WEF, Edition 18, 1992	Determination of cyanides and thiocyanate in soil samples by continuous flow colorimetry (Skalar)	W
022R	In-house method	Determination of PAH compounds in soil samples by hexane / acetone extraction followed by GC-MS detection	W
020S	In-house method based on Second Site Property: Environmental Assessment Guidance Version 3: March 2003	Determination of methanol/water based mobile phase extractable phenols in soil samples by HPLC with electrochemical detection	W
009S	In-house method referencing BS1377: Part 3: 1990 and Second Site Property: Environmental Assessment Guidance Version 3: March 2003	Determination of pH by addition of water followed by electrometric measurement	W
008	In-house method adapted from MEWAM "Sulphide in Waters and Effluents", HMSO, 1983	Determination of sulphide in soil samples by sulphuric acid addition, absorption of liberated hydrogen sulphide in sodium hydroxide / ascorbic acid buffer solution and ion selective electrode detection	W
069S	In-house method based on MEWAM "Methods for the Determination of Metals in Soil", HMSO, 1986	Determination of metals in soil samples by aqua-regia digestion followed by ICP-OES detection	D
032	In-house method	Determination of elemental sulphur (with simultaneous PAH screening) by dichloromethane extraction followed by HPLC-UV detection	D
025a	In-house method based on BS1377 Part 3, "Chemical and Electrochemical Tests", 1990	Determination of hydrochloric acid soluble sulphate in soil samples by Inductively Coupled Plasma - Optical Emission Spectrometry (ICP-OES)	D

ALcontrol Technichem Table Of Results - Appendix

Project Name: Felpham
Client : Geotechnical Environmental Associates

Job Number : 07-30661

Project Code: J07097

Summary of methods contained within report :

Method No.	Reference	Description	Wet/Dry Analysis
016S	In-house method	Determination of water soluble boron by 2:1 extraction in hot water followed by ICP-OES detection	D
092	In-house method	Determination of organic matter in soil samples by combustion analyser	D
007S	In-house method based on Method 3500-Cr, "Standard Methods for the Examination of Water and Waste Water", APHA AWWA WEF, Edition 18, 1992	Determination of hexavalent chromium in soil samples by water extraction and colorimetric detection	D

Soil results are expressed on a dry weight basis. Where the test uses as-received sample, a moisture correction factor is applied to the wet weight result. This factor is determined gravimetrically using weight loss on drying at 30° (+/-5) C.

Dominic Brightman
Geotechnical & Environmental Associates
Tyttenhanger House
Coursers Road
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AL4 OPG

30 April 2007

TEST REPORT

Our Report Number: 07-30664

Your Order Reference: Instructions of 18/04/2007

2 soil samples submitted for analysis on 18/04/2007

Project Name: Felpham

Project Code: J07097

Laboratory analysis started on 24/04/2007

All laboratory analysis completed by 30 April 2007

Rexona Rahman
Analytical Reporting Manager
ALCONTROL TECHNICHEM

Rhys Ashton
Project Co-Ordinator
ALCONTROL TECHNICHEM

Test methods are documented in house procedures or where appropriate standard methods. Non accredited tests (if applicable) are identified on each page. Procedures for sampling are outside the scope of the laboratory UKAS accreditation. Opinions and interpretations expressed herein are outside the scope of our UKAS accreditation. All samples connected with this report , including any 'on hold', will be stored and disposed of according to company policy. A copy of this policy is available on request.

Job Number: 07-30664
Client: Geotechnical & Environmental Associates
Project Code: J07097

Page 2 of 5

ALcontrol Technichem Table Of Results

Job Number : 07-30664
Matrix : Soil
Project Code: J07097

Project Name: Felpham
Client : Geotechnical Environmental Associates

Sample Reference	TP8	TP32				Method No	Units	LOD
Sample Depth (m)	0.20	0.20						
Date Sampled	-	-						
Date Scheduled	18/04/07	18/04/07						
Laboratory Reference No	222889	222890						
Analysis								
Moisture Content (Dry Weight)	21.2	19.9					%	0.1
Moisture Content (Wet Weight)	17.5	16.6					%	0.1
Arsenic	9.1	7.4				069S TM	mg/kg	3
Boron (W/S)	0.9	0.6				016S TM	mg/kg	0.5
Cadmium	< 0.5	< 0.5				069S TM	mg/kg	0.5
Chromium	30	27				069S TM	mg/kg	10
Chromium (Hexavalent)	-	< 5				007S	mg/kg	5
Copper	14	13				069S TM	mg/kg	5
Lead	17	20				069S TM	mg/kg	10
Mercury	< 0.6	< 0.6				069S TM	mg/kg	0.6
Nickel	20	18				069S TM	mg/kg	4
Selenium	< 2.5	< 2.5				069S TM	mg/kg	2.5
Sulphate (Total Acid Soluble) as SO ₄	550	340				025a TM	mg/kg	200
Zinc	54	50				069S TM	mg/kg	10
Total Cyanide	< 1	< 1				061S TM	mg/kg	1
Organic Matter	2.5	2.0				092 ^I	%	0.2
Organic Carbon	1.5	1.2				092 TM	%	0.1
pH	6.8	5.8				009S TM	pH Units	
Acid Soluble Sulphide	< 10	< 10				008 TM	mg/kg	10
** RAPID TPH SUITE **								
TPH (C8-C40)	< 25	< 25				065 TM	mg/kg	25
Elemental Sulphur	< 100	< 100				032 TM	mg/kg	100
** RAPID PAH SUITE **								
Naphthalene	< 0.5	< 0.5				022R TM	mg/kg	0.5
Benzo(a)pyrene	< 0.5	< 0.5				022R TM	mg/kg	0.5
Rapid PAH (Total 16)	ND	ND				022R ^I	mg/kg	2
** PHENOLS SUITE **								
Phenol	< 0.1	< 0.1				020S TM	mg/kg	0.1
Total Monohydric Phenols	< 1	< 1				020S ^I	mg/kg	1

^I ISO 17025 accredited.

^M MCERTS accredited for sand, loam and clay.

ALcontrol Technichem

Table Of Results - Appendix

Project Name: Felpham
Client : Geotechnical Environmental Associates

Job Number : 07-30664

Project Code: J07097

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ALcontrol Technichem Table Of Results - Appendix

Project Name: Felpham
Client : Geotechnical Environmental Associates

Job Number : 07-30664

Project Code: J07097

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Soil results are expressed on a dry weight basis. Where the test uses as-received sample, a moisture correction factor is applied to the wet weight result. This factor is determined gravimetrically using weight loss on drying at 30° (+/-5) C.



Geotechnical &
Environmental
Associates

Tyttenhanger House
Coursers Road
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Herts AL4 0PG

Site Plan

Site : Felpham, Bognor Regis, West Sussex

Client : KingsOak Southampton limited

Engineer

Job Number
J07097

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