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# SOUTH WEST BICESTER OXFORDSHIRE

# GROUND INVESTIGATION

# FACTUAL AND INTERPRETATIVE REPORT

Revision Record

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# SOUTH WEST BICESTER

#### **OXFORDSHIRE**

# GROUND INVESTIGATION

# FACTUAL AND INTERPRETATIVE REPORT

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# EXECUTIVE SUMMARY

Pell Frischmann was instructed by A D Woodley and Sons to carry out a Site Investigation for the proposed development of the land surrounding Whitelands Farm. The purpose of the report is to highlight the geotechnical and environmental considerations that should be addressed as part of the proposed scheme.

The superficial deposits comprise localised deposits of alluvium made ground and the completely weathered upper surface of the solid geology. The underlying solid geology comprises Kellaways Clay, Combrash and Forest Marble Formations.

A total of 11 percussive boreholes and 110 trial pits were undertaken as part of this investigation. The exploratory holes confirmed the anticipated ground conditions, together with some additional areas of made ground.

It will be possible to construct shallow foundations on the majority of the site. Only limited areas of made ground, peat or soft clay are deemed unsuitable. Sulphate tests on a limited number of samples show that the soils fall into Class 1 of the BRE Digest, with the exception of a limited number of made ground samples.

With respect to contamination, the majority of the site did not contain any significant levels of contaminants. The backfilled quarry in the north west corner of the site did show elevated levels of some metals, but these were proved to be immobile.

Other than the provision of a clean break layer for landscaping areas or cover by hardstanding in limited areas, we do not consider the contaminants present a significant hazard on site, although disposal off site may attract additional costs. This is with the proviso that two anomalous results towards the eastern site boundary are investigated further, with a limited programme of testing.

The majority of soils encountered beneath the site will in general be acceptable for reuse as earthworks materials. Excavation sides within the soils will generally be stable, although excavation depth is likely to be restricted over much of the site due to shallow rockhead. Limited groundwater control measures may be required where perched water is encountered.



#### 1. INTRODUCTION

A D Woodley and Sons Ltd has commissioned Pell Frischmann Consultants to carry out a Site Investigation at the site of Whitelands Farm at Bicester Oxfordshire. The proposal is to develop the land surrounding the farm for a variety of end uses, including residential and light industrial. The site investigation is required to ascertain whether the site is suitable for the proposed use and any remedial works that may be required.

This Report gives an assessment of the underlying ground conditions together with the possible problems that may occur as a result of the proposed scheme. This includes recommendations on foundation design, the potential for material re-use and an assessment of potential contamination of the site.

#### 2. EXISTING INFORMATION

Information on sub-surface data has been obtained from the British Geological Survey Sheet SP52SE Geological Map <sup>(1)</sup>. Reference has also been made to the Pell Frischmann Desk Study <sup>(7)</sup> with respect to records of previous land use and potential contamination from sources either on or adjacent to the site.

#### 3. SITE DESCRIPTION

The site is of generally low relief with a gradual fall to the Southeast. Land use was seen to be wholly agricultural, with fields surrounding the buildings of Whitelands Farm. Small stands of trees occurred across the site. Two main open drainage ditches were noted. One in the south eastern area of the site appeared to originate within the site boundary and exited the site in a south east direction. The other entered the site on the northern boundary and exited in an approximately east south east direction. At the time of the survey, the majority of the site was being used for crop production, with minor areas in the north eastern corner and immediately north west of Whitelands Farm being given over to livestock.



The backfilled quarry in the north western corner of the site did not show any significant surface features other than a slightly darker topsoil with occasional ash and clinker fragments compared to the surrounding areas.

An area of obviously disturbed ground in the north western corner of the site was noted during the ground investigation, forming shallow depressions and low rounded mounds. Exploratory boreholes were undertaken to investigate these features.

# 4. SITE HISTORY AND DEVELOPMENT

Based on current and historical Ordnance Survey maps obtained for the Desk Study and dating from 1884/1885, it was considered that the site was unlikely to be affected by a legacy of industry. Only two areas of potentially significant contaminating activities were identified either on or in the vicinity of the site.

In the north west corner of the site there is an infilled quarry which covers an approximate area of 500 square metres. From discussions with the Farmer for the site, Mr Alan Woodley, it is understood that the material disposed of, originated from nearby military premises and comprised mainly ash from burnt waste, with scrap vehicle parts. This quarry was accurately delineated during the ground investigation.

To the north east of the site there is an existing petrol filling station. Historical and current maps identified that the remainder of the site has comprised agricultural land throughout the period between 1884/1885 and the present.

During the ground investigation it became clear that there had been a further unrecorded area of quarrying activity in the north eastern area of the site. From the exploratory hole data, it appears that this activity comprised the shallow excavation of the weathered upper surface of the Forest Marble limestone, with larger blocks of stone being removed and the finer granular materials forming discard. These small spoil mounds gave a gently undulating surface to the area. There was also a suggestion of lime burning activity in one of the excavations, with some white calcined limestone noted within the generally fine grained granular material.



#### 5. GEOLOGY AND HYDROGEOLOGY

#### 5.1 Geology

Published geological information (1) indicates this area to be underlain by rocks of the Jurassic Period with limited overlying superficial deposits.

The superficial deposits, in the vicinity of the site, are recorded as Quaternary in age and comprise localised deposits of Alluvium, which generally follow the route of the local streams.

Based on the geological map of the area, the solid rocks under the site comprise the following (youngest first):

- Kellaways Clay
- Cornbrash
- Forest Marble Formations.

The Cornbrash Formation generally covers the northern areas of the site, with other smaller outcrops towards the south eastern boundary and typically comprises grey and yellow brown rubbly limestones. The Forest Marble Formation is present as a small outcrop in the north east corner of the site and generally comprises interbedded grey flaggy mudstone and sandy limestones. The Kellaways Clay Members present in the southern of the site comprises dark grey mudstones.

The ground investigation was able to penetrate the weathered upper surfaces of these formations, the Cornbrash being recovered as a sandy silty gravel, the Forest Marble Formations as either a coarse gravel (where limestone) or a stiff to very stiff clay (where mudstone) and the Kellaways Clays as a firm to very stiff clay.



#### Hydrogeology 5.2

The Environment Agency classifies inland waterways (rivers and canals) according to the General Quality Assessment scheme (GQA). The GQA scheme is designed to provide an accurate and consistent assessment of the state of water quality changes over time. The chemistry GQA describes quality in terms of three chemical measurements, which detect the most common types of organic pollution.

The nearest surface watercourse to the site is Gagle Brook, which lies approximately 50 to 100m south of the site. There are also two on-site streams or drainage ditches, which drain into an off-site drain lying approximately 350m east of the site. Gagle Brook and the on-site drains are not classified, however the unnamed off-site drain to the east has a GQA of Grade D (Fair).

The Environment Agency (EA) Groundwater Vulnerability Map and Regional Appendices, which make up part of the published 'Policy and Practice for the Protection of Groundwater', divide the underlying strata in England and Wales into major, minor and non aquifers dependent upon their potential for potable water supply.

The underlying Combrash and Forest Marble Formations are classified as a minor aquifer with the Kellaways Clay Formation classified as a non-aquifer.

There are four licensed groundwater or surface abstractions located within 500m of the site, one being on the site adjacent to Whitelands Farm. Three of the abstractions are to provide water for general agricultural use in adjacent farms whilst the fourth is the water supply for the adjacent caravan site.

There are two consents to discharge, one in the north east corner of the site and the second approximately 750m east of the site adjacent to the sewage treatment works.



#### 6. FIELDWORK

#### 6.1 General

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The ground conditions were determined by drilling cable percussion boreholes and excavating trial pits. Selected samples taken from the exploratory holes were subsequently used to undertake geotechnical and chemical laboratory testing.

The fieldwork was carried out between 7th and 22nd August 2001.

The ground investigation was carried out in general accordance with BS5930: 1981 "Code of Practice for Site Investigations" and was supervised by technical staff from Pell Frischmann Consultants Ltd. Pell Frischmann Consultants Ltd originally specified the locations and depths of the exploratory holes and pits. These were modified during the site works due to harvesting activities leading to access restrictions at various times across the site. The exploratory hole and pit locations are indicated in Figure 1.

#### 6.2 Cable Percussion Boreholes

A total of eleven boreholes with a nominal diameter of 150mm were drilled by light cable percussion techniques to depths of between 1.5 metres and 5 metres below existing ground levels.

During the course of cable percussion boring, small (jar), large disturbed (bulk) and water samples were obtained for identification and classification purposes. In addition, 100mm nominal diameter undisturbed samples were obtained in cohesive soils using standard open drive sampling equipment.

In granular soils, cohesive soils and weathered bedrock, in situ Standard Penetration Tests (SPT's) were performed in accordance with BS 1377: Part 9 to provide an indication of the relative density and shear strength of the materials. The results, uncorrected for the effects of overburden pressure, are presented on the Borehole Records in **Appendix 1**.



A water-monitoring standpipe was installed in one borehole, BH9. The boreholes did not encounter groundwater during drilling operations.

The remainder of the boreholes were backfilled with arisings on completion.

#### 6.3 Trial Pits

A total of 110 trial pits were dug using a Komatsu backactor excavator. The pits were taken to a maximum depth of 3m below the existing ground level.

During the course of trial pitting, both soil and water samples were obtained for identification, classification and chemical testing purposes. In addition in-situ CBR and vane shear tests were carried out where applicable. The trial pits were then backfilled with the arisings.

#### 6.4 Exploratory Hole Records

The depths and descriptive details of all strata encountered, together with details of all samples recovered are presented on the Exploratory Hole Records in **Appendix 1**. The strata descriptions are based upon in-situ observations and examination of the samples by an Engineering Geologist and take into account the results of laboratory testing.

The descriptions are in general accordance with the requirements of BS 5930:1999<sup>(3)</sup>.



# 7. GROUND CONDITIONS

# 7.1 Strata Encountered

A summary of approximate areas of the different soils and rocks encountered is given in Figure 2. These broadly follow the arrangement of the geological map for the area, although it should be noted that our site investigation does not represent a detailed mapping exercise and that a degree of simplification has been adopted, with conditions being considered primarily in engineering terms.

The boundaries given in Figure 2 are generally estimated between widely spaced exploratory holes and should thus be regarded as only indicative. Further detailed investigation of individual plots would be required to confirm this initial estimate.

#### (i) Made Ground

The strata encountered generally confirmed the published geology of an area of made ground in the north west of the site, with the addition of made ground in the north eastern area of the site and other probably localised areas of fill in the central eastern area of the site.

Between 1.65m and 2.45m of granular made ground was identified in the north west of the site, predominantly comprising ash fill with much glass and metal fragments. Some larger pieces of metal were identifiably vehicle engine parts. The glass, including some intact bottles, showed some evidence of melting, indicating high temperature combustion in the past.

Made ground in the north eastern area of the site was largely a fine sandy silty clayey gravel, although a 1.3m thick layer of soft to firm cohesive material with plant remains was encountered in one trial pit, TP84.



Probable localised areas of fill were identified in the central eastern area of the site in Trial Pits 76 and 76B, comprised largely cohesive materials between 2.1m and 2.5m deep. Trial pit 76B was extended in a north east to south west direction and appeared to show a shallow channel in the underlying limestone, infilled by clay. This could represent either an infilled drainage ditch or formally unrecorded shallow limestone quarry, similar to those identified elsewhere on the site.

#### (ii) Alluvial Deposits

Alluvial deposits were encountered in the south eastern area of the site comprising predominantly sand between 1m and 1.8m thick, and in the north eastern corner as a thin layer of soft clay and peat to less than 1m depth below ground level.

#### (iii) Kellaways Clay

Kellaways Clay was encountered in much of the southern and south western area of the site. This comprised predominantly stiff clay (highly to completely weathered mudstone) between 0.5m and 2.5m thick, and either gradually becoming a weak to very weak mudstone with increasing depth or was underlain by limestone (the Combrash).

#### (iv) Combrash

Combrash was encountered in the much of the northern area of the site. This comprised predominantly coarse granular material (highly to completely weathered limestone) between 0.5m and 2.5m thick, and either was underlain by generally moderately weak to moderately strong limestone or a stiff to very stiff clay, this representing completely weathered mudstone of the Forest Marble Formation. Grading results for the Combrash identified a range from a silty sandy gravel to a very clayey very silty sandy gravel.



# (v) Forest Marble

Forest Marble Formation was encountered in the north eastern area of the site and underlying the Combrash where the base of this layer was penetrated. The Forest Marble Formation comprised either a moderately strong light grey limestone, (weathered to a granular material on the upper surface) or a predominantly stiff to very stiff clay (highly to completely weathered mudstone). The clay was found to be between 0.5m and 2.5m thick, becoming a weak mudstone with increasing depth, with occasional beds of moderately weak siltstone. Grading results for the Cornbrash identified a range from a silty sandy gravel to a very clayey very silty sandy gravel.

#### 7.2 Groundwater

Groundwater was encountered in a number of trial pits across the site, but its occurrence was intermittent, being present in some pits but absent in adjacent ones. Water inflow was generally restricted to a seepage and a delay of up to an hour was often required to allow sufficient water to collect to enable a sample to be obtained.

A very minor seepage (reported as the borehole becoming damp) was noted in made ground in Borehole 1. The majority of groundwater encountered was as seepages either within the Cornbrash or at the interface between this and the underlying Forest Marble mudstones.

Water in the form of both a seepage and a moderate inflow was encountered at the interface between the suspected clay fill and Cornbrash, in trial pits TP 76 and TP 76B

Both seepages and moderate inflows were noted in the weathered upper surface of the Forest Marble in the north east corner of the site, although this is considered to be a local feature, attributable to the proximity of drainage ditches in this area.

The water strikes are considered to represent perched water, generally within the Cornbrash.

It should be noted that groundwater levels may be subject to seasonal and other variation.



A summary of groundwater strikes is tabulated below in Table 1:

Exploratory	Depth Water	Depth Water Rise	Comments
Hole	Encountered (m)	(m)	
BH1	1.3	None	Very minor seepage in made ground
ВН2	3.0	None	Very minor seepage at interface Combrash
			and underlying Forest Marble clay
BH11	1.0	None	Seepage from Combrash
TP14A	1.8	None	Seepage at interface Combrash and
		. •	underlying Forest Marble clay
TP15A	1.0	None	Seepage from Cornbrash
TP16	1.5	None	Seepage from sandy lenses in Forest Marble
			clay
TP17	1.1	None	Seepage at interface Combrash and
			underlying Forest Marble clay
TP36	0.5	None	Seepage from Cornbrash
TP47	1.0	None	Seepage from Cornbrash
TP52	2.0	None	Seepage from Cornbrash
TP59	1.8	None	Seepage from Cornbrash
TP71	0.9	None	Seepage from Cornbrash
TP76	2.5	1.7 after30 mins.	Moderate inflow at interface clay fill and
			underlying Cornbrash
TP76B	2.1	2.0 after 20 mins.	Seepage at interface clay fill and underlying
		~ "	Combrash
TP83	0.8	0.6 after 20 mins.	Moderate inflow close to interface of gravel
			and underlying Forest Marble limestone
TP89A	0.9	None	Seepage at interface clayey gravel and
			underlying Forest Marble limestone
TP89B	0.9	0.45m in 30 mins.	Moderate inflow close to interface of gravel
			and underlying Forest Marble limestone

Table 1 Groundwater Encountered by Exploratory Holes



#### 8. LABORATORY TESTING

A programme of laboratory testing was prepared by Pell Frischmann Consultants. Engineering tests were carried out by Thyssen Geotechnical and chemical tests by ECOS Ltd. All engineering test results and chemical test data are presented in **Appendix 2**.

#### 8.1 Engineering Tests

A programme of geotechnical testing was undertaken on selected bulk, small disturbed and undisturbed soil samples recovered from the exploratory holes. Testing was carried out in general accordance with BS 1377:1990<sup>(4)</sup> and comprised:

- Natural Moisture Content
- Atterberg Limits
- Particle Size Analysis
- Ouick Undrained Triaxial Test on Undisturbed Samples
- Quick Undrained Triaxial Test on Remoulded Samples
- One Dimensional Consolidation Test
- pH Value
- Sulphate Content
- 2.5kgCompaction Tests (Dry Density/Moisture Content Relationship)
- 4.5kgCompaction Tests (Dry Density/Moisture Content Relationship)
- California Bearing Ratio Tests at Natural Moisture Content
- California Bearing Ratio Tests at Each Compaction Point



#### 8.2 Chemical Testing

A programme of chemical testing was undertaken on 58 selected soil samples recovered from the exploratory holes. Leachate tests were also undertaken on 11 of the soil samples to determine the potential mobility of any contaminants identified.

Soil samples obtained were analysed for the following determinants:

Arsenic	Lead	Cyanide
Boron	Mercury	Thiocyanate
Cadmium	Nickel	Selenium
Chromium	DRO	Zinc
Copper	pН	Phenol
Sulphate	Sulphide	Sulphur
РАН	Pesticide Suite	Leachate

A programme of chemical testing was undertaken on 11 selected water samples recovered from the exploratory holes to assist in identifying any potentially mobile contaminants.

Water samples obtained were analysed for the following determinants:

-Arsenic	Lead	Cyanide	
Boron	Mercury	Thiocyanate	
Cadmium	Nickel	Selenium	
Chromium	DRO	Zinc	
Copper	рН	Phenol	
Sulphate	Sulphide	Sulphur	
PAH	Chloride	PCB	
Ammoniacal Nitrogen	Total Organic Carbon		



# 9. ENGINEERING CONSIDERATIONS

#### 9.1 Ground Conditions

#### (i) General

The investigation has identified that the site is underlain by Cornbrash, Kellaways Clay and Forest Marble, with limited areas of alluvium and made ground, as detailed in Section 7 of this report. An indicative plan showing their possible distribution is given in Figure 2. The engineering properties of these groups are considered below.

#### (ii) Made Ground

Between 1.65m and 2.45m of granular made ground was identified in the north west of the site, predominantly comprising ash fill with SPT 'N' values ranging from 1 to 20 (very loose to medium dense). The higher values are probably due to larger obstructions within the fine ash material and thus should be treated with caution. It is recommended that the lower bound 'N' value is assumed for the purposes of design and that the whole deposit is assumed to be very loose.

Made ground in the north eastern area of the site was largely a fine sandy silty clayey gravel, although a 1.3m thick layer of soft to firm cohesive material with plant remains was encountered in one trial pit, TP84. From observations during excavation, the granular material should be assumed to be very loose and the cohesive fill treated as a soft organic clay.

Probable localised areas of fill were identified in the central eastern area of the site and comprised largely cohesive materials. A single test on a sample of clay from TP76 has a low plasticity (CL on the Casagrande Plasticity Chart). Although described as a stiff clay in the trial pits, this type of material can be subject to considerable lateral variation, therefore conservative assumptions are recommended for design.



# (iii) Alluvial Deposits

Alluvial deposits were encountered in the south eastern area of the site predominantly as a thin layer of sand, and in the north eastern corner as a thin layer of soft clay and peat.

The cohesive soils were found to have a high to extremely high plasticity (H to EH on the Casagrande Plasticity Chart). Shear strength values of 30 kN/m $^2$  were obtained from vane tests. The shear strength from a remoulded triaxial test (Cu<sub>rem</sub>) was found to be only 9 kN/m $^2$ .

#### (iv) Kellaways Clay

Kellaways Clay was encountered in much of the southern and south western area of the site. This comprised predominantly stiff clay (highly to completely weathered mudstone) and either gradually becoming a weak to very weak mudstone with increasing depth or was underlain by limestone (the Cornbrash).

The cohesive soils were found to have a high to very high plasticity (CH to CVH on the Casagrande Plasticity Chart). Shear strength values of in excess of 130 kN/m<sup>2</sup> were obtained from vane tests. The shear strength from a triaxial test (Cu) was  $71kN/m^2$ . The shear strength from a remoulded triaxial test (Cu<sub>rem</sub>) was found to be  $227kN/m^2$ .

# (v) Cornbrash

Cornbrash was encountered in much of the northern area of the site. This comprised predominantly coarse granular material (highly to completely weathered limestone) and was either underlain by generally moderately weak to moderately strong limestone or a stiff to very stiff clay, this representing completely weathered mudstone of the Forest marble Formation. This clay gradually became a weak mudstone with increasing depth, with occasional beds of moderately weak siltstone.



SPT 'N' values of between 20 and 60 were obtained in the weathered Combrash (medium dense to very dense).

#### (vi) Forest Marble

Forest Marble Formation was encountered in the north eastern area of the site and underlying the Combrash where the base of this layer was penetrated. The Forest Marble Formation comprised either a moderately strong light grey limestone, (weathered to a granular material on the upper surface) or a predominantly stiff to very stiff clay (highly to completely weathered mudstone, becoming a weak mudstone with increasing depth, with occasional beds of moderately weak siltstone).

The granular weathered surface of the limestone was generally less than 1m in thickness and assessed as dense to very dense from observations during excavation.

The cohesive materials were found to have an intermediate to high plasticity (CI to CH on the Casagrande Plasticity Chart). Shear strength values of in excess of 130 kN/m² were obtained from vane tests. The shear strength from triaxial tests (Cu) varied between 96kN/m² and 173kN/m².

#### 9.2 Foundation Assessment

Foundation design has at this stage been limited to a general assessment, identifying the suitable foundation types that can be adopted, an allowable bearing pressure for a pad footing and general advice. Individual structures should be reassessed when final locations, loadings and settlement requirements are known.

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The made ground in the back-filled quarry area would not be suitable as a founding medium for pad footings, however, it is understood that this area is currently identified for a roundabout and access road. This is discussed further in Section 9.3 of this report.

For the area of made ground associated with shallow working of the weathered limestone in the north eastern area of the site, the material was predominantly granular, with intact



limestone beneath. Individual footing loads should be taken through the made ground layer and onto the limestone beneath. Proof rolling of the made ground and removal of any soft spots or cohesive fill should be sufficient for most types of ground bearing slabs, although this recommendation should be reviewed if a low settlement tolerance or high slab loads are required (such as occurs with large distribution warehouses).

The alluvial deposits encountered in the extreme north eastern corner of the site include soft clays, peat and organic clay. These will not be suitable as a founding medium and should be removed from beneath building footprints and in the case of the peat, also from beneath areas of hardstanding. The limited thickness of these materials means that significant excavation is unlikely, although provision for groundwater control in the base of excavations may be required.

For the remainder of the site the weathered Combrash, Forest Marble Formation and Kellaways Clays should be suitable for shallow foundations for residential and most light industrial or similar structures.

For the Kellaways Clay, an assessment of the bearing capacity has been made using the shear strength data. An allowable bearing pressure of at least 180kN/m² has been calculated for a 2m x 2m plan area footing, for a settlement of less than 25mm.

For the Combrash and granular Forest Marble, an assessment of the bearing capacity of the weathered upper surface of the limestone has been made, modelling the material as a granular soil. An allowable bearing pressure of at least  $450 \text{kN/m}^2$  has been calculated for a 2m x 2m plan area footing, for a settlement of less than 25mm.

For foundations taken down into the unweathered limestone beneath, An allowable bearing pressure of at least  $600 \text{kN/m}^2$  can be adopted for a 2m x 2m plan area footing, for a settlement of less than 25mm.

For the cohesive Forest Marble, an assessment of the bearing capacity has been made using the shear strength data. An allowable bearing pressure of at least 240kN/m² has been calculated for a 2m x 2m plan area footing, for a settlement of less than 25mm.



#### 9.3 Pavement Assessment

The subgrade will generally consist of the weathered upper surface of the Kellaways Clay, Cornbrash and to a lesser extent, the Forest Marble. Localised areas of made ground are also identified.

#### (i) Made Ground

The loose granular ash fill in the backfilled quarry at the north western edge of the site should respond well to proof rolling, with the removal of any soft spots. A CBR up to approximately 5% is advised, hence a sub-base thickness of 225mm or a 250mm capping with 150mm sub-base is recommended for this type of material.

It is strongly recommended that these materials are not trafficked during periods of wet weather as they could rapidly break down to a slurry. It should be noted that there is still a potential for differential settlement or reflective cracking at the quarry 'high walls' therefore it is recommended that any roads or hardstanding incorporate a geogrid reinforcement beneath the sub-base.

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For the area of made ground associated with shallow working of the weathered limestone in the north eastern area of the site, the material was predominantly granular, with intact limestone beneath. Proof rolling of the made ground and removal of any soft spots or cohesive fill should be sufficient to ensure a CBR of 15%. Based on Figure 3.1 of the Department of Transport HD25/94<sup>(5)</sup> Design Manual for Roads and Bridges, a sub-base thickness of 150mm is recommended for this type of material.



With respect to the localised cohesive fill materials encountered in TP68, TP76 and TP76B, a CBR of 3% is recommended based on in-situ CBR testing and a conservative assessment, given the nature of the material. Based on Figure 3.1 of the Department of Transport HD25/94<sup>(5)</sup> Design Manual for Roads and Bridges, a sub-base thickness of 300mm or a 350mm capping with 150mm sub-base is recommended for this type of material.

#### (ii) Alluvium

The alluvial deposits encountered in the extreme north eastern corner of the site include soft clays, peat and organic clay. The soft clays should either be removed or replaced, or a design for a CBR of 1% be adopted. Based on Figure 3.1 of the Department of Transport HD25/94<sup>(5)</sup> Design Manual for Roads and Bridges, a 600mm capping with 150mm sub-base is recommended for this type of material.

Should this latter option be considered, the use of geogrid reinforcement is likely. Any peat should still be removed from beneath proposed roads and areas of hardstanding.

The soils in the south eastern area of the site were identified predominantly as sands. Subject to proof rolling, with the removal of any soft spots, a CBR of at least 10% should be achieved. Based on Figure 3.1 of the Department of Transport HD25/94<sup>(5)</sup> Design Manual for Roads and Bridges, a sub-base thickness of 175mm or a 190mm capping with 150mm sub-base is recommended for this type of material. Due regard nevertheless should be given to the relatively high fines content of this material and potential frost susceptibility with respect to final construction thickness.



#### (iii) Kellaways Clay

With respect to the Kellaways Clay in the southern half of the site, laboratory CBR tests and in-situ CBR tests by Mexe Probe indicated a CBR of 5% should be adopted for design purposes. Based on Figure 3.1 of the Department of Transport HD25/94<sup>(5)</sup> Design Manual for Roads and Bridges, a sub-base thickness of 225mm or a 250mm capping with 150mm sub-base is recommended for this type of material.

#### (iv) Cornbrash

With reference to the laboratory CBR tests, a CBR of greater than 15% should be achieved on Cornbrash, this occurring predominantly in the northern half of the site. Based on Figure 3.1 of the Department of Transport HD25/94<sup>(5)</sup> Design Manual for Roads and Bridges, a sub-base thickness of 150mm is recommended for this type of material. Due regard nevertheless should be given to the relatively high fines content of this material and potential frost susceptibility with respect to final construction thickness.

Given the relatively high fines content of some of this material, it is recommended that exposure to rainfall or surface water is minimised. A moisture content increase could lead to deterioration of the subgrade and an attendant reduction in CBR. Similarly, tracking of the subgrade should be avoided in periods of wet weather. Provision should also be made for the removal of localised 'soft spots' and replacement by suitable granular fill.

#### (v) Forest Marble

With reference to the laboratory CBR tests, a CBR of greater than 15% should be achieved on the granular Forest Marble, this occurring predominantly in the north eastern corner of the site. Based on Figure 3.1 of the Department of Transport HD25/94<sup>(5)</sup> Design Manual for Roads and Bridges, a sub-base thickness of 150mm is recommended for this type of material. Due regard nevertheless should be given to



the relatively high fines content of this material and potential frost susceptibility with respect to final construction thickness.

As with the Cornbrash, given the relatively high fines content of some of this material, it is recommended that exposure to rainfall or surface water is minimised. A moisture content increase could again lead to deterioration of the subgrade and an attendant reduction in CBR. Similarly, tracking of the subgrade should be avoided in periods of wet weather. Provision should also be made for the removal of localised 'soft spots' and replacement by suitable granular fill.

With respect to the cohesive Forest Marble, this generally underlies the Combrash in the northern half of the site, laboratory CBR tests indicated a CBR of 8% chould be adopted for design purposes. This is supported by in-situ CBR tests by Mexe Probe. Based on Figure 3.1 of the Department of Transport HD25/94<sup>(5)</sup> Design Manual for Roads and Bridges, a sub-base thickness of 190mm or a 210mm capping with 150mm sub-base is recommended for this type of material.

This material is generally below a layer of Combrash and thus may not in the majority of cases form the subgrade. However, if road levels are required to be deeper than the existing ground levels, the reduction in CBR compared to the overlying Combrash should be borne in mind.

#### 9.4 Excavations and Material Re-use

From observations during the trial pitting exercise, it is considered that excavations in most conditions will generally be stable, and the presence of hard strata at shallow levels will limit the depth of excavation over much of the site. Therefore a requirement for provision of temporary support or battering back of excavation sides is unlikely for the majority of development.



An assessment of the suitability of the various material groups is given below for use as general fill materials. It should be noted that the gradings obtained means that much of the granular material will be unlikely to achieve the relatively high specifications required for specialist fills, such as those required for drainage media or fill behind structures.

#### (i) Made Ground

The vast majority of made ground is unlikely to be able to be re-used as an engineered fill, other than as a Class 4 Landscaping Fill in accordance with the Department of Transport Specification<sup>(6)</sup>. It may be possible to re-use the stiff clays encountered in TP76 and TP76B as a Class 2B general fill, although with the potential for variation within such materials, further testing would be required before such an assumption could be adopted for design. Due regard should also be given to the recommendations given in Section 10 of this report with respect to contamination.

#### (ii) Alluvium

The majority of alluvial materials are also unlikely to be able to be re-used as an engineered fill, other than as a Class 4 Landscaping Fill in accordance with the Department of Transport Specification<sup>(6)</sup>.

The thin layers of alluvial sand in the south eastern area of the site may prove to be usable as a Class I fill, but the majority of this area is currently in the area identified as 'open space'.

#### (iii) Kellaways Clay

For the cohesive weathered Kellaways Clay materials, it is estimated that approximately 70% of this material should be suitable as a Class 2A or 2B general fill material in accordance with the Department of Transport Specification<sup>(6)</sup>, the majority of the remainder being too wet of the soils plastic limit.



#### (iv) Combrash

For the weathered Cornbrash materials, it is estimated that approximately 55% of this material should be suitable as a Class 1A or 1B general fill material in accordance with the Department of Transport Specification<sup>(6)</sup>, the remainder again having too high a fines (silt and clay) content. Although failing the criteria for this specification, as for the granular Forest Marble, we are of the opinion that a greater proportion of the material may be re-usable as an engineered fill, subject to a field trial. This would involve the laying of a test panel, followed by measurement of in-situ dry density and moisture content by Nuclear Density Gauge. Dependent on end –use requirements, the test panel could also be subjected to plate bearing tests to confirm acceptable compaction and performance.

#### (v) Forest Marble

For the cohesive weathered Forest Marble Formation materials, it is estimated that approximately 75% of this material should be suitable as a Class 2A or 2B general fill material in accordance with the Department of Transport Specification<sup>(6)</sup>, the majority of the remainder being too wet of the soils plastic limit.

For the granular weathered Forest Marble Formation materials, it is estimated that approximately 60% of this material should be suitable as a Class 1A or 1B general fill material in accordance with the Department of Transport Specification<sup>(6)</sup>, the remainder having too high a fines (silt and clay) content. Although failing the criteria for this specification, we are of the opinion that a greater proportion of the material may be re-usable as an engineered fill, subject to a field trial. This would involve the laying of a test panel, followed by measurement of in-situ dry density and moisture content by Nuclear Density Gauge. Dependent on end –use requirements, the test panel could also be subjected to plate bearing tests to confirm acceptable compaction and performance.



Particular care is needed in using the cohesive materials identified for earthworks, in both the Kellaways Clays and the cohesive Forest Marble. Their sensitivity to increase in moisture content is demonstrated by the CBR test results, where a rapid decline in CBR % is shown for only a slight increase in moisture. Delays following exposure and working during wet weather should both be expressly avoided.

For the granular materials, heavy compaction plant is likely to ensure sufficiently low air voids. The use of vibrating rollers is not recommended given the relatively high silt content, particularly if the more marginal materials are intended for re-use.

#### 9.5 Shrinkage and Swelling

The test data indicates that the cohesive deposits are generally intermediate to high plasticity. It is recommended that a high shrinkability classification be adopted (NHBC Standard Building Near Trees Chapter 4.2). If foundations are to be placed on this material the guidelines of this standard should be followed with regard to foundation depths and the planting of trees.

#### 9.6 Sulphate Assessment

As part of the site screen potential for contaminants, tests included for total sulphate content. Results show the total soil sulphate content to be below 0.24% SO<sub>4</sub>, except within the ash fill materials encountered in the backfilled quarry at the north western corner of the site and one anomalous result at TP68. The pH results varied between 6.3 and 8.4 but were generally in excess of 7.

Tests on 11 groundwater samples showed sulphate levels to be well below  $0.4 \text{ g/l SO}_4$  and pH to be between 7.2 and 7.9.

A total of 14 soil samples of near surface deposits were tested for 2:1 water/soil extract sulphate content and pH. Results show the 2:1 water/soil extract sulphate content to be below 0.4 g/l SO<sub>4</sub> except again within the ash fill materials encountered in the backfilled quarry at the north western corner of the site. The pH varies between 7.2 and 8.5.



For the ash fill material, the sulphate results fall into Class 2 of BRE Digest 363, 1996 (2). As discussed further in Section 10, the anomalous data from TP68 should be subjected to an additional limited site investigation. For the remainder of the site, the sulphate results fall into Class 1 of BRE Digest 363 in terms of soil and groundwater results.

#### 9.7 Drainage

With respect to the excavation for site drains and other services, due regard should be given to the difficulties experienced by the excavator during the trial pitting exercise. Design should take account of the final levels identified in each of the logs. Attempting to dig below these levels may require the breaking out of rock.

It is understood that soak-away drainage is being considered for the site. To this end the permeability of the Cornbrash has been investigated using the laboratory grading data and a limited programme of soak-away tests in trial pits.

From the grading curves, a range of permeability has been calculated. For Combrash this varies from 1x10<sup>-5</sup>mm/s (typical of a silt) to 9x10<sup>-3</sup>mm/s (typical of a fine sand/coarse silt). This material would not be considered ideal for a soak-away drainage design, both in terms of performance and because of the risk of a loss of fines leading to silting up of the pit and even possible local subsidence.

The soakaway tests in trial pits are summarised overleaf in Table 2 with an average of the volume of water lost from each pit per minute:

0,00,000 min /6.00.00 min /0.006.00



Exploratory Hole	Average Water Loss	Average Water Loss
	m³/min.	Litres/min (Approx.)
TP45	0.010	10
TP46	0.115	115
TP56	0.050	50
TP64	0.005	5
TP65	0.012	12
TP73A	0.010	10

Table 2 Summary of Soak-away Tests

We have reservations with regard to adopting soak-aways as the main method of drainage on the site.

Firstly, the layer for drainage to occur in is likely to be restricted to the relatively thin Cornbrash layer, this at least in part being bounded above and below by weathered mudstones, giving an essentially impermeable cap and base to this layer. The capacity of this layer could thus be severely restricted. ٠

Secondly, it is understood that high groundwater levels can occur during the winter, based on discussions with the Farmer for the site, Mr Alan Woodley, who has observed water levels within approximately 0.5m below ground level during new drainage ditch excavation. This could in effect turn soak-aways into ponds during the period of maximum demand on the drainage system.



#### CONTAMINATION ASSESSMENT 10.0

#### General 10.1

Initial desk study information indicated no previous potentially contaminative use on or immediately adjacent to the site, other than a small quarry in the north west comer and a petrol station on the eastern boundary. The selection of samples for contamination testing was based on concentrating tests on these areas and any other suspected made ground, together with a general screen across the site.

The chemical analysis was undertaken by ECOS Ltd, a UKAS accredited laboratory with specialised testing expertise.

In order to interpret analytical results it is common practice to compare them with the various guidelines published across the UK and within Europe. These guidelines act as an aid and are by no means definitive and any judgement must be based on a source - pathway - target analysis. These guidelines include the UK Interdepartmental Committee on the Redevelopment of Contaminated Land (ICRCL) published in Guidance Note 59/83, UK Water Supply (Water Quality) Regulations (1989) and the soil and groundwater guidelines published by the Dutch authorities as the Dutch Intervention Levels.

The ICRCL values provide the most appropriate guidance in the UK and are primarily intended as a guide to site re-development. They were first published in 1983 and use the concept of 'trigger' and 'action' concentrations of contaminants in soil, which are related to the intended end use of the site. The concentrations are related to the sensitivity of the site. However ICRCL values relate to soil only and cover a limited range of contaminants.

Therefore, it is common practice to use either the Dutch value, or where there are threshold concentrations specified, the Department of the Environment concentrations (set out in Waste Management Paper 4 for the 'completion of landfill sites') for the assessment of groundwater contamination. The Dutch value may also be adopted for assessing soil contaminants for which there are no ICRCL guidelines.



The Dutch Intervention Levels are based on a framework comprising two threshold values of increasing concentration, the 'desired/target' level and the 'action/intervention' level. These are defined as follows:

- The Target Level Not considered as hazardous or posing significant risk when concentrations occur below this level.
- The Intervention Level A threshold value above which remediation should be considered.

# 10.2 Analysis of Results

The following sections subdivide the findings of the chemical testing programme into heavy metals potentially hazardous to health, phytotoxins and a range of other organic and inorganic contaminants. Only those results considered significant are given in the following sections.

# 10.2.1 Heavy Metals

Selected samples from the trial pits and boreholes were submitted for analysis to establish the concentrations of Heavy Metals. Where results exceeded the Dutch Intervention values the samples are identified in Table 3, with the relevant metals highlighted.

		>55mg/le	4. 5	>530~0/	الان الان الان الان الان الان الان الان	
Trial Pit	Depth (m)	Arsenic mg/kg	Cadmium mg/kg	Lead mg/kg	Mercury mg/kg	Chromium mg/kg
TTI	0.5	68.5	3.1	701	<1	87.7
TT2	0.5	122.8	2.2	1227	1.5	55.8
TT2	1.0	77.8	2.7	749.5	<1	58.5
TT3	1.0	87.7	5.2	1332.5	2.8	55.5
TP68	1.5	231	<0.2	6.6	<1	62.5
TP75	0.3	103.6	0.4	8.3	<1	39.2
% of Total S	amples	10%	-	7%	-	-

TABLE 3: Heavy Metals potentially hazardous to health

Shaded boxes indicate concentrations in excess of Dutch Intervention Values



Six arsenic concentrations exceeded the intervention value of 55mg/kg, with four of the samples being ash from the landfill site on the north western corner of the site, the other two occurring towards the central eastern boundary.

Four lead concentrations exceeded the intervention value of 530mg/kg the samples again being ash from the landfill site on the north western corner of the site.

The high results for arsenic and lead represent contaminants within the ash materials, which was anticipated, elevated metals being common in ash fills. The elevated levels of arsenic in the two other locations are somewhat more problematic.

Trial Pit 68 did include a thin clinker like layer of material at the interface between limestone and overlying clay, which on initial examination appeared to be the upper surface of limestone having been subject to leaching out of carbonate. Having considered further these observations, together with an assessment of the test data, we consider that this material is made ground, although it is not clear at this stage as to the origins of these materials.

There was no evidence of unusual conditions at the second of these two sampling points, TP75. Tests in similar materials in the surrounding area and groundwater samples did not identify any significant levels of contamination.

These high arsenic results may only represent isolated 'hot spots' of contamination, but we would strongly recommend a further limited investigation of both these areas.

#### 10.2.2 Phytotoxic Metals

Soil samples were also submitted for analysis to establish the concentrations of phytotoxic metals, which can be detrimental to plants (namely copper, zinc and nickel). Where results exceeded ICRCL levels for phytotoxins or the Dutch Intervention values, the samples are identified in Table 4 overleaf, with the relevant metals highlighted.



Trial Pit No.	Depth (m)	Copper mg/kg	Nickel mg/kg	Zinc mg/kg
TT1	0.5	363.3	106	.2967
TT2	0.5	420.6	169.8	1660-Z
TT2	1.0	363.5	131.7	1237/28; <sub>***</sub>
TT3	1.0	327.2:	173.0	1679.7
TP68	1.5	57.8	161.7	271.4
% of Total Sar	nples	7%	9%	7%

# Key: Exceeding ICRCL Levels

Exceeding ICRCL Levels and Dutch Intervention Values

TABLE 4: Metals detrimental to plant growth

The results indicated that copper, nickel and zinc occurs at elevated levels only within the ash fill materials at the north western comer of the site, with a single elevated level at TP68 adjacent to the eastern boundary. Due regard should be given to the results if it is intended to use these materials in landscaping, by for example the use of a 500mm break layer of clean material between the fill and overlying topsoil. It is interesting to note however that the north western quarry area has been successfully used for crop growing, although this may reflect dilution of contaminants by ploughing and mixing with topsoil.

# 10.2.4 Other Organic and Inorganic Contaminants

Soil samples were also submitted for analysis to establish the concentrations of the following organic and inorganic contaminants: polyaromatic hydrocarbons, phenols, cyanide (total, free and complex), thiocyanate, sulphate, sulphide, sulphur and total petroleum hydrocarbons. Tests were also undertaken on selected samples for pesticides, PCBs and Diesel Range Organics. Only one result for one analyte from the entire site exceeded Dutch Intervention Values or ICRCL Action Limits, namely the sample from TP 68 at 1.5m depth, which gave an unusually elevated sulphate result of 14,027 mg/kg. This represents 3% of all samples tested and again may reflect a 'hot spot' of contamination.



# 10.2.5 Leaching Tests

Leaching tests were undertaken on 15 soil samples. All samples were analysed for 16 determinands comprising ammonia, arsenic, boron, cadmium, chromium, copper, lead, manganese, mercury, nickel, pH, total phenols, selenium, and zinc. No significant concentrations of contaminants were reported in these samples.

#### 10.2.5 Water Testing

Chemical tests were undertaken on 11 water samples. All samples were analysed for determinands comprising arsenic, cadmium, chromium, lead, mercury, selenium, boron, copper, nickel, zinc, PAH (total and 16 EPA1), total phenols, cyanide, thiocyanate, sulphate, sulphide and sulphur.

Selected samples were also tested for chloride, ammoniacal nitrogen, total organic carbon, diesel range organics and PCBs. These concentrated on the areas adjacent to the quarry waste in the north western corner of the site and also the suspected made ground area towards the eastern boundary of the site. Other tests were undertaken as a general site screen.

A single sample was also recovered from the water bore at Whitelands Farm to test the water table at depth. It is understood that this water is abstracted from approximately 40m below existing ground levels, within the Great Oolite.

No significant concentrations of contaminants were reported in these samples, indicating that mobile contaminants were not present either from an on site source or from one originating off site.



# 10.2.6 Material Disposal

With regard to the disposal of the material off-site, reference has been made to the Environment Agency publication 'Guidance on the Disposal of Contaminated Soils'. Under the disposal option identification flowchart in this publication, the majority of material from this site will require disposal in a suitably licensed or permitted site.

This is based primarily on levels of arsenic across the site. Although these are below the Dutch Intervention Values, the Environment Agency upper threshold value and do not exceed the leachability lower threshold values, they do exceed the Environment Agency lower threshold value of 10 mg/kg for the majority of samples recovered.

Reference has also been made to the contamination classes used by the Greater Manchester Waste Regulation Authority. This is used by a number of Local Authorities in the UK. The soil samples identified in Table 3 have been classified in accordance with this document. The results are summarised below in Table 5:

Trial Pit	Depth (m)	Arsenic mg/kg	Cadmium mg/kg	Lead mg/kg	Mercury mg/kg	Chromium mg/kg
TTI	0.5	C	В	В	A	Α
TT2	0.5	D	В	C	В	A
	1.0	C	В	B	. A	A
TT2	1.0	C	В	C	В	A
TT3	1.0	D	A	A	A	A
TP68	1.3	D		A	A	A
TP75	0.3	υ	A			

Class A: Uncontaminated

Class B: Slightly Contaminated

Class C: Contaminated

Class D: Heavily Contaminated

Class E: Unusually Highly Contaminated

TABLE 5: Heavy Metals potentially hazardous to health GMWRA Classification



The soil samples identified in Table 4 have also been classified in accordance with this document. The results are summarised below in Table 6:

Trial Pit No.	Depth (m)	Copper mg/kg	Nickel mg/kg	Zinc mg/kg
TTI	0.5	C	С	D
TT2	0.5	C	С	D
TT2	1.0	C	С	D
TT3	1.0	С	С	D
TP68	1.5	A	С	В

Class A: Uncontaminated

Class B: Slightly Contaminated

Class C: Contaminated

Class D: Heavily Contaminated

Class E. Unusually Highly Contaminated

TABLE 6: Metals detrimental to plant growth GMWRA Classification

Under the contamination classes used by the Greater Manchester Waste Regulation Authority, the materials sampled from the backfilled quarry would classify as either contaminated or heavily contaminated for arsenic, lead, copper and nickel, and slightly contaminated for mercury and cadmium. It is understood at present that the material is unlikely to be removed given the proposed construction of a roundabout over the area. We strongly recommend that this remains the case during the development of design.

The sample from TP75 at 0.3m depth classes as Class D Heavily Contaminated for arsenic.

The sample from TP 68 at 1.5m depth also classes as Class B Slightly Contaminated for zinc and Class D Heavily Contaminated for both arsenic and sulphate.

As stated previously, it is recommended that the areas these last two samples were taken from be investigated further, to delineate the suspected 'hot-spots' they represent.



Therefore, although not necessarily presenting a hazard whilst remaining on site, there is a strong possibility that the disposal of the materials identified above off-site may attract elevated rates and restrictions as to the suitable waste sites available. Should significant quantities of material need to be taken off-site, it is advised that the relevant waste regulatory authority is contacted in the first instance to ascertain the nearest suitable sites and the premiums charged on these materials.

# 10.2.7 General Comments for Construction Works

In general, good working practice should be sufficient to protect the workforce and public from the risk of hazards of contamination. In the event that any anomalous or suspect materials, water or odours are encountered, suspect material should be reported and professional advice sought.

These recommendations are subject to the findings of the limited additional investigation of the areas surrounding trial pits TP68 and TP75.



## 11.0 RECOMMENDATIONS AND CONCLUSIONS

It is proposed to develop the site for a variety of end-uses including residential, leisure, business and light industrial.

The investigation has identified that the site is underlain by Cornbrash, Kellaways Clay and Forest Marble, with limited areas of alluvium and made ground. An indicative plan showing their possible distribution is given in Figure 2.

A preliminary assessment of foundation types has been given for the anticipated ground conditions. Shallow footings are considered suitable for the site, only limited areas of made ground and peat with soft clays may require excavation from beneath foundation footprints and replacement by suitable granular fill.

Assessment of the sulphate content of the near surface in situ deposits shows that they fall into Class 1 of Table 1 of BRE 363, 1996<sup>(2)</sup>.

Soak-aways are considered unlikely to be a viable option as the main means of drainage for the site.

The majority of materials over the site are regarded as likely to be acceptable for re-use as general fill, with regard to the DTP Specification for Highway Works. Care will be needed to ensure moisture control is strictly adopted for the fill however, due to sensitivity to moisture content change.

For pavement design, a CBR of at least 15% is considered reasonable for the areas of the site underlain by Cornbrash and granular weathered Forest Marble, assuming proposed road levels remain close to existing. For areas underlain by Kellaways Clay, a CBR of 5% should be adopted for design.



With respect to contamination, we do not consider that the site presents a significant hazard to the proposed end-uses. Other than the provision of a clean break layer for landscaping or cover by hardstanding in limited areas, we do not consider special measures will be required, although disposal off site may attract additional costs. Should significant quantities of material need to be taken off-site, it is advised that the relevant waste regulatory authority is contacted to ascertain the nearest suitable site and the premiums charged on these materials.

High results for arsenic, lead and phytotoxins within the quarry backfill were anticipated, elevated metals being common in ash fills.

The elevated levels of arsenic and sulphate in TP68 and of arsenic in TP75 are somewhat These high results may only represent isolated 'hot spots' of more problematic. contamination, but we would strongly recommend a further limited investigation of both these areas.

No significant contamination was noted throughout the remainder of the site.

There is no evidence of any significant concentrations of mobile contaminants on the site or from any off site source.



## 12.0 REFERENCES

- 1. Geological Survey of Great Britain 1:10,000 Scale Geological Map. Sheet No SP52SE (Solid and Drift Edition).
- 2. Building Research Establishment, 1996. Sulphate and Acid Resistance of Concrete in the Ground. BRE Digest 363.
- 3. BS 5930:1999 Code of Practice for Site Investigation
- 4. BS1377:1990 Soils for Engineering Purposes
- 5. Department of Transport Design Manual For Roads and Bridges HD25/94
- 6. Department of Transport Specification For Highway Works Series 600
- 7. Pell Frischmann Consultants 2001. Phase 1 Desk Study for South West Bicester.



**FIGURES** 



## APPENDIX 1 EXPLORATORY HOLE LOGS

PELL FRISCHMANN CONSULTANTS LTD	. E	BOREH		Number				
ITE: Bicester	EQUIPMEN		BH1					
ELIENT: A D Woodley	GROUND LEVEL COORDINATE: 0.000 E: 0.00 N:				TES 1: 0.00		DATE	13/08/2001
STRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)			S/TES No	TS Test	INSTALLATIONS/ BACKFILL
TOPSOIL		0.50	.· .· .	<b>4.00</b>			and the second s	
MADE GROUND grey brown ash and clinker fill with much glass bottles, some metal and occasional pottery fragments. Glass showing signs of melting due to high temperatures in the past				1.06	D		19	
		2.00		2. <b>9</b> 6	D			
oft to firm brown sandy CLAY		2.50	V 1	2.50	D			
Stiff light brown grey sandy CLAY				3. <b>9</b> 6	D	A COMPANY TO A COM	45	
		3.45 3.50 3.60		3.50	D			
Moderately weak light brown LIMESTONE Weak grey MUDSTONE (Chiselling 3.45m to 3.6m		3.60			:			
1Hr) End of Borehole at 3.60 m		1						
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PELL FRISCHMANN CONSULTANTS LTD			Borehole Number					
SITE: Bicester	EQUIPME	NT AND ME	ETHODS:				Bl	12
CLIENT: A D Woodley	GROUND 0.000	LEVEL	E:	COORDIN 0.00	ATES N: 0.00	)	DATE	13/08/2001
STRATA DESCRIPTION	KEY	DEPTH	LEVEL		SAMPLES/TE:			INSTALLATION
TOPSOIL		(Thick)	(mAOD)		Туре	No	Test	BACKFILL
		0.30		•				
MADE GROUND grey brown ash and clinker fill with much glass bottles, some metal and occasional pottery fragments. Glass showing signs of melting due to high temperatures in the past				3	· .			
of melting due to high temperatures in the past			•	1. <b>9</b> 6	D		1	
						The state of the s		
				2. <b>9</b> 6	D		20	
		2.45			1			
soft light grey CLAY	_XXXXX	2.45 2.60		2.60				
Gravelly COBBLES of limestones Stiff grey CLAY	· · · · · · · · · · · · · · · · · · ·	2.80		2.80 3. <b>9</b> 6				
				1	1	-		
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Dark grey weak MUDSTONE (Chiselling 4.4m to 4.6m 1 Hr)				4. <b>9</b> 6	D		81	
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		4.60						
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LIENT: A D Woodley	GROUND L 0.000	EVEL	E: 0	COORDINA .00 1	TES V: 0.00		DATE	14/08/2001				
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TRATA DESCRIPTION	**************************************	(Thick)	(mAOD)	Depth 0.00	Туре	No	Test	BACKFILL				
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PELL FRISCHMANN CONSULTANTS LTD	BOREHOLE RECORD							Borehole Number				
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A D Woodley	0.000	SAMPLES/TE				S/TES	TS	INSTAL	LATIONS/			
RATA DESCRIPTION	KEY	DEPTH (Thick)	(mAOD)	Depth 0.00	Туре	No	Test	BAC	KFILL			
PSOIL		0.00	:	<b>U</b> .00								
avelly COBBLES of limestone			!									
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							29					
							25					
				2.06	D							
							31					
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		2.90		3. <b>9</b> 6	U							
tiff grey CLAY			:	0.00								
		3.50		3.50	D			-				
/eak grey MUDSTONE (Chiselling 4.8m to 4.9m 1 r)				4.00	D							
r)				4.00		 !						
						-  -	47					
		4.90		t .		!						
End of Borehole at 4.90 m		7.50	1		· !							
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Remarks							Sca	le				
TEST RESULTS ARE SPT N VALUES				•			1:50	jure	Sheet 1			

PELL FRISCHMANN CONSULTANTS LTD	BOREHOLE RECORD							Borehole Number				
SITE: Bicester	EQUIPMEN	T AND ME	THODS:				BH5					
CLIENT: A D Woodley	GROUND LEVEL COORDINATES 0.000 E: 0.00 N: 0.00					DATE	14/08/200	01				
STRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)	Depth	SAMPLE Type	S/TES	TS Test	INSTALLATIO BACKFILL				
TOPSOIL		0.00		0.00	В							
Firm stiff grey mottled yellow CLAY				1. <b>9</b> 6	U							
				1.50	D							
				2. <b>9</b> 6	D				:			
							20	-				
		2.90		2.90 3. <b>96</b>	מכמם							
Stiff blue grey CLAY  Weak dark grey (Chiselling 3.5m to 3.5m 1 Hr)		3.30 3.50	÷ ;	2.90 3. <b>00</b> 3.00 3.00	DD		26					
End of Borehole at 3.50 m												
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Remarks				in an armenter Miller Co.			Logge	ed by Chec	ked by			
TEST RESULTS ARE SPT N VALUES							Scale 1:50 Figu	Shee	et 1 of			
Notes: Malegials are described in accordance with BS 5930:1999 21 tepths and reduced levels are in metres. Thicknessess given in brackets in	depth column.											

PELL FRISCHMANN CONSULTANTS LTD	Е	Borehole Number								
SITE: Bicester	EQUIPMEN	NT AND ME	THODS:		-	ВН6				
CLIENT: A D Woodley	GROUND L 0.000	EVEL	E: 0	COORDINA 1.00		DATE	15/08/2001			
STRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)	Depth	SAMPLE Type	S/TES No	TS Test	INSTALLATIONS/ BACKFILL		
TOPSOIL		0.00		0.00						
Firm grey brown sandy CLAY		0.40								
				1.06	D		13			
Firm to stiff grey CLAY		1.70	1-	1.70 2. <b>0</b> 6	D U	١				
		2.50		2.50						
Light grey MUDSTONE (CHISELLING 2.5m TO 3.2m 1.5 hrs)			. !	3.00	P	,				
		3.60		3. <b>00</b> 3.60 3.60 3. <b>6</b> 6	ם מכם		78			
End of Borehole at 3.60 m		• • • • • • • • • • • • • • • • • • • •								
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Remarks							Logged Scale	Dy Checked by		
TEST RESULTS ARE SPT N VALUES							1:50 Figure	Sheet 1 of 1		
Notes: Majerials are described in accordance with BS 5930:1999. Diffepiths and reduced levels are in metres. Thicknessess given in brackets in c	depth column.					-				

(Th	L PTH L			N: 0.00		DATE	15/08/2001 INSTALLATIONS BACKFILL
O DEF (Th	PTH L nick) (л .00	E: 0 EVEL	.00 Depth	N: 0.00	ES/TES	TS	INSTALLATIONS
(Th	nick) (л .00 .40		Depth	Туре			
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PELL FRISCHMANN CONSULTANTS LTD	BOREHOLE RECORD							Borehole Number				
TE: Bicester	EQUIPMEN	вн8										
LIENT:	GROUND L	EVEL	COORDINATES E: 0.00 N: 0.00				DATE	15/08/2001				
A D Woodley	the second secon		LEVEL		SAMPLE	S/TES	STS INSTALLATIONS					
TRATA DESCRIPTION		(Thick)	(mAOD)	Depth 0.80	Туре	No	Test	BACKFILL				
TOPSOIL		0.30		0.00								
Moderately strong yellow brown LIMESTONE (Chiselling 0.3m to 0.8m 1 Hr)		0.80			1	i						
End of Borehole at 0.80 m		0.00				-						
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ITE: Bicester								
LIENT: A D Woodley	GROUND L 0.000	EVEL	E: 0	COORDINA .00	TES N: 0.00		DATE	16/08/2001
TRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)	Depth	SAMPLE Type	S/TES	TS Test	INSTALLATIONS BACKFILL
TOPSOIL		0.00		0.96	В			
Moderately strong yellow brown LIMESTONE (Chiselling 1m to 1.45m 1Hr)			· · · · · · · · · · · · · · · · · · ·		:			
		1.45						
End of Borehole at 1.45 m				,				
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Remarks						•	Scale	
spl al 78 seating blows only							1:50 Figu	Sheet 1

PELL FRISCHMANN CONSULTANTS LTD	BOREHOLE RECORD							Borehole Number				
PIECHIMANN	EQUIPMENT	AND ME	rhods:				BH10					
Bicester	GROUND LE	VEL	COORDINATES E: 0.00 N: 0.00				DATE 16/08/20					
A D Woodley	0.000	DEPTH	LEVEL				S	INSTAL	ATIONS/			
STRATA DESCRIPTION	KEY	(Thick)	(mAOD)	Depth	Type	No	Test	BACI	KFILL			
TOPSOIL		0.30		<b>y</b> .00								
Firm becoming stiff with depth brown grey sandy CLAY												
				1.00	U		. '					
			:	1.50	D							
		**			-							
				2.00	D		80					
		2.45			! !							
Weak grey MUDSTONE (Chiselling 2.45m to 3m 1 Hr)		3.00										
End of Borehole at 3.00 m	1			v İ	1							
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Remarks							5c		Sheet 1 of			
spt at 78 seating blows only							Fi	gure				

PELL FRISCHMANN CONSULTANTS LTD	В	OREH		Borehole Number						
TE: Bicester	EQUIPMENT AND METHODS:						Bł	<del> </del>		
LIENT: A D Woodley	GROUND L	EVEL	E: 0	OORDINAT	ES 1: 0.00		DATE 16/08/2001			
A D Woodley	KEY	DEPTH	LEVEL :		SAMPLES/TES		s	INSTALLATIONS		
TRATA DESCRIPTION	NE I		(mAOD)	Depth 0.00	Туре	No	Test	BACKFILL		
TOPSOIL		0.00		<b>u</b> .00						
Stiff brown CLAY with much coarse limestone										
gravel	=====			1. <b>9</b> 6	D		56			
		1.45								
Moderately strong yellow brown LIMESTONE (Chiselling 1.45m to 1.8m 1 Hr) End of Borehole at 1.80 m		1.80								
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Remarks spt at 78 sealing blows only						e.	Scal 1:50	e Sheet 1		
spt at 78 seating blows only  Notes: Materials are described in accordance with B\$ 5930:1999. Althorities and reduced levels are in metres Thicknessess given in brackets.	in depth column						Fig			

PELL FRISCHMANN CONSULTANTS LTD	7	RIAL	PITRE	CORD			Trial Num				
SITE: Bicester	EQUIPME	EQUIPMENT AND METHODS:						TP1			
CLIENT: A.D Woodly	GROUND 0.000		COORDINA 156334.00	DATE 08/08/20							
STRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)		SAMPLES/TES			INSTALLATIONS/			
TOPSOIL		0.30	(111400)	Depth	Type	No	Test	DAUNFILL			
Yellow brown very sandy clayey course angular GRAVEL and COBBLES (up to 150mm x 150mm x 10mm) of limestone, assessed from pit walls as dense (highly to completely weathered limestone)		0.00		0.50	В						
Yellow and light grey very thinly bedded moderately to highly weathered moderately strong trong LIMESTONE		0.90 1.00									
Find of Borehole at 1.00 m			. ,								
	0.1	in de	A Penas								
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Remarks							Logged	by Checked by			
No groundwater encountered, trial pit st	able througho	out, unab	le to progre	ess below	1m		Scale 1:25 Figure	Sheet 1 of			

PELL FRISCHMANN CONSULTANTS LTD		TRIAL	PIT RE	CORD			Tria Nun	l Pit nber
SITE: Bicester	EQUIPME	NT AND M	ETHODS:		-		Т	P1A
CLIENT: A.D Woodly	GROUND 0.000	LEVEL	E:	COORDINA 456218.00		2456.0	DATE	08/08/2001
STRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL			LES/TE		INSTALLATIONS
TOPSOIL		0.00	(mAOD)	Depth 0.10	Type	No	Test	BACKFILL
Orange brown very clayey fine to medium SAND		0.25		· .				
with much angular and subangular gravel of light grey limestone, assessed from pit walls as dense (highly to completely weathered limestone)		0.60		0.50	В			
Yellow brown very sandy clayey course angular GRAVEL and COBBLES (up to 150mm x 150mm x 10mm) of limestone, assessed from pit walls as dense (highly to completely weathered limestone)	0.00.00	0.60						
		1.10						
/ellow and light grey very thinly bedded moderately to highly weathered moderately strong to strong LIMESTONE		1.25						
End of Borehole at 1.25 m	i					***************************************		
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Remarks	*	*				1.5	ogged by	Checked by
No groundwater encountered, trial pit walls	stable throu	ighout, ur	able to pr	ogress be	low 1.		cale 25	Sheet 1 of 1
otes: Atgripts are described in accordance with BS 5930:1999. https://doi.org/10.1006/pdf.com/netres/Thicknessess given in brackets in depth or						F	igure	

PELL FRISCHMANN CONSULTANTS LTD	T	RIAL F	PIT RE	CORD			Trial I Numb	
SITE: Bicester	EQUIPMEN	IT AND ME	THODS			and all the second	Ţſ	2
CLIENT: A.D Woodly	GROUND I	EVEL		COORDINA 156200.00		348.00	DATE	08/08/2001
STRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)	Depth	SAMPLE Type	S/TES	TS Test	INSTALLATIONS/
TOPSOIL		0.00						
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.50		0.30	D			
weathered limestone) Yellow fine grained SAND with much coarse angular gravel of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)		0.90					-	
Yellow and light grey very thinly bedded moderately to highly weathered moderately strong strong LIMESTONE		1.20						
End of Borehole at 1.20 m	<del>_ l _ l _ l _ l _ l _ l _ l _ l _ l _ l</del>							
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Remarks  No groundwater encountered, trial pit s	table through	out, unab	le to progi	ress belov	v 1.2m		Scale 1:25	Sheet 1 c

PELL FRISCHMANN CONSULTANTS LTD	T	RIAL F	PIT RE	CORD			Trial Pit Number				
TE:	EQUIPMEN	T AND ME	THODS:				TP3				
Bicester LIENT:	GROUND L	.EV <b>E</b> L		COORDINA 156266.001	TES N. 2222		DATE	08/08	3/2001		
A.D Woodly	0.000				SAMPLE		s	INSTAL	LATIONS/		
TRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)	Depth	Type	No	Test		CKFILL		
TOPSOIL		0.00	و المستعلق أستي	0.10	D						
		0.20									
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)		0.50				and the second s					
Yellow and light grey very thinly bedded moderately to highly weathered moderately strong to strong LIMESTONE, with bedding dipping at 20 degrees to the south											
degrees to the south		0.90			1						
End of Borehole at 0.90 m				1							
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Remarks		througho	ut unahle	to progre	ss belo	w 0.9n	Scale		-		
Remarks  No groundwater encountered, trial pit	walls stable	mougno	ut, uriable	. to progre			1:25 Fig	ure	Sheet 1		
							rig	uie			

PELL CONS	FRISCHMANN ULTANTS LTD	T	RIAL F	,	Trial Pit Number					
TE:		EQUIPMEN	IT AND ME	THODS:				TF	P4	
Bicester		GROUND I	EVEL	C	OORDINA 56242.00	TES N: 2220		DATE	08/08/	2001
A.D Woodly		0.000				SAMPLE		S	INSTALL	ATIONS/
STRATA DESCRIPTIO	N .	KEY	DEPTH (Thick)	LEVEL (mAOD)	Depth	Туре	No	Test		KFILL
TOPSOIL	The second secon		0.00							
	vev coarse angular		0.20		0.30	D				
Red brown very sandy clar GRAVEL and COBBLES of from the pit walls as dense weathered limestone)	of limestone, assessed (highly to completely		0.60				. •			
End of Boreh	ole at 0.60 m									
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Remarks		and the second s							ged by	
No groundwater encountered, to	ial pit stable throughout, unable to progres	s below 0.6m, cobb	oles and boulde	ers of pale grey lin	mesione (poss	ible bedrock	)	Sca 1:2	5	Sheet 1 c
<b>9</b>								Fic	gure	

PELL FRISCHMANN CONSULTANTS LTD	II I I I I I I I I I I I I I I I I I I							Number					
ITE: Bicester	EQUIPMENT	AND ME	THODS:				T	<b>2</b> 5					
CLIENT: A.D Woodly	GROUND LEV	/EL	E: 4	COORDINATES E: 456182.00N: 22189				08/08/200					
	KEY D	EPTH	LEVEL		SAMPLE	S/TES	TS	INSTALLATION					
STRATA DESCRIPTION		Thick) 0:00	(mAOD)	Depth 0.10	Туре	No -	Test	BAC	KFILL				
TOPSOIL		0.25		٠٠٠٠٠ . ب									
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)		0.50											
Stiff to very stiff grey CLAY becoming hard and friable at base (possible mudstone bedrock)													
					A COLOR OF THE COL								
		0.00											
End of Borehole at 2.30 m		2.30		1									
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						1	The second secon						
Remarks	<u> </u>			a juliane see see s				ed by	Checked				
No groundwater encountered, trial pit	stable througho	ut, una	ble to prog	ress belo	ow 2.3r	n	Scal 1:25		Sheet 1 c				
Notes: Materials are described in accordance with BS 5930:1999. Art boths and reduced levels are in metres.Thicknessess given in brackets in			,				Fig	ure					

PELL FRISCHMANN CONSULTANTS LTD	Т	RIAL F	Trial Pit Number					
TE: Bicester	EQUIPMEN	IT AND ME	TP6					
JENT: A.D Woodly	GROUND L 0.000	EVEL	EL COORDI E: 456241.		TES N: 2217		DATE	08/08/2001
	KEY	DEPTH	LEVEL		SAMPLE	S/TES	rs	INSTALLATIONS
TRATA DESCRIPTION	WAR STORY	(Thick) 0:00	(MOAm)	Depin 0.10	Type D	No	Test	BACKFILL
OPSOIL		0.30		0.10				
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed rom the pit walls as dense (highly to completely weathered limestone)								
	0 0 0 0 0	0.90						
Stiff yellow and grey mottled CLAY becoming very stiff with depth and hard and friable at the base of he pit (possible mudstone bedrock)							-	
				i 			-	
		2.40						
End of Borehole at 2.40 m		1						
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		Leo	57 (1) 18 (1) 07 (1)	3 0 6 0	oK oK	To the company of the		
		Sup	nate 1	197 "	OK			
					1	Majoran a se de management a partir de management de la companya d		
		1						
		f					Logo	ed by Checked
Remarks  No groundwater encountered, Inal pit stable throughout, unable to progress to	pelow 2.4m						Scale 1:25 Fig	Sheet 1

Notes: Materials are described in accordance with BS 5930:1999. Art topths and reduced levels are in metres. Thicknessess given in brackets in depth column

PELL FRISCHMANN CONSULTANTS LTD	; <b> </b>	INAL	11 1/1-								
ITE: Bicester	EQUIPMENT AND METHODS:							TP7			
LIENT: A.D Woodly	GROUND L 0.000	EVEL	E: 4	COORDINAT	TES N: 222501.00			08/08/200			
	ANTS LTD  EQUIPMENT AND METHODS.  TP  GROUND LEVEL COORDINATES DATE OF E: 456350.00N: 222501.00  KEY DEPTH LEVEL SAMPLES/TESTS IN (Thick) (mAOD) Depth Type No Test  0:00 0.10 D  angular a assessed completely 0.40  angular and mx 150mm x pit walls as ead limestone) 0.90  1.30		INSTA	LLATIONS/							
TRATA DESCRIPTION		(Thick)	(mAOD)			No	Test	BA	CKFILL		
TOPSOIL		0.00		0.10	ע	ļ					
		0.40		;	-						
Red brown very sandy clayey coarse angular		. 0.40		-			-				
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)	9 9 9 9			0.70	В						
weathered limestone)	0,,0,0,0	0.90						1			
Yellow brown very sandy clayey course angular	0.00.00	0.00									
Yellow brown very sandy clayey course angular PRAVEL and COBBLES (up to 150mm x 150mm x mm) of limestone, assessed from pit walls as dense (highly to completely weathered limestone)	0 - 0 0 0 0										
End of Borehole at 1.30 m	0 . 8 4 . 0	1.30			:		7.5				
End of Borenole at 1.30 m											
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Remarks	amble below this de	oth.					Scale	1 .			
No groundwater encountered, some localised collapse of pit walls 0.4-0.9m,	Prapie below this de	in					1:25 Figu		Sheet 1 0		

PELL FRISCHMANN CONSULTANTS LTD	. T	TRIAL PIT RECORD Trial Pit Number						
re: Bicester	EQUIPMEN	T AND ME	THODS				TP	8
IENT: A.D Woodly	GROUND L 0.000	EVEL	E: 4	OORDINA 56317.00	TES N: 2221		DATE 0	8/08/2001
	KEY	DEPTH	LEVEL		SAMPLE	S/TES		NSTALLATIONS/
TRATA DESCRIPTION		(Thick)	(mAOD)	Depth	Тур <b>е</b>	No	Test	BACKFILL
ropsoil		0.00		: :				
		0.30 0.40						
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed	00.400	0.40						
from the pit walls as delise (flight) to the pit walls as delise (flight)	0.0000	0.65	1	0.70	D			
Yellow brown very snady clayey course angular GRAVEL and COBBLES (up to 150mm x 150mm x GRAVEL and COBBLES (up to 150mm x and cobbles as a see seed from pit walls as		0.80						
GRAVEL and COBBLES (up to 150min x 150m	-/							
Stiff yellow brown very sandy CLAY with much rigular medium to coarse gravel of limestone lilow and light grey very thinly bedded								
to strong   IMESTONE		1.30			!			
End of Borehole at 1.30 m								
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							Logge	by Checked
Remarks	<u></u>						Scale	
No groundwater encountered, that pit stable throughout, unable to progress	s below 1.3m						1:25	Sheet 1
							Figu	ŗe

CONSULTANTS LTD	EQUIPMEN	NT AND ME	rhods:				TF	<b>9</b>	
Bicester	=								
	GROUND I	EVEL	E:	COORDI 456351.	NATES 00N: 2220		DATE	08/08/2	2001
T: A.D Woodly	0.000	DEPTH	LEVEL		SAMPLE	S/TES	TS	INSTALL	
ATA DESCRIPTION	KEY	(Thick)	(mAOD)	Depth	Туре	No	Test	BACK	FILL
SOIL		0.00							
		0.25							
brown very sandy clayey coarse angular AVEL and COBBLES of limestone, assessed in the pit walls as dense (highly to completely thered limestone)		0.50 0.60							
ow and light grey weathered moderately strong derately to highly weathered moderately strong									
End of Borehole at 0.60 m				1					
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							Lo	ogged by	Checked
Remarks							3	cale	01 = =1 4
No groundwater encountered, trial pit stable throughout, unable to prog	gress below 0.6m							igure	Sheet 1

PELL FRISCHMANN CONSULTANTS LTD	; T	RIAL F	IT REC	ORD		Trial Num	
ANNA ANNA	EQUIPMEN	T AND ME	THODS:			T	P10
re: Bicester	GROUND L	EVEL		COORDINA	TES	DATE	08/08/2001
A.D Woodly	0.000			56354.00	SAMPLES		INSTALLATIONS
TRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)	Depth	Type	No Test	BACKFILL
		0.00					
TOPSOIL		0.30					
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)		0.50					
weathered limestone) Yellow brown very snady clayey course angular GRAVEL and COBBLES (up to 150mm x 150mm x 10mm) of limestone, assessed from pit walls as dense (highly to completely weathered limestone)		1.00					
End of Borehole at 1.00 m							
	. *		• · · · · · · · · · · · · · · · · · · ·				
		Annual Management of the Annual Management of					
	<u>최</u>						
			an appear a construction of				
	•			1 			
Remarks No groundwater encountered, trial pit stable throughout, unable to progre	ss below 1m due to	imestone cobb	les and boulders	in pit base (po	ossible limesto		ale Sheet 1 o
No groundwater encountered, trial pit stable throughout, unable to progress  Notes.  Materials are described in accordance with 85 5930:1999.  APPLED his and reduced levels are in metres. Thicknessess given in brackets.						F	gure

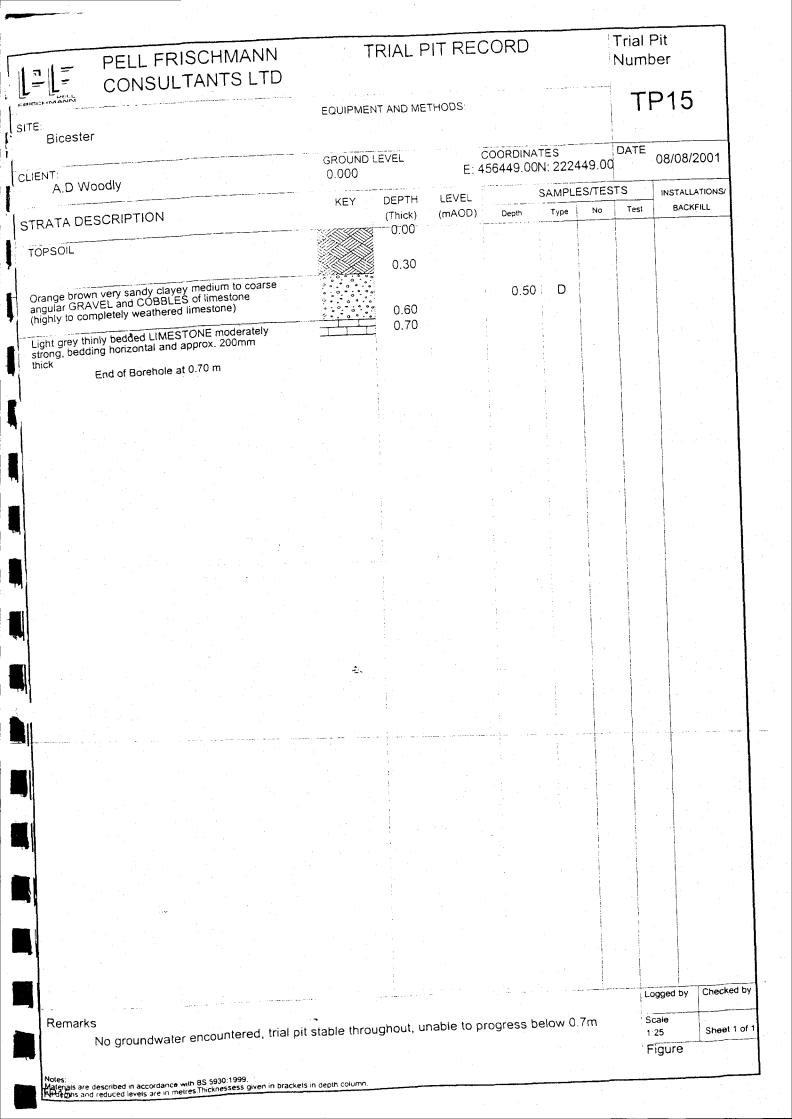
PELL FRISCHMANN CONSULTANTS LTD			11 1	CORD			Trial Pit Number			
TE: Bicester	EQUIPME	NT AND ME	ETHODS:			-	TF	11		
IENT: A.D Woodly	GROUND 0.000	LEVEL		COORDIN 456347.0		740.00	DATE 2	0/08/2001		
TRATA DESCRIPTION	KEY	DEPTH	LEVEL		SAMPL		·	NSTALLATIONS		
		(Thick)	(mAOD)	Depth	Туре	No	Test	BACKFILL		
TOPSOIL-Mid brown soft fiberous silty clayey TOPSOIL with rootlets and organics (5%) with very occasional fine flint and limestone gravel.		0.25								
Mid brown and orange mottled moderately firm cohesive silty CLAY with grey moderately weak medium to coarse grained highly weathered IMESTONE gravel.		0.35								
reliow grey moderately strong medium to construct or grained broken moderately weathered LIMESTONE in a yellow moderately coarse damp sndy clayey		0.50								
End of Borehole at 0.56 m										
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Remarks		hor progr	ass could	ha mada			Scale	J.,		
Trial pit terminated at 0.56m in Cornbras	sn, as no τυπ	n <del>e</del> i progi	caa could	i ve made			1:25	Sheet 1 o		
oles: Algriais are described in accordance with BS 5930:1999. With the and region the terror in merces Thicknessess given in brackets in de							Figure			

PELL FRISCHMANN CONSULTANTS LTD	TF	RIAL P	IT REC	CORD		Trial f Numb	er	
I CONTROLL IN ANN	EQUIPMEN	T AND MET	HODS:	and the second s		T	212	
Bicester	GROUND L	ÉVÉL	F· 4	COORDINA 56347.0	ATES ON: 221600.00	DATE	20/08/200	01
NT: A.D Woodly	0.000 KEY	DEPTH	LEVEL		SAMPLES/TES	<u> </u>	INSTALLATIO	i
ATA DESCRIPTION		(Thick)	(mAOD)	Depth	Type No	Test	BACKFILL	
PSOIL-Mid brown soft fiberous silty clayey PSOIL with rootlets and organics (5%) with very assional fine flint and limestone gravel.		0.28						
and orange mottled moderately firm		0.39						
llow grey moderately weathered LIMESTONE sined broken moderately weathered LIMESTONE a yellow moderately coarse damp sandy clayey								
End of Borehole at 0.55 m	•							
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Remarks				ould be r	nade	· (	icale	
Remarks  Trial pit terminated at 0.55m in Cornb	orash, as no	turther pl	ogress c	Julu De l		1	igure	Sheet 1

PELL FRISCHMANN CONSULTANTS LTD	TRIAL PIT RECORD						Trial Pit Number				
Bicester	EQUIPMEN	NT AND ME		TP13							
ENT: A.D Woodly	GROUND 0.000	EVEL	E: 4	00RDINA 56397.00	ATES ON: 2214	151.00	DATE	20/08/2001	18/2001		
	KEY	DEPTH	LEVEL		SAMPLE	S/TES	TS	INSTALLATION	4S/		
RATA DESCRIPTION	~~~~	(Thick)	(mAOD)	Depth	Туре	No	Test	BACKFILL			
PSOIL-Mid brown soft fiberous silty clayey PSOIL with rootlets and organics (5%) with very		0.20		0.20	D						
casional fine flint and limestone gravel.  id brown and orange mottled moderately firm shesive silty CLAY with grey moderately weak edium to coarse grained highly weathered		0.34 0.40	· • • • • • • • • • • • • • • • • • • •								
MESTONE gravel.  ellow grey moderately strong medium to coarse ellow grey moderately weathered LIMESTONE a yellow moderately coarse damp sandy clayey latrix (CORNBRASH)						-					
End of Borehole at 0.40 m	1				AND THE REST OF THE PARTY OF TH						
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						Management of the control of the con	And a second of the second of				
							Logg	ed by Check	æ		
Remarks  Trial pil terminated at 0.40m in Combrash, as no further progress could be	e made. Samples: Ti	913 S1 0.5kg P	ol .				Scal 1:25 Fig	1 -	t 1		

TRIAL PIT RECORD						Trial Pit Number				
EQUIPMEN	-	TP14								
				· · · · · · · ·						
GROUND L 0.000	EVEL	E:	456500.00N	v: 222651	1.00	07/C	8/2001			
KEY	DEPTH	LEVEL			<del></del>	<del> </del>	ALLATIONS/			
	(Thick) 0.00	(mAOD)			No Tes	st B/	ACKFILL			
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table throug	hout, una	ble to pr	ogress belo	ow 0.8m			Sheet 1 c			
							Jileet , C			
depih column.										
	GROUND L 0,000 KEY	GROUND LEVEL 0.000  KEY DEPTH (Thick) 0.00  0.30  0.50  0.80	GROUND LEVEL 0.000  KEY DEPTH LEVEL (Thick) (mAOD) 0.30 0.50  0.80  Accorded   GROUND LEVEL COORDINAT (1,000) E: 456500.000 E: 456500.000 O.10 O.30 O.50 O.60 O.80 O.80 O.80 O.80 O.80 O.80 O.80 O.8	GROUND LEVEL COORDINATES 0.000 E: 456500.00N: 22265  KEY DEPTH LEVEL SAMPLES/ (Thick) (mAOD) Depin Type 0.00 0.10 D  0.30 0.50 0.60 D  1111 0.80  ACCORDINATES E: 456500.00N: 22265  KEY DEPTH LEVEL SAMPLES/ (Thick) (mAOD) Depin Type 0.00 0.10 D  0.30  0.50 0.60 D  1111 0.80  Capper SS CK Suparte SS CK Suparte OK Supart	GROUND LEVEL 0.000 E: 456500.00N: 222651.00  KEY DEPTH LEVEL SAMPLES/TESTS  (Thick) (mAOD) Depth Type No Te  0.00 0.50 0.60 D  0.80 0.60 D  ACCORDINATES  (Thick) (mAOD) Depth Type No Te  0.00 0.10 D  0.30 0.50 0.60 D	GROUND LEVEL COORDINATES (1,000) E: 456500,000: 222651.00 DATE (17/10k) (mAOD) Depth Type NO TENI D. D. D. D. D. D. D. D. D. D. D. D. D.				

PELL FRISCHMANN CONSULTANTS LTD	Τ	Trial Pit Number						
E: Bicester	EQUIPMEN	IT AND ME	THODS				TF	P14A
IENT:	GROUND L 0.000	EVEL	COORDINAT E: 456481.00N				DATE	09/08/2001
A.D Woodly	KEY	DEPTH	LEVEL		SAMPLE	ESITES	STS	INSTALLATIONS
TRATA DESCRIPTION		(Thick)	(mAOD)	Depth 0.10	Туре	No	Test	BACKFILL
OPSOIL		0.30		0.40				
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)	0.0000	0.50		0.40				
veathered limestone) Yellow brown very sandy clayey course angular GRAVEL and COBBLES (up to 150mm x 150mm x 10mm) of limestone, assessed from pit walls as dense (highly to completely weathered limestone)								
	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1.80		1.80 1.80 1.80 2.00 2.00	) D W ) W			
Stiff light grey CLAY with much coarse angular limestone gravel, becoming v. stiff below 2.4m				2.00	B D D			
		2.60						
End of Borehole at 2.60 m	<u> </u>	4			:			
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Remarks		e					Logg	ed by Checked
No groundwater encountered. Some minor instability 0.3-1.8m							1 25 Fig	Sheet 1



PELL FRISCHMANN CONSULTANTS LTD	TR	Nui	Trial Pit Number							
FINANN	EQUIPMENT	AND MET		TP15A						
Bicester	GROUND LE	DAT	DATE 08/08/2001							
NT: A.D Woodly	0.000	DEPTH	E: 0.		N: 0.00 SAMPLES	SITESTS			rions	
RATA DESCRIPTION		(Thick)	(mAOD)	Depth	Туре	No Te	st B	ACKFILL	-	
PSOIL		0.30	,	0.40	D					
ange brown very sandy clayey medium to coarse gular GRAVEL and COBBLES of limestone ghly to completely weathered limestone)				0.10						
ith much angular	0 3 . 0	0.85		1.00	w					
ery stiff grey sandy Clay with much angular ledium to coarse angular gravel of limestone.										
		1.75								
End of Borehole at 1.75 m										
		O. 4	. in the	g fla		1.0	i i			
	CLEA .	Arsenia	ිරිලි එක කො		DK-					
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							Activities and the second seco			
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					1	e de la companya de l				
							Logge	d by Ch	necked	
Remarks  Groundwater seepage at 1.6m, pit stable throughout, unable to progress	ss below 1.75m due la	limestone cot	bles and bould	lers in pit base			Scale 1:25 Figu		heet 1	

PELL FRISCHMANN CONSULTANTS LTD	!						<b>TD</b> 4 0	
FINA ANN	EQUIPMENT	AND MET	HODS:				TP16	:
Bicester								
:NT:	GROUND LE	VEL	C E: 45	00RDINAT 6527.00N	ES : 2223	14.00	08/08/2	2001
A.D Woodly	SAMPLES/TESTS						INSTALL	ATIONS/
RATA DESCRIPTION		DEPTH (Thick)	(mAOD)	Depth	Туре	No T	est BACK	FILL
DPSOIL .		0.00		0.10	D			
		0.30						
ed brown very clayey sandy coarse GRAVEL and OBBLES of moderately strong limestone, boulder light grey limestone noticed in pit face 500 x 500 100mm, assessed as dense in pit walls		0.50						
OBBLES of moderaters stored in pit face 500 x 500 light grey limestone noticed in pit face 500 x 500	0.0000							
100mm, assessed as delise in picture. ellow brown clayey sandy coarse angular RAVEL and COBBLES of moderately strong mestone, assessed as dense in pit walls, (highly completly weathered limestone)								
mestone, assessed as dense in pit wails, (lilighty) occupietly weathered limestone)	0 . 0							
	0 4 . 0 . 0 . 0		1	1.50	W			
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ilian kanangan dan br>Kanangan dan kanangan dan kanang			1		*			
				2.60	: D: B			
-du CLAY with		2.60		2.0				
Very stiff grey mottled yellow sandy CLAY with much coarse angular limestone gravel.		1			. !			
		3.10						
7 7 7 0 0 0 thala at 3 10 m		3.10			1			
End of Borehole at 3.10 m				Annua e				
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		are a larger program to de la company		and the second s			Logged by	
Remarks Groundwater seepage at 2.6m. Slight spalling of pit walls 0.5-2.6m, hand			120+ 120+ k	N/m2			Scale 1:25	Shee

Trial Pit

PELL FRISCHMANN CONSULTANTS LTD	TRIAL PIT RECORD							Trial Pit Number TP16A				
re:												
Bicester	GROUND LEVEL COORDINATES 0.000 E: 456411.00N: 222286.00					DATE	08/08/2001					
A.D Woodly		OCOTH	LEVEL		SAMPLE		<u> </u>	INSTALLATIONS				
TRATA DESCRIPTION	KEY	DEPTH (Thick)	(mAOD)	Depth	Туре	No	Test	BACKFILL				
OPSOIL .		0.00										
		0.30		:								
Orange brown very sandy clayey medium to coarse angular GRAVEL and COBBLES of limestone highly to completely weathered limestone)				0.50	D							
		0.60		! + 6.								
Light grey thinly bedded LIMESTONE moderately strong, bedding horizontal and approx. 10mm thick	====											
		1,00		i .								
End of Borehole at 1.00 m												
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Remarks No groundwater encountered, trial pit st	able through	nout, unal	ole to prog	gress belo	w 1m		Scale	CL 1				
To groundwater endealing and pro-					•		1:25 Figu	Sheet 1				



**Bicester** 

## PELL FRISCHMANN CONSULTANTS LTD

# TRIAL PIT RECORD

Trial Pit Number

**TP17** 

EQUIPMENT AND METHODS:

CLIENT: A.D Woodly	GROUND 0.000	LEVEL		COORDINA 56500.00		197.00	DATE	09/08/2001
STRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)	Depth	SAMPL Type	ES/TES	TS Test	INSTALLATIONS/
TOPSOIL		0.00						
		0.30	:	0.20 0.20	D B			•.
Red brown very sandy clayey medium to co angular GRAVEL and COBBLES of limesto	oarse one		: .	0.50	В			
(highly to completely weathered limestone)								
		0.80			!			
Light grey slightly sandy course angular GF of limestone (highly to completely weathere	RAVEL			· ·				
limestone)		1.10		1.10	W			
Very stiff grey mottled yellow sandy CLAY some to much coarse angular limestone gray	with	1						
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End of Borehole at 2,60 m		•						
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Remarks	<u> </u>					-	Logge	by Checked I

No groundwater encountered, trial pit stable throughout, unable to progress below 2.6m onto light grey strong limestone, hand vane on 1.1m-2.6m Cu= 120, 120+, 120 - 125

Sheet 1 of 1

Figure

=   =	PELL FRISCHMANN CONSULTANTS LTD	. T	RIAL F	PIT RE	CORD			Trial Numl	
Bicester		EQUIPMEN	IT AND ME	THODS:				TI	218
CLIENT: A.D Woo	ndly	GROUND L 0.000	EVEL	E: 4	COORDINA 456492.00	ATES DN: 2220	00.00	DATE	09/08/2001
		KEY	DEPTH	LEVEL		SAMPL	ES/TES	TS	INSTALLATIONS/
STRATA DES	CRIPTION		(Thick)	(mAOD)	Depth	Туре	No	Test	BACKFILL
TOPSOIL	•								
Stiff orange bro	wn sandy CLAY with some to much estone gravel		0.30						
			0.60						
Yellow brown c GRAVEL and C limestone, asse to completely w	layey sandy coarse angular COBBLES of moderately strong essed as dense in pit walls, (highly weathered limestone)								
			1.15						
E	nd of Borehole at 1.15 m								
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Remarks			ad a) 500mm :	500mm\				Scale	•
Trial pil stable throi	ughout, unable to progress below 1.15m due to boulder of	limestone (estimati	ed at 500mm x	Journally .				1.25	Sheet 1 c
Notes:	ied in accordance with 8S 5930:1999. ed levels are in metres.Thicknessess given in brackets in o							Figi	ם יר

PELL FRISCHMANN CONSULTANTS LTD	TF	RIAL P	IT REC	ORD		Trial Numl	
CONSULTANTS LTD	EQUIPMENT	AND ME	rhods:	فقا المستسوس	100	T	P19
Bicester	GROUND LE		C	OORDINA	TES	DATE	20/08/2001
NT: A.D Woodly	0.000		, part 10 - 20 - 20 - 20 - 20 - 20 - 20 - 20 -		N: 221808 SAMPLES/		INSTALLATIONS/
RATA DESCRIPTION	KEY	DEPTH (Thick)	(mAOD)	Depth		No Test	BACKFILL
PSOIL: Mid brown soft fiberous sndy clayey PSOIL with rootlets and organics (5%) with very casional fine flint and limestone gravel		0.25		0.25	D		
ange brown moderately firm corresive sity suits,		0.52					
ellow grey moderately strong medium to coarse ained broken moderately weathered LIMESTONE a yellow moderately coarse damp sandy clayey atrix (CORNBRASH)  End of Borehole at 0.62 m		0.62					
0.25 m depth							
Chromium d4 11 Chromium d4 11 Chromium	0K						
Copper 37 "					-		
Wickel 44 " 0		· ·					
Sulphare 981 " 0				: : :			
	<b>소</b> .	and the second s		1			
				: : :			
		4					
							Logged by Chec
Remarks  Trial pit terminated at 0.62m in Cornbrash, as no further progress coul	ld be made. Samples	: TP19 S1 0.5	kg Pal				Scale 1:25 Shee Figure

PELL FRISCHMANN CONSULTANTS LTD				CORD			Numl		
CHIVANI	EQUIPMEN	T AND ME	THODS:				T	P19/	4
Bicester	GROUND L	EVEL		COORDINA	TES	200.00	DATE	20/08/2	001
NT: A.D Woodly	0.000			156501.00	SAMPLE			<del></del>	
The state of the s	KEY	DEPTH (Thick)	LEVEL (mAOD)	Deplh	Type	No	Test	INSTALLA BACKF	
ATA DESCRIPTION	-	`0.00 0.18							
PSOIL: Mid brown moderately cohesive silty yey TOPSOIL with rootlets and organics (5%)		U, 10							
brown mottled grey stiff to firm cohesive silty AY with occasional grey moderately weak dium to coarse grained highly weathered estone gravel. Becoming more competent with		0.50							
o grey occasionally orange mottled very stiff									
nesive fissured silty CLAY with occasional nesive fissured silty CLAY with occasional name of the silty of the silty occasional fissures at the silty occasional occa				•					
pth, to resemble a dark blood of a significance of the same of the				1.20	) В				
				i .					
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		<u> </u>	•			1			
		1							
		2.80							
End of Borehole at 2.80 m		1		4					
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	And the second s								
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		**							
		· ·	•						
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		:		٠					
		point a constraint of the first					Lo	gged by	Checker
Remarks		20 51 12 15	D				. !	ale	
Kemarks  Trial pit terminated at 2.80m in Mudstone, as no further progress could be	e made. Samples: TF	Z9 S1 1.Z-1.0I	••				1:3 F	igure	Sheet 1
Notes: Naterials are described in accordance with BS 5930:1999. WHIPDWA and reduced levels are in metres Thicknessess given in brackets								J	

E: Bicester  ENT: A.D Woodly 0.000 E: 45  A.D Woodly 0.000 E: 45  TRATA DESCRIPTION (Thick) (MACO) 0.000  COPSOIL: Mid brown fiberous sandy silty TOPSOIL (Thick) (MACO) 0.000  TRATA DESCRIPTION (Thick) (MACO) 0.000  COPSOIL: Mid brown fiberous sandy silty TOPSOIL (MACO) 0.000  With rootlets and organics (5%) with very coasional fine flint and limestone gravel very coasional fine flint and limestone gravel very coasional fine flint and limestone gravel very weak coarse grained very observed whethered limestone gravel with orange moderately coarse sandy fissures at increasing depth and occasional angular limestone gravel. More competent with depth, resembling a dark blue grey occasionally orange mottled very stiff fissured angular limestone gravel. More competent with depth, resembling a dark blue grey occasionally orange mottled very stiff fissured angular limestone gravel. More of the property orange mottled very stiff fissured angular limestone gravel. More of the property orange mottled very stiff fissured silty MUDSTONE at 2.00m  Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  End of Borehole at 3.00 m	OORDINATES 6501.00N: 22145  SAMPLES  Depth Type  0.25 D	DATE	P20 20/08/2001 INSTALLATIONS/ BACKFILL
ENT: A.D Woodly  RATA DESCRIPTION  COPSOIL: Mid brown fiberous sandy silty TOPSOIL (Thick) (Ith rootlets and organics (5%) with very coasional fine fint and limestone gravel  cellow and grey white weak coarse grained very sose medium dense silty SAND and light grey and ellow very weak coarse grained angular highly reathered limestone gravel  Dark blue grey mottled orange brown very stiff on the short of the sandy fissures at increasing depth and occasional angular limestone gravel. More competent with depth, resembling a dark blue grey occasionally orange mottled very stiff fissured damp slightly weathered silty MUDSTONE at 2.00m  Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  3.00	SAMPLES  Depth Type	51.00 S/TESTS	20/08/2001
RATA DESCRIPTION  CPSOIL: Mid brown fiberous sandy silty TOPSOIL with rootlets and organics (5%) with very coasional fine flint and ilmestone gravel ellow and grey white weak coarse grained very less medium dense silty SAND and light grey and ellow very weak coarse grained angular highly reathered limestone gravel  Dark blue grey mottled orange brown very stiff onesive silty clay with orange moderately coarse sandy fissures at increasing depth and occasional inngular limestone gravel. More competent with tepth, resembling a dark blue grey occasionally brange mottled very stiff fissured damp slightly orange mottled very stiff fissured damp slightly weathered silty MUDSTONE at 2.00m  Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  3.00	Depth Type		<del></del>
PROFIL: Mid brown fiberous sandy silty TOPSOIL th roctlets and organics (5%) with very casional fine flint and limestone gravel  allow and grey white weak coarse grained very obse medium dense silty SAND and light grey and slibow very weak coarse grained angular highly eathered limestone gravel  1.00  bark blue grey mottled orange brown very stiff ohesive silty clay with orange moderately coarse andy fissures at increasing depth and occasional nogular limestone gravel. More competent with lepth, resembling a dark blue grey occasionally lepth, resembling a dark blue grey occasionally weathered silty MUDSTONE at 2.00m  Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  3.00		No Test	BACKFILL
DPSOIL: Mid brown fiberous sandy slity TOPSOIL th rootets and organics (5%) with very casional fine flint and limestone gravel  Bellow and grey white weak coarse grained very gose medium dense sity SAND and light grey and sellow very weak coarse grained angular highly eathered limestone gravel  1.00  Dark blue grey mottled orange brown very stiff ohesive silty clay with orange moderately coarse andy fissures at increasing depth and occasional andy fissures at increasing depth and occasional ingular limestone gravel. More competent with lepth, resembling a dark blue grey occasionally lepth, resembling a dark blue grey occasionally veathered silty MUDSTONE at 2.00m  Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  3.00	0.25 D		
park blue grey white weak coarse grained angular highly eathered limestone gravel  1.00  Dark blue grey mottled orange brown very stiff onesive silty clay with orange moderately coarse andy fissures at increasing depth and occasional angular limestone gravel. More competent with lepth, resembling a dark blue grey occasionally lepth, resembling a dark blue grey occasionally weathered silty MUDSTONE at 2.00m  Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  3.00			
Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  3.00			
epth, resembling a dark blue grey occasionally epth, resembling a dark blue grey occasionally range mottled very stiff fissured damp slightly reathered silty MUDSTONE at 2.00m  Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  3.00			
Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  3.00			
Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  3.00			
Dark blue grey very stiff damp fissured silty MUDSTONE with occasional orange mottling  3.00			
End of Boleriole at other			
			<i>2</i>
			naged by Check
Remarks		S	cale
Trial pit terminated at 3.00m in Mustone, as no further progress could be made. Samples: TP20.0.5kg Pot, TP20.S1.1.0-2.5m.  Notes: Matgrials are described in accordance with BS 5930:1999. Matgrials are described in accordance with BS 5930:1999.  Matgrials are described in accordance with BS 5930:1999.  Matgrials are described in accordance with BS 5930:1999.		i	25 Sheet

PELL FRISCHMANN CONSULTANTS LTD	T	RIAL F	PIT RE	CORD		Nı	ial Pit umber	
ITE: Bicester	EQUIPMEN	IT AND ME					TP21	
LIENT: A.D Woodly	GROUND L	EVEL	E: 4	COORDINA 456501.00	TES N: 22130		20/08/	/2001
	KEY	DEPTH	LEVEL		SAMPLES			LATIONS/
STRATA DESCRIPTION	- 21/158/175SU	(Thick)	(mAOD)	Depth	Туре	No T	Test BACI	KFILL
TOPSOIL: Mid brown fiberous sandy silty TOPSOIL with rootlets and organics (5%) with very occasional fine flint and limestone gravel		0.25		0.25	В			
MADE GROUND Orange and blue grey mottled firm to stiff cohesive silty clay with grey moderately weak medium to coarse grained highly weathered limestone and very occasional rounded flint gravel. 2" Clay pipe encountered at 0.90m								
		0.90 1.00	1 * *					
Blue grey moderately strong medium to coarse grained broken moderately weathered LIMESTONE in a grey and yellow moderately coarse damp sandy clayey matrix (CORNBRASH)  End of Borehole at 1.00 m								
				•				
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	년.							
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								1.11.1 (see 1990)
							A CONTRACTOR OF THE PARTY OF TH	
· · · · · · · · · · · · · · · · · · ·				· · · · · · · · · · · · · · · · · · ·				
		:	e e e e e e e e e e e e e e e e e e e				Logged by	Checked
Remarks  Trial pil terninated at 1.0m in Cornbrash, as no further progress could be	made. Samplës: TP	21 S1A, TP21	S1B (2 bags) 0	.25-0.90m			Scale 1:25	Sheet 1 c
Notes: Malerials are described in accordance with BS 5930:1999. Malerials are described in accordance with BS 5930:1999. Malerials are described in accordance with BS 5930:1999.							Figure	

PELL FRISCHMANN CONSULTANTS LTD	TI	RIAL F	IT REC	CORD		1.1	rial F Numb	er	
E.	EQUIPMEN	T AND ME	THODS:				TF	22	
Bicester	GROUND L	EVEL		00RDINA 56667.00	TES N-22261		DATE	07/08/2001	1
ENT: A.D Woodly	0.000	DEDTU	LEVEL		SAMPLES	<u>i</u> _	S	INSTALLATION	4S/
RATA DESCRIPTION	KEY	DEPTH (Thick)	(mAOD)		Туре	No	Test	BACKFILL	
OPSOIL		0.20		0.10	D				
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed rom the pit walls as dense (highly to completely veathered limestone)		0.60				E C			
rellow and light grey very thinly bedded noderately to highly weathered moderately strong o strong LIMESTONE		0.80					ı		
o strong LIMESTONE  End of Borehole at 0.80 m									
O.T. depth									
CLEA Miseria 21 mg/log 72 Christian 06 11 OK Lood 21 11 OK Nichel 36 11 OK									
Com / L. Com									
Sulphate 901 " OK	- (1) - (1)						And the second s		
								-	
						With the second			
		aner e		2			Lo	ged by Che	;ci
Remarks  No groundwater encountered, trial pit	stable throu	ghout, ur	nable to pr	ogress be	8.0 wol	m	1:2	ale 25 She	e€

Notes:
Materials are described in accordance with BS 5930:1999.

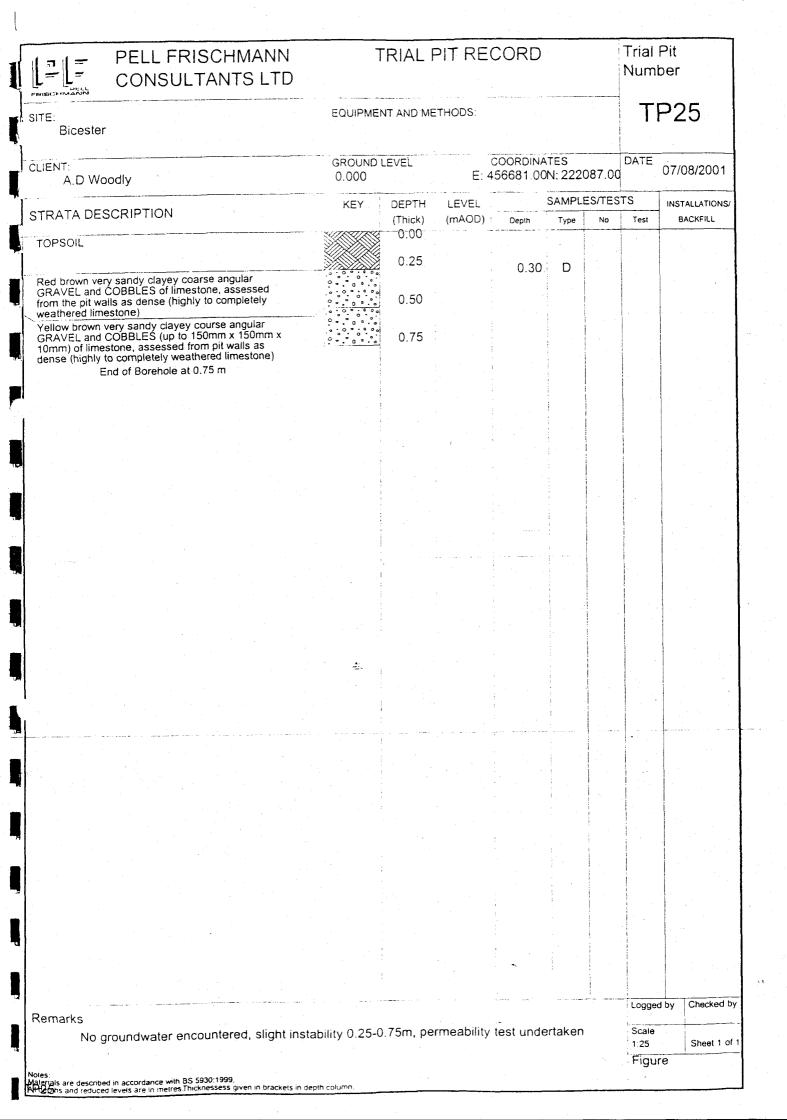
Anterials are described in accordance with BS 5930:1999.

Anterials are described in accordance with BS 5930:1999.

PELL FRISCHMANN CONSULTANTS LTD	TR	IAL PI	TREC	ORD			rial Pi umbe	er	
DELL IMANIN	EQUIPMENT	AND MET	HODS:				TP	22 <i>F</i>	١
Bicester	GROUND LE	VEL		00RDINAT	rES N. 2225		ATE (	7/08/20	001
NT: A.D Woodly	0.000		LEVEL		SAMPLE		S	INSTALLAT	IONS
ATA DESCRIPTION	KEY	DEPTH (Thick)	(mAOD)	Depth	Туре	No	Test	BACKFI	
PSOIL		0.00		0.10	D				
		0.30							
d brown very sandy clayey coarse angular RAVEL and COBBLES of limestone, assessed m the pit walls as dense (highly to completely sathered limestone)		0.60							
eathered limestone)  Illow and light grey very thinly bedded  oderately to highly weathered moderately strong  strong LIMESTONE									
		1.00							
tiff to very stiff light grey and brown mottled v. andy fissured CLAY with cobbles in the upper orface									
				. · ·	-				
				2.0	0 D				
					:				
		2.40		1					
Light blue grey very thinly bedded moderately weathered moderately weak MUDSTONE End of Borehole at 2.50 m		2.50							
	æ.	: :							
		A CONTRACTOR							
		,			. !	-	-		
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		1		. !	:	\ \			
		Ì	**************************************						
				: :					
		b 0 1							Checke
	<u></u>			. •				ogged by	J.J.J.
Remarks  Very minor groundwater seepage, to	rial pit stable	throughc	out, unabl	e to progr	ess belo	ow 2.51	m (\$	icale :25 -igure	Sheet

THE SPELL	PELL FRISCHMANN CONSULTANTS LTD	· T	RIAL F	PIT REC	CORD			Trial F Numb	
SITE: Bicester		EQUIPMEN	NT AND ME	THODS.				TF	23
CLIENT:	odly	GROUND I	LEVEL	E: 4	00RDINA 56649.00	TES N: 2223		DATE	07/08/2001
STRATA DES		KEY	DEPTH	LEVEL		SAMPLE			INSTALLATIONS/ BACKFILL
TOPSOIL	,		(Thick)	(mAOD)	Depth .	Туре	No	Test	BACKFIEL
			0.30				and the second s		
Red brown ver GRAVEL and from the pit wa weathered lime	y sandy clayey coarse angular COBBLES of limestone, assessed alls as dense (highly to completely estone)	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.50						
Yellow brown GRAVEL and 10mm) of lime	very sandy clayey course angular COBBLES (up to 150mm x 150mm x sounce, assessed from pit walls as to completely weathered limestone)	00	0.80						
Very stiff light CLAY with mu gravel	grey mottled brown fissured friable ch medium coarse angular limestone								
					2.00	D	-		
<u>.</u>									
Dot blue gro	y very thinly hedded moderately		2.65 2.75		2.50	D			
weathered mo	y very thinly bedded moderately oderately strong to strong LIMESTONE End of Borehole at 2.75 m	<u>-i.</u>		•	: :				
			To control of the con						
							to backbook when a large condition to		
·									
					1 1 2 2 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4				
			: :			: <u> </u>		Logge	d by Checked b
Remarks No	groundwater encountered, trial pit	walls stable th	nroughout	, unable to	progress	s below	2.75m		Sheet 1 of
Notes: Materials are describ	ped in accordance with BS 5930:1999.	n death column.						igu	

Bicester  CLIENT: GROUND LEVEL COORDINATES DA A.D Woodly 0.000 E: 456647.00N: 222200.00  KEY DEPTH LEVEL SAMPLES/TESTS		4
Bicester  CLIENT: A.D Woodly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOODLY  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  CLIENT: A.D WOOdly  COORDINATES  DA  COORDINATES  DA  COORDINATES  DA  COORDINATES  DA  COORDINATES  DA  COORDINATES  DA  COORDINATES  DA  COORDINATES  DA  COORDINATES  DA  COORDINATES  COORDINATES  DA  COORDINATES  COORDINATES  COORDINATES  DA  COORDINATES  COORDINATE	07/0	8/2001
A_D Woodly  O_000  E: 456647.00N: 222200.00  KEY DEPTH LEVEL SAMPLES/TESTS  STRATA DESCRIPTION  (Thick) (mAOD) Depth Type No T  TOPSOIL  Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)  Yellow brown very sandy clayey course angular GRAVEL and COBBLES (up to 150mm x 150mm x 10mm) of limestone, assessed from pit walls as dense (highly to completely weathered limestone)  Yellow and light grey very thinly bedded moderately to highly weathered moderately strong LIMESTONE	07/0	8/2001
STRATA DESCRIPTION  KEY DEPTH LEVEL SAMPLES/TESTS  (Thick) (mAOD) Depth Type No T  TOPSOIL  Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)  Yellow brown very sandy clayey course angular GRAVEL and COBBLES (up to 150mm x 150mm x 10mm) of limestone, assessed from pit walls as dense (highly to completely weathered limestone)  Yellow and light grey very thinly bedded moderately to highly weathered moderately strong LIMESTONE	INSTA	5/2001
STRATA DESCRIPTION  (Thick) (mAOD) Depth Type No T  TOPSOIL  Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)  Yellow brown very sandy clayey course angular GRAVEL and COBBLES (up to 150mm x 150mm x 10mm) of limestone, assessed from pit walls as dense (highly to completely weathered limestone)  Yellow and light grey very thinly bedded moderately to highly weathered moderately strong to strong LIMESTONE		ALLATIONS/
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)  Yellow brown very sandy clayey course angular GRAVEL and COBBLES (up to 150mm x 150mm x 10mm) of limestone, assessed from pit walls as dense (highly to completely weathered limestone)  Yellow and light grey very thinly bedded moderately to highly weathered moderately strong LIMESTONE  0.30  0.60  0.70 B	Test BA	ACKFILL
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)  Yellow brown very sandy clayey course angular GRAVEL and COBBLES (up to 150mm x 150mm x 10mm) of limestone, assessed from pit walls as dense (highly to completely weathered limestone)  Yellow and light grey very thinly bedded moderately to highly weathered moderately strong to strong LIMESTONE		
weathered limestone)  Yellow brown very sandy clayey course angular GRAVEL and COBBLES (up to 150mm x 150mm x 10mm) of limestone, assessed from pit walls as dense (highly to completely weathered limestone)  Yellow and light grey very thinly bedded moderately to highly weathered moderately strong LIMESTONE		
Yellow and light grey very thinly bedded moderately to highly weathered moderately strong 1.10		
Yellow and light grey very fining bedded moderately to highly weathered moderately strong 1.10		
End of Borehole at 1.10 m		
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	Logged by	Checked by
l de la companya de la companya de la companya de la companya de la companya de la companya de la companya de	Scale	
Notes: Malgripls are described in accordance with BS 5930:1999.		Checked by



PELL FRISCHMANN CONSULTANTS LTD	٦	TRIAL !	PIT RE	CORD			Trial Num	
SITE: Bicester	EQUIPME	NT AND ME	ETHODS:				T	P26
CLIENT: A.D Woodły	GROUND 0.000	LEVEL		COORDINA 156591.00		979.00	DATE	20/08/2001
STRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)		SAMPLI Type	ES/TES	TS Test	INSTALLATIONS
TOPSOIL: Mid brown soft fibrous sandy clayey TOPSOIL with rootlets and organics (5%) and occasional flint and limestone gravel		0.36		0.36	D			
Orange brown moderately firm cohesive sandy CLAY		0.80						
Yellow grey moderately strong medium to coarse grained broken moderately weathered LIMESTONE in a yellow moderately coarse damp sandy clayey matrix (CORNBRASH)		0.90						
End of Borehole at 0.90 m			:					
	or my and a second of the seco						The state of the s	
					\$ : : : : : : : : : : : : : : : : : : :			
	<b>2</b> .							
		en (n. 1. 2. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	And the second s					
	The second secon							
					: :			
					:			
							Logged	d by Checked
Remarks  Trial pit terminated at 0.9m in Cornbrash, as no further progress could be made	e. Samples: TP26 S	st 0.36m					Scale 1.25 Figur	Sheet 1

Trial Pit TRIAL PIT RECORD PELL FRISCHMANN Number CONSULTANTS LTD TP27 EQUIPMENT AND METHODS: Bicester COORDINATES GROUND LEVEL 20/08/2001 E: 456615.00N: 221792.00 CLIENT: 0.000 A.D Woodly SAMPLESITESTS INSTALLATIONS/ LEVEL DEPTH KEY BACKFILL STRATA DESCRIPTION (mAOD) Type (Thick) 0.00 TOPSOIL: Mid brown soft fibrous sandy clayey TOPSOIL with rootlets and organics (5%) and occasional flint and limestone gravel 0.30 Grey brown mottled very stiff cohesive silty sandy 0.72 Orange brown and grey mottled stiff friable silty clay with light grey coarse grained angular LIMESTONE gravel and cobbles 1.00 Yellow grey moderately strong medium to coarse rained very loose broken moderately weathered LIMESTONE in a yellow moderately coarse damp sandy clayey matrix (CORNBRASH). Becomes more competent and difficult to excavate with depth depth 1.80 End of Borehole at 1.80 m Checked by Logged by Remarks Scale Trial pit terminated at 1.80m in Combrash, as no further progress could be made. Samples: TP27 S1 0.5kg Pot, TP27 S1 0.3-0.7m, TP27 S2 Sheet 1 of 1:25 Figure Notes:
Materials are described in accordance with 8S 5930;1999.
Materials are described in accordance with 8S 5930;1999.
MATERIALS are in metres. Thicknessess given in brackets in depth column



## PELL FRISCHMANN CONSULTANTS LTD

TRIAL PIT RECORD

Trial Pit Number

Figure

EQUIPMENT AND METHODS:

**TP28** 

TRATA DESCRIPTION  KEY DEPTH LEVEL SAMPLES/TESTS INSTALLATIONS (TRACK)  Open Type No Test BACKPAL  TOPSOIL Mid brown soft Brows sandy clayey COO  TOPSOIL with rootless and organics (5%) and coccasional filtra dimenstron graves (5%) and coccasional filtra dimenstron graves (5%) and coccasional filtra dimenstron graves medium to colors highly earliered limestone graves coarse grained very weak coarse grained very weak coarse grained were concessive stay CLAY with coccasional filtra dimenstration graves and concess sity can grained were concessive stay CLAY with coccasional varieties and concessive stay CLAY with coccasional robust of the concession of th	ENT: A.D Woodly	GROUND 0.000	LEVEL		00RDINA 56656.00		300.00	DATE	20/08/2001
OPSOIL: Mid brown soft fibrous sandy clayery CPSOIL: who recletes and organics (5%) and CPSOIL: who recletes and organics (5%) and CPSOIL: who recletes and organics (5%) and CPSOIL: who recletes and organics (5%) and CPSOIL: o		KEY	DEPTH	LEVEL		SAMPLE	ES/TES	TS	INSTALLATIONS
COPSIDL. Mid prown soft histories and organics (SN) and coasonal mid and c	RATA DESCRIPTION			(mAOD)	Depth	Туре	No	Test	BACKFILL
Mid brown stiff to firm cohesive stilly CLAY with gray moderately weak medium to coarse highly weathered limestone gravel (fellow brown and grey weak coarse grained very coce stilly standy GAV stand	OPSOIL with rootlets and organics (5%) and				0.23	D		·	,
Park blue occasionally brown and yellow motified wery stiff cohesive fissured stiffy CLAY with accasional grape moderals. Becomes more competent with depth, resembling a dark blue grey occasionally orange motified wery stiff cohesive fissured stiffy CLAY with accasional orange moderals. Becomes more competent with depth, resembling a dark blue grey occasionally orange motified very stiff fissured slightly weathered sity mudistone at 3.40m.  End of Berehole at 3.40 m.  Construction of Ber	id brown stiff to firm cohesive silty CLAY with rev moderately weak medium to coarse highly		0.33		0.33	В			
Dark blue occasionally brown and yellow mottled very stiff cohesive fissured slitty CLAY with scasional orange moderately coarse sandy fissures at increasing depths. Secones more competent with depth, resembling a dark blue grey occasionally orange mottled and standard slightly weathered sity mudstone at 3.40m.  End of Borehole at 3.40 m.  Chy on tion A2 my its OK.  Cappe 16 M. OK.  Suiphake TT3 M. OK.	ellow brown and grey weak coarse grained very								-
Dark blue occasionally brown and yellow mottled very stiff cohesive fissured silly CLAY with blue processional orange moderately social estandy control of the control of t	ery weak coarse grained highly weathered								
Dark blue occasionally brown and yellow mottled very stiff cohesive fissured sitty CLAY with second part of the common department of the common de									
Dark blue occasionally brown and yellow mottled very stiff cohesive fissured silty CLAY with blue cocasional orange moderately ose which yellow more more standard processor of the company of the compan									
Dark blue occasionally brown and yellow mortled yers stiff cohesive fissured stiff. CLY with concessional orange moderately coarse sand some sources or stiff issured stiff issured consistency and the public responsibility or stiff fissured consistency with the public responsibility orange motified very stiff fissured consistency weathered sity mudstone at 3.40 m.  End of Borehole at 3.40 m.  Chyper 16 m. OK.  Zinc. 87 GK.  Sulphake. 773 m. OK.			1.50						
scasional orange moderately coarse sardy sissures at increasing depths. Becomes more competent with depth, resembling a dark blue gray occasionally orange motted every stiff fissured slightly weathered sity mudstone at 3.40 m  End of Borehole at 3.40 m  Chromism 43 mg/l/g CK  Chromism 43 mg/l/g CK  Chromism 43 mg/l/g CK  Sulphake. 773 m CK	en/ stiff cohesive fissured stity CLAY WITH		1.50						
End of Borehole at 3.40 m  O. 32 m. depth  Chromium 42 mg/kg OK  Copper 16 m. OK  Sulphake. 713 m. OK	ccasional orange moderately coarse sandy surveys at increasing depths. Becomes more								
End of Borehole at 3.40 m  O.03 m depth  Chromium 42 mg/kg OK  Capper 16 u OK  Zinc 87 GK  Sulphate 773 v OK	ccasionally orange mottled very stiff fissured lightly weathered silty mudstone at 3.40m								
End of Borehole at 3.40 m  O.03 m depth  Chromium 42 mylkg OK  Capper 16 m OK  Zinc 87 m OK  Sulphate 773 m OK									
End of Borehole at 3.40 m  O. 3 m depth  Chromium 42 mg/kg OK  Capper 16 m OK  Zinc 87 m GK  Sulphake. 773 m OK									
End of Borehole at 3.40 m  O. 3 m depth  Chromium 42 mg/kg OK  Capper 16 m OK  Zinc 87 m GK  Sulphake. 773 m OK				•		.i			.'
End of Borehole at 3.40 m  O. 3 m depth  Chromium 42 mg/kg OK  Capper 16 m OK  Zinc 87 m GK  Sulphake. 773 m OK									
End of Borehole at 3.40 m  O. 3 m depth  Chromium 42 mg/kg OK  Capper 16 m OK  Zinc 87 m GK  Sulphake. 773 m OK				:					
End of Borehole at 3.40 m  O. 3 m depth  Chromium 42 mg/kg OK  Capper 16 m OK  Zinc 87 m GK  Sulphake. 773 m OK									'
Capper 16 4 OK  Zinc 87 11 OK  Sulphate 773 0 OK	End of Borehole at 3.40 m		3.40						
Capper 16 4 OK  Zinc 87 11 OK  Sulphate 773 0 OK					· •				-
Capper 16 4 OK  Zinc 87 6K  Sulphake 778 OK	O.O.S. depth				•				
Zinc 87 GK. Sulphate. This work	Chronium 42 mg/					٠.		and the second	
Sulphate. The OK	• • • • • • • • • • • • • • • • • • • •								
	Subhake TB.	OW	·		e N		!	ļ.,.	
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PELL FRISCHMANN CONSULTANTS LTD	Ţ	RIAL	PIT RE	CORD		-	Trial Numl		
Bicester	EQUIPMEN	NT AND ME	ETHODS:		,		TI	29	
LIENT: A.D Woodly	GROUND (	EVEL		COORDINA 56651.00		451.00	DATE	20/08/20	01
STRATA DESCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)	Depth	SAMPLI Type	ES/TES	TS Test	INSTALLATIO BACKFILL	1
TOPSOIL: Mid brown soft fibrous sandy silty TOPSOIL with rootlets and organics (5%) with very occasional fine flint and limestone gravel.		0.30		Берит	, , , , ,				
Mid brown stiff to firm cohesive silty CLAY with grey moderately weak medium to coarse grained highly weathered limestone gravel									
		1.20	1	1. <u>8</u> 0 1.20	D B				
Yellow and grey weak coarse grained very loose silty SAND with much light grey and yellow very weak coarse grained highly weathered limestone gravel		1.60							
Dark blue grey occasionally orange mottled very stiff cohesive fissured silty CLAY with occasional orange moderately coarse sandy fissures at increasing depths. Becomes more competent with depth, resembling a dark blue grey occasionally orange mottled very stiff fissured slightly weathered silty MUDSTONE at 2.70m									
		2.70							
End of Borehole at 2.70 m	<b>.</b>				·				
						-			
					: !				
Remarks			TD30 C3				Logg	•	ked by
Trial pit terminated at 2.70m in Mudstone, as no further progress could be no Notes:  Materials are described in accordance with BS 5930:1999.  Materials are described in accordance with BS 5930:1999.  Materials are described in accordance with BS 5930:1999.		∌ S1 1,2 - 1.öπ	1 1F4# 34				1:25 Fig	She	et 1 of



# PELL FRISCHMANN CONSULTANTS LTD

Notes: Malerials are described in accordance with BS 5930:1999. Artispins and reduced levels are in metres.Thicknessess given in brackets in depth column

TRIAL PIT RECORD

Trial Pit Number

EQUIPMENT AND METHODS:

TP30

INT:	GROUND 0.000	LEVEL	E: 4	COORDINA 456651.00	TES N: 2212	i i	DATE	20/08/2	2001
A.D Woodly  ATA DESCRIPTION  PSOIL: Mid brown fibrous sandy silty TOPSOIL or rootlets and organics (5%) with very casional fine flint and limestone gravel is brown and orange moderately firm friable silty ody sandy CLAY with occasional orange derately coarse sandy fissures and grey derately weak medium to coarse grained highly athered LIMESTONE gravel slow and grey weak coarse grained loose silty ND with light grey and yellow very weak coarse sined highly weathered LIMESTONE gravel sined highly weathered LIMESTONE gravel sined highly weathered LIMESTONE gravel silty CLAY with occasional range moderately coarse sandy fissures. ecomes more competent with depth, resembling a park blue grey occasionally orange mottled very siff fissured slightly weathered silty MUDSTONE			1 EVE		S/TEST	ΓS	INSTALLATIO		
RATA DESCRIPTION	KEY	OEPTH (Thick)	(mAOD)	Depth	Туре	No	Test	BACK	FILL
PSOIL: Mid brown fibrous sandy silty TOPSOIL h rootlets and organics (5%) with very		0.00		0.20	D	-	İ		
d brown and orange moderately firm fnable sitty ndy sandy CLAY with occasional orange oderately coarse sandy fissures and grey oderately weak medium to coarse grained highly sathered LIMESTONE gravel		0.50	: 						
bllow and grey weak coarse grained loose silty AND with light grey and yellow very weak coarse ained highly weathered LIMESTONE gravel		percent of the state of the sta							
					a management of the second				
		2.00		1.80	)				
park blue grey occasionally orange mottled very tiff conesive fissured silty CLAY with occasional orange moderately coarse sandy fissures. Secomes more competent with depth, resembling a lark blue grey occasionally orange mottled very tiff fissured slightly weathered silty MUDSTONE at 3.0m			· · · · · · · · · · · · · · · · · · ·						
End of Borehole at 3.00 m		3.00				A COMMENT OF THE PARTY OF THE P			
EUG OI POLETICIE SC 2:20 W					÷ '.				
Mass no.0									
Chromium 30 mg	·	• .							
Nieval 16 0	ove ove		*						
18 1 Stylica - 418 11	OK								
				e ur e e					
							Lo	gged by	Check

TRIAL PIT RECORD Trial Pit PELL FRISCHMANN Number CONSULTANTS LTD **TP31** EQUIPMENT AND METHODS SITE: Bidester DATE COORDINATES GROUND LEVEL 20/08/2001 E: 456651.00N: 221151.00 CLIENT: 0.000 A.D Woodly SAMPLES/TESTS INSTALLATIONS/ DEPTH LEVEL KEY BACKFILL STRATA DESCRIPTION (mAOD) Depth (Thick) 0.00 TOPSOIL: Mid brown moderately cohesive clayey TOPSOIL with rootlets and organics (5%) with very occasional fine flint and limestone gravel 0.26 D 0.26 Mid brown and orange soft becoming firm moderately cohesive sandy becoming firm moderately cohesive sandy becoming silty with depth CLAY 0.70 Blue grey occasionally orange mottled very stiff cohesive fissured silty CLAY with occasional orange moderately coarse sandy fissures and grey moderately weak medium to coarse grained highly weathered limestone gravel 0.87 at 0.870: Brown and orange moderately weak medium to coarse grained broken weathered LIMESTONE in a grey and yellow moderately coarse damp sandy clayey matrix (CORNBRASH) End of Borehole at 0.87 m Checked by Logged by Remarks Scale Trial pit terminated at 0.87m in Combrash, as further progress could be made. Samples: TP31 0.5kg Pot, TP31 S1 0.87m Sheet 1 of 1 1:25 Figure nuies. Materials are described in accordance with BS 5930:1999. Artigans and reduced levels are in metres. Thicknessess given in brackets in depth column

PELL FRISCHMANN CONSULTANTS LTD	PELL FRISCHMANN TRIAL PIT RECORD CONSULTANTS LTD										
BIGCHMANNI ITE: Bicester	EQUIPME		TP32								
LIENT: A.D. Woodly	GROUND 0.000	LEVEL	E:	COORDINA 456798.00		591.00	DATE	07/08/2001			
	KEY	DEPTH	LEVEL		SAMPLE	S/TES	TS	INSTALLATION			
TRATA DESCRIPTION		(Thick)	(mAOD)	and the second s	Туре	No	Test	BACKFILL			
TOPSOIL		0.00		0.10	D			. * *			
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)		0.60		0.50	D						
Yellow and light grey very thinly bedded moderately to highly weathered moderately strong to the strong LIMESTONE		0.80				٠.					
End of Borehole at 0.80 m					·			-			
			• •								
0.5m depth											
Areania 18 mg/leg OK											
Nietro 1 29 OK.											
No 4 155 stanfelus											
	Ž.				:	To the second se					
				ver production of the second				to the second se			
		·					The state of the s				
		<u>.</u>									
					: :	a mean and the property of the					
						1					
				- : <u>'_</u> ,.		_!	Logged	by Checke			
Remarks  No groundwater encountered, trial pit stab	le through	out, unabl	e to prog	gress below	0.8m		Scale 1:25 Figui	Sheet			

ERIBCHMANN	PELL FRISCHMANN CONSULTANTS LTD	T	RIAL	PIT RE	CORD			Trial Num	
SITE: Bicester		EQUIPMEN	NT AND M	ETHODS:				T	P33
CLIENT: A.D Wo	odly	GROUND L 0.000	EVEL	E:	COORDINA 456749.00		2473.00	DATE	07/08/2001
STRATA DES	SCRIPTION	KEY	DEPTH (Thick)	LEVEL (mAOD)	and the second second second		ES/TES		INSTALLATIONS/
TOPSOIL			0.00	(1111100)	0.10	Type D	NO .	Test	BACKFILL
Red brown ven GRAVEL and C from the pit wal weathered lime	y sandy clayey coarse angular COBBLES of limestone, assessed Ils as dense (highly to completely estone)		0.25		0.50 0.50	B <sub>D</sub>			
1	it grey very thinly bedded nighly weathered moderately strong STONE and of Borehole at 1.00 m		1.00						
	0.5 depth								
	Arsenie 17 mg/kg o Chromium 18 11 OK Wided 27 m OK	16							
	Sulphate 783 " OK.	<b>2</b>							
				·					, <u></u>
							Andrew Common to the common to		
				:					
							The state of the s		
Remarks						·	1	Logged t	Checked by
	Dundwater encountered, trial pit stable in accordance with 8S 5930:1999 evels are in metres Thicknessess given in brackets in depth o		it, unable	e to progre	ess below	1m		Scale 1:25 Figure	Sheet 1 of 1

. 1

PELL FRISCHMANN CONSULTANTS LTD	T	:	Trial Pit Number									
E: Bicester	EQUIPMEN	IT AND ME	THODS				TP34					
ENT:	GROUND L 0.000	EVEL	E: 4	COORDINA 56775.00	86.00	DATE	ATE 07/08/2001					
A.D Woodly	KEY !	DEPTH	LEVEL :		SAMPLE	S/TES	TS Test	INSTALLATI BACKFIL				
RATA DESCRIPTION		(Thick) 0.00	(mAOD)	0.10	Type D		1630	<i>D</i> , (0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,				
OPSOIL		0.30						-				
ed brown very sandy clayey coarse angular RAVEL and COBBLES of limestone, assessed om the pit walls as dense (highly to completely reathered limestone)			:	0.50	D							
		0.80										
ellow brown very sandy clayey course angular SRAVEL and COBBLES (up to 150mm x 150mm x 00mm) of limestone, assessed from pit walls as tense (highly to completely weathered limestone)												
fellow and light grey very thinly bedded		1.30 1.40										
reliow and light grey very thirmy because income noderately to highly weathered moderately strong o strong LIMESTONE  End of Borehole at 1.40 m	-							·				
					<u>.</u>							
O.Im depth			<del>.</del>	General Control of the Control		1						
clea Arsenic 23 mg/kg >20			*									
Chronium 38 mg/kg ok Lead 19 11 OK		i										
Copper 16 4 0K	<b>걸.</b>											
VICTOR 2	<u> </u>											
Suppriore 753 " OK												
								-				
		•				and the state of t						
									. 1			
Remarks		hle to or	ogress bel	ow 1.4m			Logg	,	ecke			
Remarks  No groundwater encountered, trial pit u	nstable, una	יט טיי פוטנ	- g V.				1:25 Figt		eet 1			

## PELL FRISCHMANN CONSULTANTS LTD

TRIAL PIT RECORD

Trial Pit Number

EQUIPMENT AND METHODS:

**TP35** 

SITE: Bicester	EQUIPMEN	1P35						
CLIENT: A.D Woodly	GROUND I 0.000	EVEL		COORDINA 156799.00		DATE	07/08/2001	
	KEY	DEPTH	LEVEL		SAMPLES/TEST		TS	INSTALLATIONS/
STRATA DESCRIPTION		(Thick) 	(mAOD)	Depth	Туре	No	Test	BACKFILL
TOPSOIL		0.30		0.20	D			
Red brown very sandy clayey coarse angular GRAVEL and COBBLES of limestone, assessed from the pit walls as dense (highly to completely weathered limestone)		0.70		0.50	В			
End of Borehole at 0.70 m	00.0000	0.70						
			-					
	:					St. St. St. St. St. St. St. St. St. St.	-	
				:	-			
	<b>2</b> .				•			
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			ra i			i	Logged	by Checked t

Remarks

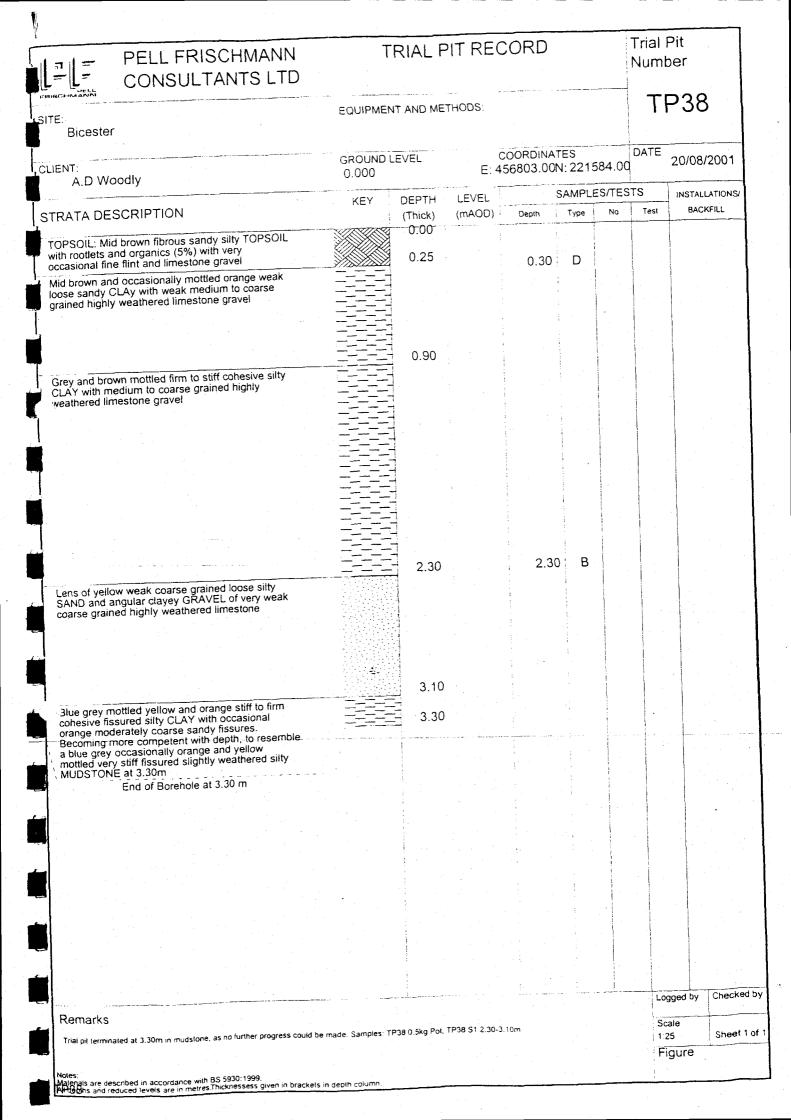
No groundwater encountered, trial pit unstable, unable to progress below 0.7m due to boulders of limestone

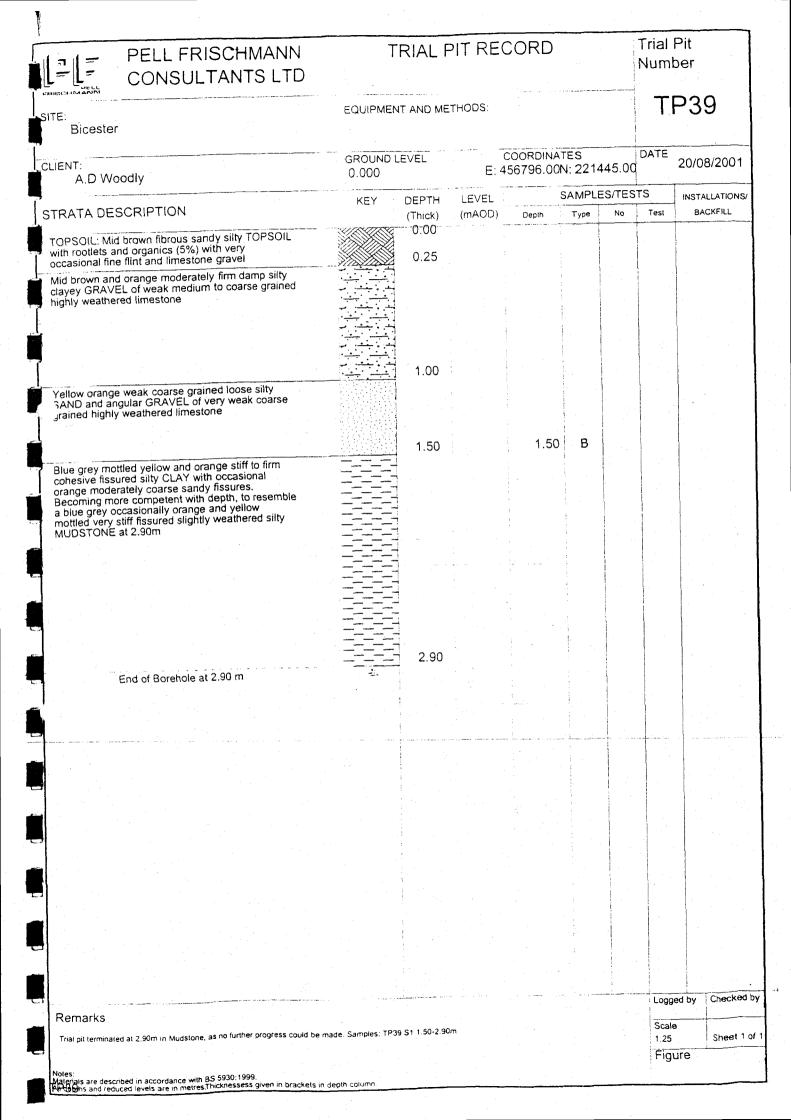
Scale Sheet 1 of 1 1:25 Figure

Malenals are described in accordance with BS 5930-1999. AHTHODINS and reduced levels are in metres.Thicknessess given in brackets in depth coli

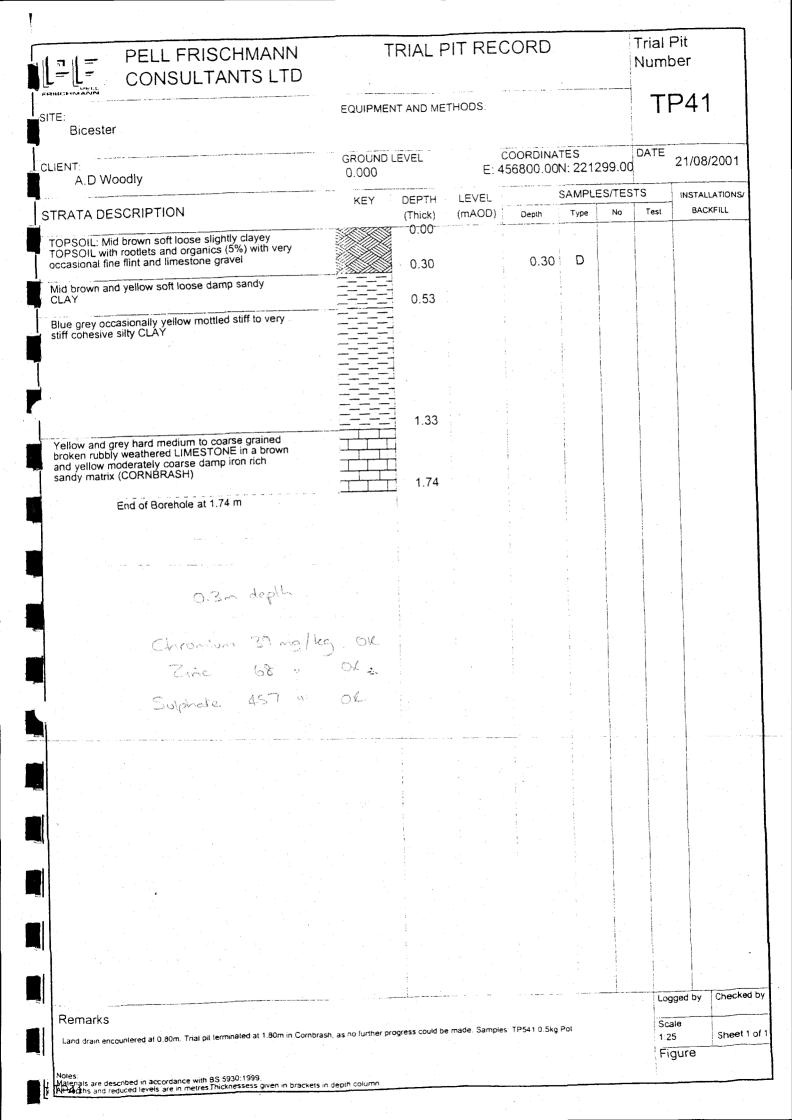
PELL FRISCHMANN CONSULTANTS LTD	T		Trial Pit Number							
Bicester	EQUIPMEN	IT AND ME	THODS:				TP36			
ENT:	GROUND L 0.000	EVEL	COORDINATES E: 456771.00N: 2219			32.00	DATE	20/08/200		
A.D Woodly	KEY	DEPTH	LEVEL		SAMPLE	ES/TES	TS	INSTALL	ATIONS/	
RATA DESCRIPTION		(Thick)	(mAOD)	Depth	Туре	No	Test .	BACK	FILL	
OPSOIL: Mid brown soft fibrous silt clayey OPSOIL with rootlets and organics (5%)		0.20								
ght orange and brown weak loose friable silty LAY with grey moderately weak medium to parse grained highly weathered limestone gravel		0.50		0.50	W					
ellow grey strong hard medium to coarse grained roken moderately weathered LIMESTONE in a ellow/tan moderately coarse damp sandy calyey hatrix (CORNBRASH)		1.00								
End of Borehole at 1.00 m		1.50								
					1					
Suphate 46										
Suphate 46	洲									
		land to	1		: :					
	<u> 21</u> ,				1					
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		a y Employment Community	make apply to the second of the con-							
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	2 2 - 4 2				:		ŀ.			
				:	·					
- April			and the supplementation of the supplementatio						Checke	
Remarks  0.5m water sample remoned from base of pit after approx. 5 mins. Trial pit	t terminated at 1.0m	in Combrash,	as no further pr	ogress could be	made. Sar	mples: TP	36 1L <b>visite</b> 1:2	He 5	Sheet	
U.5m water sample removied from page of page 2.							Fi	gure		

PELL FRISCHMANN CONSULTANTS LTD	T	RIAL P	IT REC	ORD	· 	:	Trial Pit Number				
HIMACIN	EQUIPMEN	T AND ME	THODS:				TI	P37			
Bicester	GROUND LEVEL COORDINATES 0.000 E: 456800.00N: 221754.00							DATE 20/08/2001			
NT: A.D Woodly	0.000				SAMPLE		TS .	INSTALLA	ATIONS/		
RATA DESCRIPTION	KEY	DEPTH (Thick)	(mAOD)	Depth	Туре	No	Test	BACKE	FILL		
OPSOIL: Mid brown soft clayey TOPSOIL with other and organics (5%) with very occasional office and timestone gravel		0.25		0.25	D						
ght/mid brown soft damp moderately cohesive ty sandy CLAY becoming wetter with depth											
ellow and grey hard medium to coarse grained roben rubbly weathered LIMESTONE in a brown		0.85									
roken rubbly weathered LIMESTONE III a blown nd yellow moderately coarse wet sandy clayey natrix (CORNBRASH)											
7 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -		1.60	:								
End of Borehole at 1.60 m											
Arsenic 15 mg/kg			Tarin kanan					-			
Arsenia 15 mg/kg of Chromlin 50 u of	SK j										
Cobbs. 31 " Ox	<u>.</u> 2. <del>2.</del> .						and the second s				
Nickel de			عمل الأسلامي عمل عمل عمل المساعد						a again san an anns sa		
Sulphate 564" OK											
				• 1			Consession and the second seco				
				ما والسور ا				ogged by	Check		
Remarks  Water encountered at 1.60m insufficient for sample. Trial pit terminated a	at 1,60m in Combra	sh, as no furth	er progress cou	d be made. Sa	imples: TP3	7 0.5kg P	ot S	Scale 1:25 Figure	Sheet		





	PELL FRISCHMANN CONSULTANTS LTD	T	T <del>ria</del> l Pit Number							
ITE: Bicester		EQUIPMEN	TP40							
LIENT:		GROUND L 0.000	EVEL	E: 4	299.00	DATE	21/08	/2001		
A.D Wo	odly		DCDTU	LEVEL		SAMPLE		L	INSTAL	LATIONS/
TRATA DES	CRIPTION	KEY	DEPTH (Thick)	(mAOD)	Depth	Туре	No	Test	BAC	KFILL
TOPSOIL: Mid TOPSOIL with occasional fine	brown moderately cohesive clayey rootlets and organics (5%) with very flint and limestone gravel		0.29		0.29	D				
Mid brown and moderately coh with occasiona Blue grey occa cohesive fissur occasional ora sandy fissures red very coars	orange soft becoming firm nesive silty slightly sandy CLAY I fine angular limestone gravel sionally yellow mottled stiff to firm red damp silty CLAY with nge and yellow moderately coarse , and small (<1m) dark brown and e damp iron rich sand lenses		0.40							
								No. of the last of		
matrix (CORN	low and grey hard to very hard arse grained broken well cemented litic LIMESTONE in a brown and ately coarse damp sandy clayey IBRASH)		2.30 2.30							
		<b>.</b>	*							
										a in man can suppress a second
							-			
			<u> </u>		and the second			Logg	ed by	Checked
Remarks Trial pit terminate	d at 2.30m in Combrashm, as no further progress could b	se made. Samples: T	P40 0.5kg Pol	·				Scale 1:25 Fig		Sheet 1 o



EMBCHMANN	PELL FRISCHMANN TRIAL PIT RECORD CONSULTANTS LTD										Trial Pit Number					
SITE:		1.	-	EQUIPME	TP42											
Bicester																
CLIENT:	nodiv			GROUND 0.000	LEVEL	E: 4	COORDINA 56961.00	TES N: 2225	34.00	DATE	07/08/2001					
				KEY :	DEPTH	LEVEL		SAMPLE	S/TES	TS	INSTALLATIONS	š/				
STRATA DES	SCRIPTION				(Thick)	(mAOD)	Depth 0.10	Туре	No	Test	BACKFILL	-				
TOPSOIL					0.25		0.10									
Yellow brown v angular GRAV assessed as d completely we	very clayey slightly EL and COBBLES lense in pit walls (I athered limestone	y sandy coarse 5 of limestone, highly to )					0.50	D								
•					0.90											
strong LIMES	ly bedded modera TONE Ind of Borehole at				0.90 0.95					The state of the s						
· ·	and the second s															
	0-1~	-depth			Dation	doph	: :									
	Λ	·														
	Arsenik S Janomium				per e											
€. 1	Lead ?		OK						f.							
ļ	Jidret .		ÖK				:									
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	Sulphoste 9		OK		895		:									
				- '												
and the second s			The second secon									:				
						•										
								: :								
						*		† 								
			;			an and a second sec		*		Logge	d by Checker	d bv				
Remarks						05				Scale	G Dy CHOCKE	-, 				
No groundwater en	ncountered, trial pil show	ing same minor insta	bility 0.25-0.9n	n, unable to progre	ess pil below 0	mce,				1:25	Sheet 1	of ·				
Notes: Malerials are describe	ed in accordance with B	S 5930:1999.								Figu	1 <del>0</del>					