Defence Estates

Roussillon Barracks, Chichester

Geotechnical Site Investigation

Final Factual Report
DE Project No. 12123/2

October 2007

Entec UK Limited

Prepared by Entec UK Limited for the Ministry of Defence, under commission DE4/4513

Report for

Defence Estates
D Ops North – CST, EMG
St George's House
Kingston Road
Sutton Coldfield
West Midlands
B75 7RL

Main Contributors

Ross Muir
Ed Gilligan

Issued by

[redacted]

Ed Gilligan

Approved by

[redacted]

.....

Dave Williams

Accepted by Task Officer

.....

Accepted by Project Sponsor

.....

Entec UK Limited

17 Angel Gate
City Road
London EC1V 2SH
England
Tel: +44 (0) 207 843 1400
Fax: +44 (0) 207 843 1410

20636-RR029i1

h:\mod projects\20636 roussillon bks chichester si (subfile)\docs\roussillon final report oct 2007\rr029i2.doc

Defence Estates

Roussillon Barracks, Chichester

Geotechnical Site Investigation

Final Final Factual Report
DE Project No. 12123/2
DE Project Number 12123/2

October 2007

Certificate No. FS 13881

Certificate No. EMS 69090

Document Revisions

No.	Details	Date
01	Draft Report	Sept 07
02	Final Report	Oct 07

Executive Summary

Introduction and Terms of Reference

Entec UK Ltd (Entec) was commissioned by Defence Estates (DE) to undertake a Geotechnical Investigation of the Roussillon Barracks site. The purpose of the investigation is to provide outline factual geotechnical and topographical data to support disposal of the site.

Site Location, Description and History

Roussillon Barracks is located approximately one mile north of Chichester city centre in the county of West Sussex as shown in Figure 1 and lies off Broyle Road. It is centred on National Grid Reference SU 861 063.

The site covers an area of approximately 15 hectares. It was first developed during the Napoleonic Wars (1799 - 1815) and was acquired by the military in 1812. The site was used as a barracks by the Royal Sussex Regiment following its formation in 1881 and was further developed by the Royal Military Police as a training school from 1964.

More recent developments on the site include refurbishment of existing buildings and construction of additional accommodation buildings.

The site is underlain by Gravel Head Deposits which are thought to consist of variable gravels, sands, silts and clays. The hydrogeological map of the area indicates the site to be underlain by Brickearth and Coombe deposits which comprise silty loams, sands and clays.

The drift deposits are underlain by the Reading Beds comprising mottled clays with a basal bed of pebbles at depth. The southern end of the site is shown to be underlain by London Clay comprising bluish grey clay. The London Clay, if present is underlain by the Reading Beds. The Cretaceous Upper Chalk underlies the Reading Beds at depth.

The site is underlain by a Minor Aquifer comprising Gravel Head Deposits and the Reading Beds.

Environmental Setting

The site is underlain by Gravel Head Deposits which are thought to consist of variable gravels, sands, silts and clays. The hydrogeological map of the area indicates the site to be underlain by Brickearth and Coombe deposits which comprise silty loams, sands and clays.

The drift deposits are underlain by the Reading Beds comprising mottled clays with a basal bed of pebbles at depth. The southern end of the site is thought to be underlain by London Clay comprising bluish grey clay. The London Clay, if present is underlain by the Reading Beds. The Cretaceous Upper Chalk underlies the Reading Beds at depth.

Site Investigation and Ground Conditions

The site investigation works comprised drilling of 11 window sample boreholes, drilling of 13 cable percussion boreholes and excavation of 8 trial pits, with associated soil sampling and geotechnical testing, both in situ and laboratory based.

The geological sequence generally comprised the following:

- Topsoil;
- Made Ground;
- Drift (Gravel Head Deposits);
- Clay (Reading Beds/London Clay).

Made Ground

A variable thickness of Made Ground was encountered, generally consisting of reworked natural ground with a minor proportion of inert building waste (brick rubble, concrete, timber, metal fragments).

Natural Ground

The Made Ground, where present, was underlain by drift deposits of a relatively consistent thickness across the site (approximately 6m). The drift comprised variable gravels and clay gravels, sands and gravely clays and clays. Generally, coarse clayey gravels up to 3.2m in thickness were underlain by gravely sands up to 5.5m thick.

The drift deposits were underlain by Reading Beds over the majority of the site at relatively consistent depth of approximately 6 m bgl with the exception of the south west of the site where the drift deposits were underlain by London Clay with Reading Beds beneath. In this area of the site the Reading Beds were found at a depth of approximately 11 m to 15 m bgl.

The Reading Beds were found to consist of stiff to very stiff red and grey mottled sandy clays. The London Clay is firm to stiff blue/grey slightly sandy clay, which in places was thickly laminated with silt with thin laminations of fine to medium sand.

Groundwater

Groundwater was encountered at the majority of locations across the site, within the drift deposits. Water levels were generally around 3 m bgl across the site. Seven boreholes were installed with groundwater monitoring apparatus and monitored daily, after completion, for the duration of the works. Gas monitoring was also carried out.

Contents

1. Introduction

1.1 Terms of Reference

1.1.1 Background

Entec UK Ltd (Entec) was instructed to carry out a geotechnical site investigation at the Roussillon Barracks site in Chichester to provide factual geotechnical information to support disposal of the site.

1.1.2 Aims and Objectives

The objectives of the project are to undertake a Geotechnical Investigation of the Barracks site in order to inform prospective purchasers and assist disposal of the site. It is understood that a Phase Two LQA of the site has been carried out with an initial intrusive investigation having been carried out in February 2007 and additional investigation in July 2007. The following key objectives were identified for the investigation:

- Establish the spatial and vertical distribution of drift deposits across the site including review of limited existing site investigation data;
- Establish the outline engineering parameters of the materials present on site through a combination of engineering description, in-situ testing and laboratory testing;
- Factual reporting of the findings of the investigation;
- Archaeological Desk Study to inform on potential constraints to the proposed site investigation and future development of the site;
- Topographical Survey showing exploratory locations, trees covered by tree protection orders and other architectural features of note.

It is important to note that the purpose of the geotechnical investigation and testing is to provide outline engineering parameters and an indication of the spatial distribution of materials across the site. Further development-specific geotechnical investigation will still be required once the layout and structural loadings of any proposed development had been established to confirm local ground conditions and design parameters.

1.1.3 Future Site Use

It is understood that the site is to be sold off in stages. Initially, the southern area of the site is to be sold off for residential development with existing properties in the north of the site retained by Defence Estates (DE). The Green in the centre of the site is likely to remain largely undeveloped.

2. Site Setting

2.1 Site Location

Roussillon Barracks is located approximately one mile north of Chichester city centre in the county of West Sussex as shown in Figure 1 and lies off Broyle Road. It is centred on National Grid Reference SU 861 063.

2.2 Site Description

2.2.1 General

The site covers an area of approximately 15 hectares. It was first developed during the Napoleonic Wars (1799 - 1815) and was acquired by the military in 1812. The site has been used as a barracks by the Royal Sussex Regiment following its formation in 1881 and was further developed by the Royal Military Police as a training school from 1964. More recent developments on the site include refurbishment of existing buildings and construction of additional accommodation buildings.

The barracks comprise a mix of brick-built buildings of up to three storeys in height, most of which date to phases of building in the 1870s, 1930s and 1960-90s. In addition there is a large open grassed space (The Green) which was laid out as a parade ground in the nineteenth century.

The northern part of the site is largely occupied by Family Services Accommodation with associated play areas and the Officers Mess. To the south of these, and to either side of The Green are a range of administrative and mess buildings, with a large accommodation block (The Sandhurst Block) to the south of The Green.

South of the Sandhurst Block is a car park and motor maintenance area, whilst there is an assault course is in the southwest corner of the site.

2.2.2 Site Boundaries

The majority of the site is bordered by roads, beyond which are residential properties. The south east of the site is directly bordered by residential properties.

2.2.3 Buried Services

The full range of services is present at the site, which is consistent with the development which is currently in place and the operational nature of the site. Full service plans were made available to Entec including electric, gas, water, foul sewer and telecoms. These were collated and made available to the site supervisor and contractors during the works and are presented in Annex D.

2.3 Site History

2.3.1 Historical Development

Full details of historical and more recent use of Roussillon Barracks are given in the Enviros Consulting Ltd Phase 2 LQA Report June 2007.

Chichester is a city of Roman origin, which continued to be occupied during the Medieval period, and is therefore of high archaeological interest. Based on this, it appears that there is a potential for the presence of archaeological remains within the site, which could have implications for the completion of site investigation works and the eventual disposal of the site. To investigate this, a cultural heritage desk-based assessment was carried out. This is presented in Annex E.

2.4 Environmental Setting

2.4.1 Geology

The geology map of the area (1:50,000 Sheet 317 Drift Edition, Chichester) indicates that the site is underlain by Gravel Head Deposits which are likely to consist of variable gravels, sands, silts and clays. The hydrogeological map of the area indicates the site to be underlain by Brickearth and Coombe deposits which comprise silty loams, sands and clays.

The drift deposits are shown to be underlain by the Reading Beds comprising mottled clays although London Clay, which is a bluish grey clay with a basal bed of pebbles at depth, is shown to be present between the drift and the Reading Beds beneath the southern end of the site. The Cretaceous Upper Chalk underlies the Reading Beds at depth.

A reference in the Phase One LQA indicates that the drift deposits across the site range in thickness between 15 m and 22 m. The report also references a BGS borehole 370m to the west of the site which indicates the thickness of London Clay and Reading Beds over the Chalk to be 45m.

Recent investigations undertaken as part of a Phase 2 LQA included drilling of ten shallow window sample boreholes in localised areas of the site. These logs have been provided to Entec for information and indicate the following sequence of strata.

Made Ground ranging in thickness between 0.4 and 1.6m was encountered in all of the holes and comprised flint gravel and occasional brick and clinker. This material is underlain by gravel predominantly comprising flint. Sand was identified in a number of the holes at depths of between 2.2 m and 2.5m bgl and was identified as 'wet' indicating it may be water bearing. Window sample holes were not installed with standpipes.

2.4.2 Hydrogeology

Groundwater Vulnerability Map No 45 indicates that the site is underlain by a Minor Aquifer comprising Gravel Head Deposits and the Reading Beds.

2.4.3 Hydrology

The River Lavant lies 650m north east of the site and flows southwards into Chichester Harbour. The River Lavant is an ephemeral watercourse fed by springs during winter months.

2.4.4 Ecology

The nearest sensitive ecological receptor to the site is Brandy Hole Copse (A Local Nature Reserve). No Sites of Special of Scientific Interest (SSSIs), Special Areas of Conservation (SACs) or other designated sites of nature conservation interest are present within 1 km of the site.

2.5 Previous Investigations

2.5.1 Introduction

Two previous environmental investigations have been carried out at the site. Due to the geotechnical scope of the current phase of investigation, these reports are not reviewed in depth, but content relevant to the geotechnical aspects of the site are summarised below.

2.5.2 Enviros Aspinwall Phase 1 LQA - October 2001

Enviros Aspinwall conducted a Phase 1 LQA in October 2001. The following is a summary of the geology on the site as described in the above report;

Drift

Drift deposits 15 – 22m thick are thought to comprise Gravel Head Deposits consisting of gravels and loams. These deposits are thicker in the south. The hydrogeological map of the site describes the deposits underlying the site as drift deposits of Brickearth and Coomb Deposits (silty loam and clay).

Solid

Gravel Head Deposits are underlain by Reading Beds in the northern two thirds of the site and may be underlain by London Clay over Reading Beds in the south. At depth the Reading Beds are underlain by Cretaceous Upper Chalk.

The Reading Beds are described as mottled coloured clays with basal beds of pebbles, sand and ironstone concretions and may be up to 30m thick. The London Clay is described as comprising bluish sand and sandy loam with horizons of sandy ironstone.

2.5.3 Enviros Consulting Ltd Phase 2 LQA Report June 2007

The following is a summary of ground conditions encountered during the phase 2 intrusive investigation:

Hardstanding

Hardstanding, where present, was found to consist of concrete 0.15 to 0.2m thick or tarmac, 0.2m thick

Topsoil

Topsoil was found to consist of sandy, slightly gravely clay with a thickness between 0.1 m and 0.3m. Two locations in the south of the site encountered buried topsoil at a depth of between 0.9 m and 0.95m below ground level (bgl).

Made Ground

Made Ground was encountered at all locations to a maximum depth of 1.6m bgl. The stratum was found to consist of slightly clayey, slightly sandy fine to coarse gravel. Enviros interpreted this to be reworked natural material. Occasional brick fragments were found at some locations.

Natural Strata

Immediately underlying hardstanding or topsoil, a layer of slightly silty, slightly sandy fine and medium gravel was encountered with a maximum thickness of 1.8m, interpreted as being Gravel Head Deposits.

In the centre of the site, a layer of slightly wet, silty fine and medium sand was encountered between 2.0m and 4.0m bgl. This was also interpreted to represent Gravel Head Deposits.

Groundwater

Groundwater was encountered at three locations in the centre of the site within the silty sand stratum.

3. Geotechnical Investigation

3.1 Scope of Works

The site investigation works comprised the drilling of 11 window sample boreholes, 13 cable percussion boreholes and excavation of 8 trial pits, with associated soil sampling and in-situ geotechnical tests. Site works were carried out by May Gurney with supervision from Entec. Supervision was also carried out by an engineer supplied by May Gurney. Site works were carried out between 9 and 19 July 2007. Exploratory locations were chosen to give a representative spread of geotechnical parameters across the site. Details of the scheduled laboratory based geotechnical tests are included in Annex A.

The site investigation target areas and investigation method as agreed with the Defence Estates team and the Quarter Master for the site prior to commencement are summarised in Table 3.1. Exploratory holes were assigned a unique identifier as shown on Figure 2 and exploratory hole logs are included in Annex B. Building and area numbers are shown on Figure 2a.

Ground gas and groundwater monitoring was carried out on a daily basis at selected boreholes commencing 24 hours after drilling. Groundwater levels and ground gas concentrations were measured on a daily basis.

Table 3.1 Site Investigation Targets Areas

Exploration Identifier	– Location
BH1	Grass verge near northwest perimeter fence north of tennis courts (Area No. 15)
BH2	Adjacent to northern perimeter wall and Family Services Accommodation (FSA)
BH3	Open land between Family Services Accommodation (FSA) and SOCO Training Area
BH4	Gardens adjacent to officers mess (Building No. 3)
BH5	Southeast corner of SOCO Training Area (Adjacent to Building No. 12)
BH6	Front garden of officers accommodation
BH7	West side of The Green (Area No. 70), adjacent to gatehouse
BH8	Adjacent to NAAFI Junior Ranks Mess and Accommodation
BH9	Adjacent to Advanced Training Wing (Building No. 67)
BH10	Adjacent to southwest side of Sandhurst Block (Building No. 7)
BH12	Centre of car park (Area No. 27) to front of Sergeants Mess (Building No. 11)
BH13	South side of assault course (Area No. 14)
WS1	Adjacent to tennis court (Area No. 15)
WS2	West side of Family Services Accommodation (FSA)

Table 3.1 (continued) Site Investigation Targets Areas

Exploration Identifier	Location
WS4	Adjacent to northern perimeter wall and Family Services Accommodation (FSA)
WS5	Northeast corner of site in Family Services Accommodation (FSA) garden
WS7	Play area at front Family Services Accommodation (FSA) gardens
WS8	Gardens at front of Officers Mess (Building No. 3)
WS9	Adjacent and east of the Royal Military Police Head Quarters building
WS10	Grass at northwest side of Sandhurst Block (Building No. 7)
WS11	South of Indoor Firing Range (Building No. 9) at northeast of Parade Ground/car park
WS12	East central side of Parade Ground/car park (Area No. 27)
TP1	East of tennis courts (Area No. 15)
TP2	North of Medical Centre (Building No. 2)
TP3	Adjacent (south) to Chapel (Building No. 55)
TP4	SOCO Training Area south of Lacard House (Building No. 12)
TP5	Southeast corner of The Green (Area No. 70)
TP6	East entrance of Sandhurst Block (Building No. 7)
TP7	Gardens to south of Sergeants Mess (Building No. 11)
TP8	Southeast corner of the site adjacent to former location of oil tanks

3.1.1 In-situ Testing

In-situ testing comprised SPTs in cable percussive boreholes, CPTs in window sample boreholes and CBR test in four trial pits. The results of these tests are included on the borehole logs and presented in Annex C.

3.1.2 Laboratory Geotechnical Testing

Laboratory geotechnical testing was conducted by May Gurney through their UKAS accredited geotechnical laboratory Norfolk Partnership Laboratory. Quality assurance information is detailed with the results in Annex A.

Table 3.2 Summary of Laboratory Testing Undertaken

Laboratory Test	Number Performed
CBR	7
PSD	23
Moisture Content	46

Table 3.2 (continued) Summary of Laboratory Testing Undertaken

Laboratory Test	Number Performed
Atterberg Limits	39
Undrained Triaxial	18
Organic Matter Content	2
Sulphate	18
pH	18
Oedometer 25,50, 100, 200, 400 kPA	5
Oedometer 12,25, 50, 100, 200 kPA	1

4. Ground Conditions

4.1 Strata Encountered

4.1.1 General

The ground conditions encountered during the geotechnical investigation were consistent with those encountered during the previous Enviros Phase 2 investigation. The geological sequence generally comprised the following:

- Topsoil;
- Made Ground;
- Drift (Gravel Head Deposits);
- Clay (Reading Beds/London Clay).

Topsoil typically comprised dark brown gravely, slightly sandy clay. Made Ground was not encountered in all exploratory locations on the site. Made Ground was found to be absent at BH6, BH7, BH8, BH10, WS7 and WS11. Drift deposits were found across the whole site to depths of 5.2m to 8.0 m bgl. Reading Beds were generally found to underlie the drift with the exception of the southwest of the site where London Clay separates these deposits. This is broadly consistent with the published information.

4.1.2 Made Ground

A variable thickness of Made Ground was encountered across the site consisting on the whole of reworked natural ground with a minor proportion of inert building waste (brick rubble, concrete, timber and metal fragments). Two locations in the north of the site were found to have a considerable thickness of Made Ground compared with other locations on the site. WS4 (in the north of the site) encountered a buried wall or footings to a depth of 2.4m bgl. WS5 (in the northeast corner of the site) was found to have 1.6m of Made Ground containing brick, ash, shell and pottery.

4.1.3 Natural Ground

The Made Ground, where present, was underlain by drift deposits of a relatively consistent thickness across the site (approximately 6m). The drift comprised variable gravels and clay gravels, sands and gravely clays and clays. Generally, a layer of coarse clayey gravel up to 3.2m thick was underlain by gravely sands up to 5.5m thick.

The drift deposits were underlain by Reading Beds over the majority of the site at relatively a consistent depth of approximately 6 m bgl with the exception of the south west of the site where the drift deposits were underlain by London Clay followed by the Reading Beds. In this area of the site the Reading Beds were present at depths of approximately 11 m to 15 m bgl.

The Reading Beds were found to consist of stiff to very stiff red and grey mottled sandy clays. The London Clay is firm to stiff blue/grey slightly sandy clay; in places the clay was thickly laminated with silt with thin laminae of fine to medium sand.

4.2 Obstructions

Obstructions and former below ground structures were largely absent across the site. A concrete slab was encountered at TP3 at a depth of 1.5m bgl; this trial pit was ceased at this depth. The slab is likely to be footings for a wall that is indicated on an historical map from 1875 in the vicinity of TP3; there is no indication from the available historical maps that a building had been present at this location.

4.3 Groundwater

The Enviros Phase 1 LQA Desk Study indicated that groundwater was present in the north of the site at approximately 20m below ground level and at 25m below the ground level in the south. With reference to the geological map of the area this would result in the presence of groundwater in the Gravel Head Deposits in the north of the site and the London Clay and Reading Beds in the south of the site. The Phase 1 LQA reported that the thickness of the London Clay is unlikely to result in the formation of an effective aquiclude above the Chalk aquifer.

The Enviros Phase 2 LQA investigation confirmed the presence of shallow groundwater, typically at approximately 2.5m depth. Groundwater was found in three of the window samples drilled during this investigation; WS6 in the east of the site; WS7, also in the east of the site and WS9 in the west of the site.

During the current geotechnical investigation, groundwater was encountered at twenty three of the exploratory locations, primarily within sand and gravels in the drift deposits. A summary of groundwater observations is presented in Table 4.1. No groundwater was encountered within the Reading Beds or London Clay formations; as a result all boreholes were screened within the Drift deposits.

Table 4.1 Groundwater Observations

Location	Groundwater Strike (m bgl)	Groundwater Rising Level (m bgl)	Strata	Comments
BH1	4.5	-	Drift deposits	Installed for groundwater monitoring
BH2	2.92	-	Drift deposits	Installed for groundwater monitoring
BH3	3.0	2.9	Drift deposits	
BH4	4.5	-	Drift deposits	
BH5	4.3	-	Drift deposits	Installed for groundwater monitoring
BH6	3.0	2.8	Drift deposits	

Table 4.1 (continued) Groundwater Observations

Location	Groundwater Strike (m bgl)	Groundwater Rising Level (m bgl)	Strata	Comments
BH7	-	-	Drift deposits	Very slight seepage, installed for groundwater monitoring
BH8	3.0	2.9	Drift deposits	
BH9	4.4	4.10	Drift deposits	
BH10	3.5	3.3	Drift deposits	
BH11	2.85	-	Drift deposits	Installed for groundwater monitoring
BH12	4.4	3.6	Drift deposits	Installed for groundwater monitoring
BH13	3.28	-	Drift deposits	Installed for groundwater monitoring
WS1	2.5	2.8	Drift deposits	
WS2	3.0	2.8	Drift deposits	
WS4	3.0	2.9	Drift deposits	
WS5	3.0	-	Drift deposits	
WS7	3.0	2.9	Drift deposits	
WS8	3.0	2.8	Drift deposits	
WS9	3.5	3.1	Drift deposits	
WS10	3.0	2.7	Drift deposits	
WS11	3.2	-	Drift deposits	
WS13	3.0	2.7	Drift deposits	
TP5	2.8	-	Drift deposits	
TP6	3.0	-	Drift deposits	
TP7	2.9	-	Drift deposits	

During the course of the geotechnical investigation, gas and groundwater levels were monitored in selected boreholes, daily, commencing 24 hours after drilling. The results are presented in Annex C. Flow rates ranged from -0.2 to 0.8 litres/h although most boreholes showed non detectable flow. Methane was not detected in any of the monitored boreholes; Carbon dioxide concentrations ranged from 0 to 2.9%. Most boreholes showed low concentrations of carbon dioxide although concentrations were slightly elevated in BH13 (2.3-2.9%). Barometric pressure was relatively constant during the monitoring period in the range of 1010-1014mB.

Figures

Key

Site boundary

0 km 3 km

Scale 1:50,000 @ A4

Prepared for the Ministry of Defence, Defence Estates, contract DE4/4513

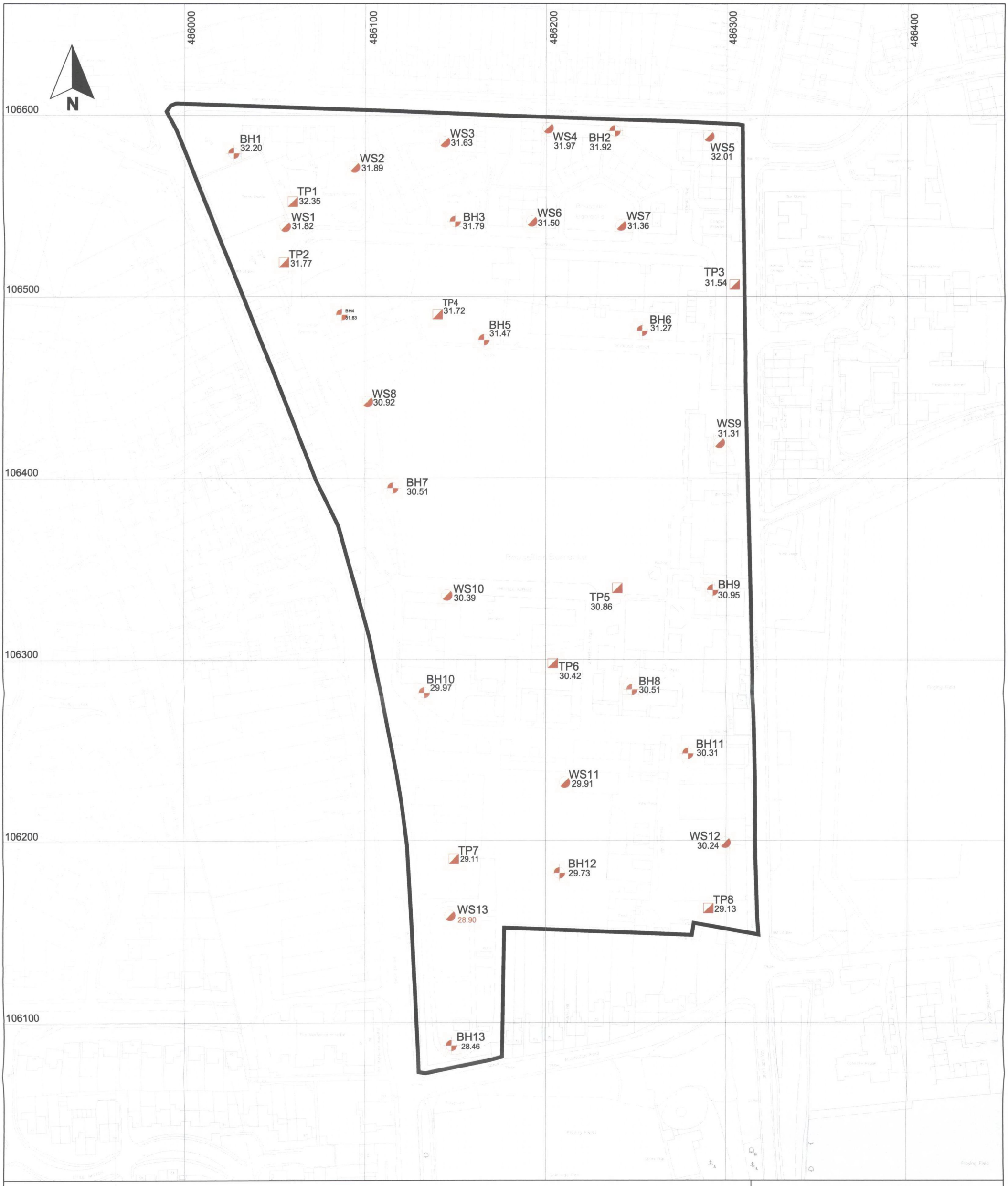
DEFENCE ESTATES
Delivering Estate Solutions to Defence Needs

Roussillon Barracks
Geotechnical Site Investigation

Figure 1
Site Location

September 2007
20636-S08.dwg smitv

Entec



Key

- Site boundary
- Borehole location
- Trial pit location
- Window sample location

0 m — 100 m

Scale 1:2000 @ A3

Prepared for the Ministry of Defence, Defence Estates, contract DE4/4513

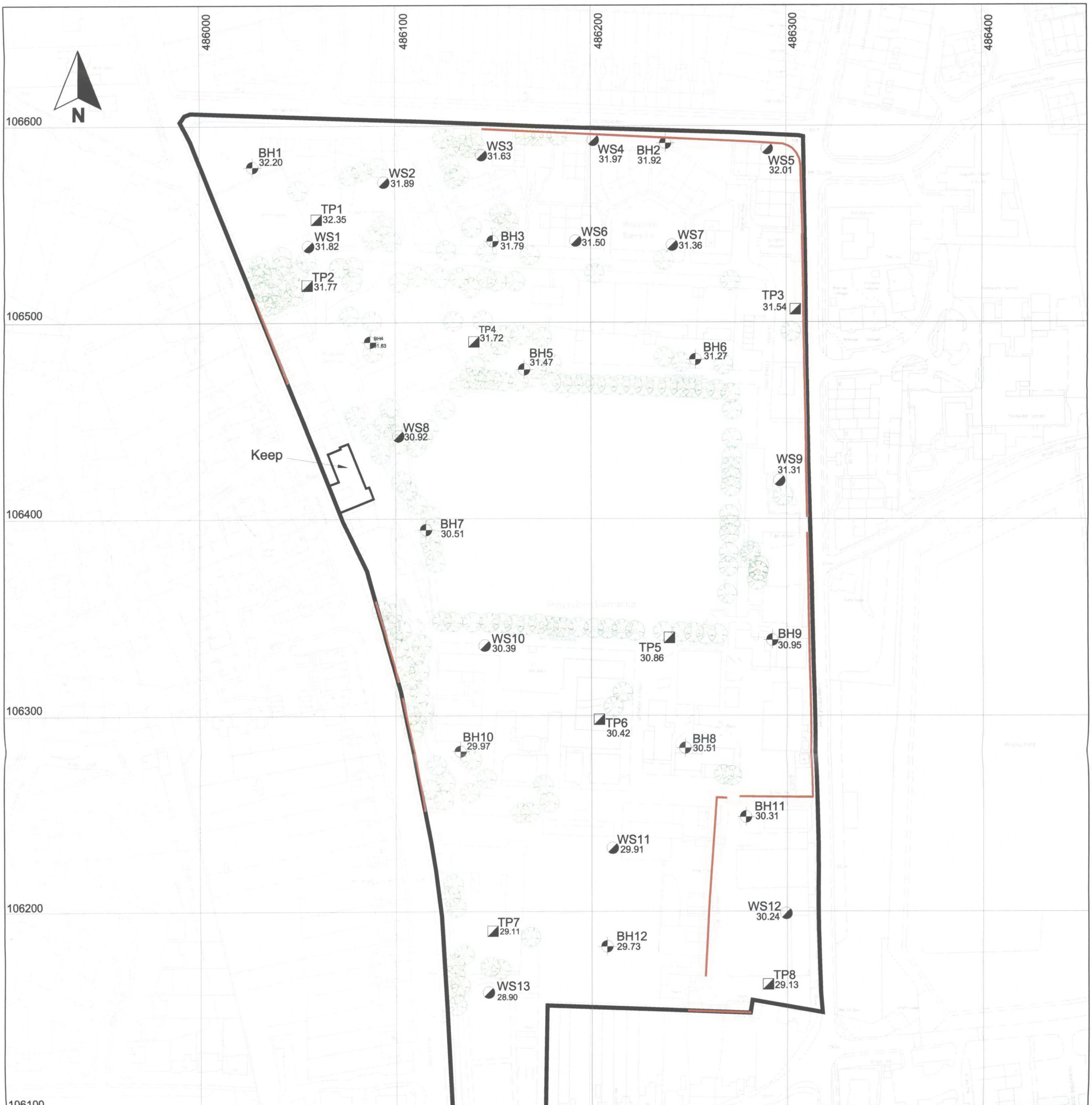
DEFENCE ESTATES
Delivering Estate Solutions to Defence Needs

Roussillon Barracks
Geotechnical Site Investigation

Figure 2
Investigation Locations

September 2007
20636-S09.dwg smitv

Entec



Key

- Site boundary
- Brick and flint wall
- Trees subject to tree protection order
- Borehole location
- Trial pit location
- Window sample location

0 m — 100 m

Scale 1:2000 @ A3

Prepared for the Ministry of Defence, Defence Estates, contract DE4/4513

DEFENCE ESTATES
Delivering Estate Solutions to Defence Needs

Roussillon Barracks
Geotechnical Site Investigation

Figure 3
Topographical Survey

August 2007
20636-S07.dwg lowec

Entec

Annex A
Geotechnical Test Results

Geotechnical Laboratory Test Results Summary Sheet

MAY GURNEY

Site: Chichester (Roussillion Barracks) | Contract No : SI1279 | Date: August 2007. | Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	σ_1-σ_3	C_u Kpa	$\varnothing_u$ (°)	
BH1	0.5	B1						0.00		7.0											
	1.5-1.9	U3	11	51	24	27	CH														
	4.5	B9						0.00		6.5											Wet Sieve & Sed
	7	D15	25	62	21	41	CH														
	8.5	U19	17	46	18	28	CI						2.250	1.94	QU	102	172	323	162		Barrel Failure, Oedometer
	11	D24	14	38	16	22	CI														
	13	S29	27	74	29	45	CV														
	17	D37	21.6																		
	19	D41	23	81	29	52	CV														

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water
Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage
σ_3 Cell Pressure
σ_1-σ_3 Deviator Stress
$\varnothing u$ Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2
(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098879
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	BH1 B9 4.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	07/08/2007		
Sample type	Disturbed	**Sample mass**	7.20 kg

Sampled by Client who is not a member of Norfolk Partnership Laboratory. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Soft brown sandy CLAY		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	100
20mm	100
14mm	100
10mm	100
6.3mm	100
5mm	100
2mm	100
1.18mm	100
600µm	100
425µm	99
212µm	95
150µm	89
63µm	26

Uniformity coefficient 2.0

REMARKS

[redacted]

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

UKAS TESTING 0920

Test code = 610

www.maygurney.co.uk
www.norfolk.gov.uk

INVESTOR IN PEOPLE

AGS ASSOCIATION OF GEOTECHNICAL & GEOENVIRONMENTAL SPECIALISTS

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098984
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

PARTICLE SIZE DISTRIBUTION OF AGGREGATE BY SEDIMENTATION to BS 1377 : PART 2 : 1990 :SECTION 9.4 (Pipette Method)

Scheme	Chichester		
Chainage / location	BH1 / B9 / 4.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Bulk	**Sample mass**	7.20 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Brown, clayey, fine SAND.		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

	TEST SPECIMEN
LOCATION	Not applicable
ORIENTATION	Not applicable
	PREPARATION DETAILS
METHOD OF DIVISION	Quartering
PREPARATION METHOD	Natural

PARTICLE SIZE	% PASSING
2mm	100
600µm	100
212µm	95
63µm	26
20µm	22
6µm	19
2µm	16

REMARKS

UKAS TESTING 0920

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

Test code = 612

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098971
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

DETERMINATION OF THE ONE DIMENSIONAL CONSOLIDATION PROPERTIES TO B.S.1377 :PART 5 : SECTION 3

Scheme	Chichester		
Chainage / location	BH1 / U19 / 8.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	08/08/2007		
Sample type	Undisturbed	**Sample mass**	4.00 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Undisturbed soil sample in U100 tube
Description	Very stiff, reddish grey, slightly clayey SILT

Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

Results are presented on sheets 2 and 3.

Results are presented on sheets 2 and 3.

REMARKS :

[redacted]

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

Test code = 650

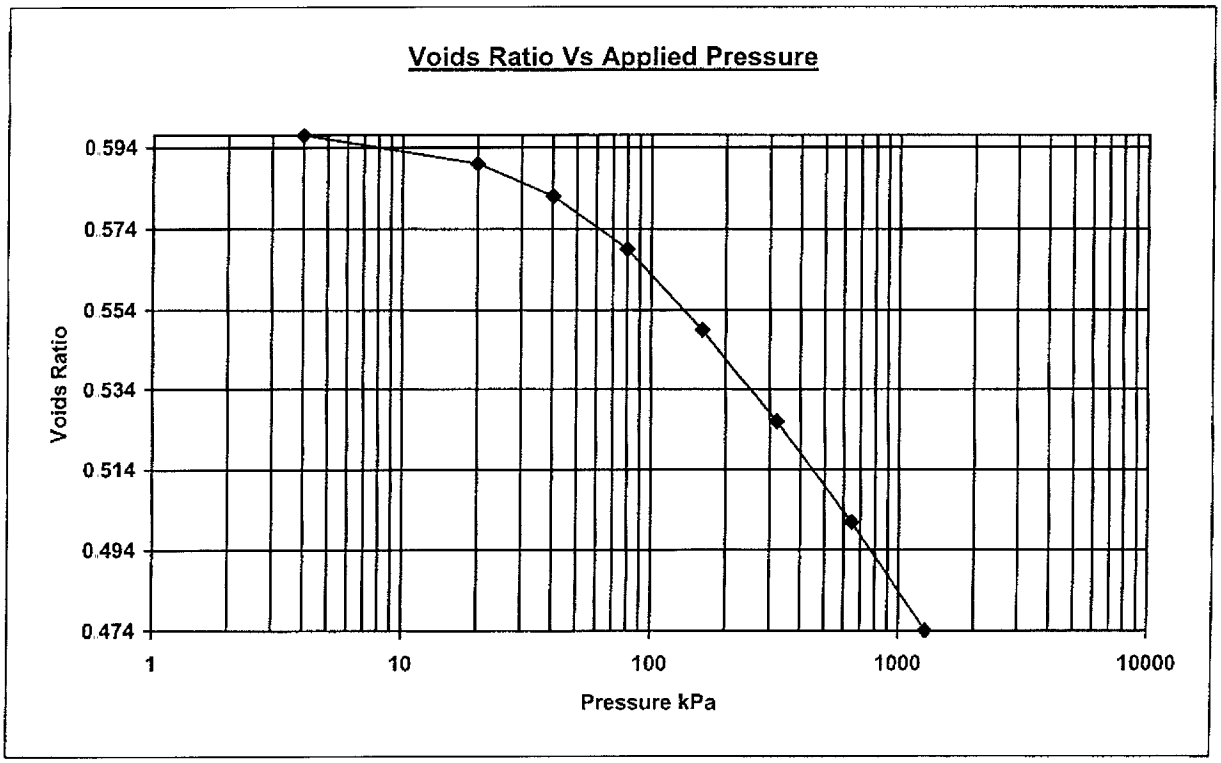
One Dimensional Consolidation Properties
(Oedometer)

Client	May Gurney	**Lab Ref**	
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	BH1	**Sample**	0000098971

Test Details			
Standard	BS 1377: Part 5 : 1990 : Clause 3	**Particle Density**	2.65 Mg/m3
Sample Type	Undisturbed sample - open drive	**Lab Temperature**	20.0 deg.C
Sample Depth	8.50 m		
Sample Description	Very stiff red - grey slighty clayey SILT		
Variations from Procedure	None		

Specimen Details			
Specimen Reference	A	**Description**	
Depth within Sample	8 55mm	**Orientation within Sample**	Vertical
Specimen Mass	185.88 g	**Condition**	Natural Moisture
Specimen Height	21.54 mm	**Preparation**	
Comments			

Test Apparatus			
Ring Number	2	**Ring Diameter**	74.81 mm
Ring Height	21.54 mm	**Ring Weight**	116.06 g
Lever Ratio	9.00 : 1		



Height of Solid Particles	13.49 mm	**Swelling Pressure**	4.0 kPa

One Dimensional Consolidation Properties
(Oedometer)

Client	May Gurney	**Lab Ref**	
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	BH1	**Sample**	0000098971

Initial Moisture Content*	18 3 % (trimmings: 19.3 %)	**Final Moisture Content**	17 7 %
Initial Bulk Density	1.96 Mg/m3	**Final Bulk Density**	2.12 Mg/m3
Initial Dry Density	1.66 Mg/m3	**Final Dry Density**	1.80 Mg/m3
Initial Void Ratio	0.5968	**Final Void Ratio**	0.4737
Initial Degree of Saturation	81 25%	**Final Degree of Saturation**	99 02 %

- Calculated from initial and dry weights of whole specimen

Pressure (Loading Stages)	**Coefficient of Volume Compressibility (m_v)**	**Coefficient of Consolidation (c_v)**
0.00		
20.0 kPa	0.25 m2/MN	59.80 m2/yr
40.2 kPa	0.25 m2/MN	32.13 m2/yr
80.3 kPa	0.21 m2/MN	25.72 m2/yr
160.7 kPa	0.16 m2/MN	19.22 m2/yr
321.4 kPa	0.09 m2/MN	11.18 m2/yr
642.8 kPa	0.05 m2/MN	4.03 m2/yr
1285.5 kPa	0.03 m2/MN	3.67 m2/yr

Method of Time Fitting Used	Square Root Time

Tested By and Date:	KL 08/08/07
Checked By and Date:	[redacted] 13/8/07
Approved By and Date:	

Geotechnical Laboratory Test Results Summary Sheet

MAY GURNEY

Site: Chichester (Roussillion Barracks) | Contract No : SI1279 | Date: August 2007. | Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	σ_1-σ_3	C_u Kpa	$\varnothing_u$ (°)	
BH2	2	B3																			
	5-6.0	B5						0.00		6.5											Wet Sieve
	7.5	D6	15.2																		Wet Sieve & Sed
	9	U1	12	34	16	18	CL						2.230	1.98	QU	102	181	477	239		Sed, Barrel Failure, Oedometer
	11	B8						0.00		7.0											
	13	D10	23.2																		
	15	U3	21										2.150	1.78	QU	102	300	220	110		Shear Failure

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water
Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage
σ_3 Cell Pressure
σ_1-σ_3 Deviator Stress
$\varnothing u$ Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2
(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098880
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	14/08/2007
	Page 1 of 1

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	BH2 / B3 / 2.0m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Bulk	**Sample mass**	13.70 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Yellow, clayey, fine to coarse flint GRAVEL.		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	87
37.5mm	83
20mm	67
14mm	55
10mm	47
6.3mm	38
5mm	35
2mm	29
1.18mm	26
600µm	24
425µm	22
212µm	19
150µm	17
63µm	13

Uniformity coefficient 501.0

REMARKS

[redacted]

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [X]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

UKAS TESTING 0920

Test code = 610

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098881
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	BH2 B5 5.0-6.0m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	07/08/2007		
Sample type	Disturbed	**Sample mass**	4.50 kg

Sampled by Client who is not a member of Norfolk Partnership Laboratory. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Very soft brown silty sandy CLAY		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	100
20mm	100
14mm	100
10mm	100
6.3mm	100
5mm	100
2mm	100
1.18mm	100
600µm	100
425µm	99
212µm	92
150µm	78
63µm	30

Uniformity coefficient	3.0

REMARKS

UKAS TESTING 0920

R J Noakes (Group Manager) ☐
M L Bumstead (Section Engineer) ☑
I D Brown (Section Engineer) ☐
D N Houseago (Lead Technician) ☐

[redacted]

Test code = 610

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098985
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007
	Page 1 of 1

PARTICLE SIZE DISTRIBUTION OF AGGREGATE BY SEDIMENTATION to BS 1377 : PART 2 : 1990 :SECTION 9.4 (Pipette Method)

Scheme	Chichester		
Chainage / location	BH2 / B5 / 5.0-6.0m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Bulk	**Sample mass**	4 50 kg

The identity of the sampler is unknown If a Sample Certificate was provided it is available for inspection The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Brown clayey silty fine SAND.		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

	TEST SPECIMEN
LOCATION	Not applicable
ORIENTATION	Not applicable
	PREPARATION DETAILS
METHOD OF DIVISION	Quartering
PREPARATION METHOD	Natural

PARTICLE SIZE	% PASSING
2mm	100
600µm	100
212µm	92
63µm	30
20µm	19
6µm	15
2µm	12

REMARKS

UKAS TESTING 0920

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

Test code = 612

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No	0000098882
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007
	Page 1 of 1

PARTICLE SIZE DISTRIBUTION OF AGGREGATE BY SEDIMENTATION to BS 1377 : PART 2 : 1990 :SECTION 9.4 (Pipette Method)

Scheme	Chichester		
Chainage / location	BH2 / U1 / 9.0m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	08/08/2007		
Sample type	Undisturbed	**Sample mass**	5 00 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection.The accuracy of information provided by third parties cannot be guaranteed.

Material	Undisturbed soil sample in U100 tube		
Description	Very stiff, desiccated, reddish grey, sandy SILT.		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

	TEST SPECIMEN
LOCATION	Not applicable
ORIENTATION	Not applicable
	PREPARATION DETAILS
METHOD OF DIVISION	Quartering
PREPARATION METHOD	Natural

PARTICLE SIZE	% PASSING
2mm	100
600µm	99
212µm	99
63µm	70
20µm	47
6µm	33
2µm	27

REMARKS

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

UKAS TESTING
0920

Test code = 612

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098972
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

DETERMINATION OF THE ONE DIMENSIONAL CONSOLIDATION PROPERTIES TO B.S.1377 :PART 5 : SECTION 3

Scheme	Chichester		
Chainage / location	BH2 / U1 / 9.0m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	07/08/2007		
Sample type	Undisturbed	**Sample mass**	5.00 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection The accuracy of information provided by third parties cannot be guaranteed.

Material	Undisturbed soil sample in U100 tube		
Description	Very stiff, desiccated, reddish grey SILT		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

Results are presented on sheets 2 and 3

Results are presented on sheets 2 and 3.

REMARKS :

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

Test code = 650

One Dimensional Consolidation Properties
(Oedometer)

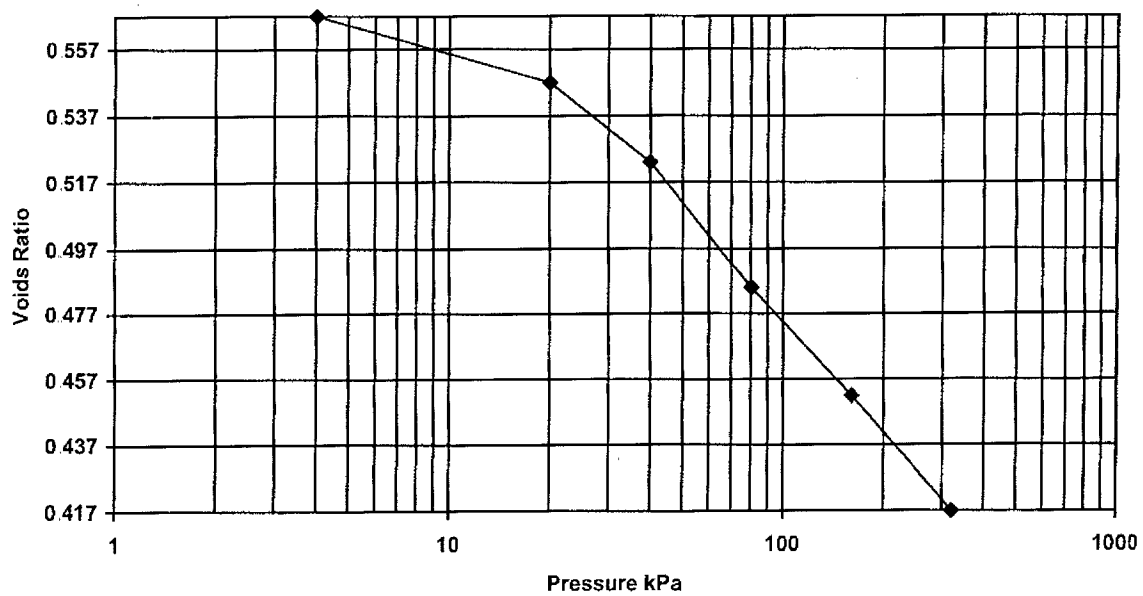
Client	May Gurney	**Lab Ref**	
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	BH2	**Sample**	0000098972

Test Details			
Standard	BS 1377: Part 5 : 1990 : Clause 3	**Particle Density**	2.65 Mg/m3
Sample Type	Undisturbed sample - open drive	**Lab Temperature**	20.0 deg.C
Sample Depth	9.00 m		
Sample Description	Very stiff desiccated red - grey SILT		
Variations from Procedure	None		

Specimen Details			
Specimen Reference	A	**Description**	
Depth within Sample	9.30mm	**Orientation within Sample**	Vertical
Specimen Mass	201.53 g	**Condition**	Natural Moisture
Specimen Height	24.52 mm	**Preparation**	
Comments			

Test Apparatus			
Ring Number	1	**Ring Diameter**	74.89 mm
Ring Height	24.52 mm	**Ring Weight**	114.77 g
Lever Ratio	9.00 : 1		

Voids Ratio Vs Applied Pressure



Height of Solid Particles	15.65 mm	**Swelling Pressure**	4.0 kPa

One Dimensional Consolidation Properties
(Oedometer)

Client	May Gurney	**Lab Ref**	
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	BH2	**Sample**	0000098972

Initial Moisture Content*	10.3 % (trimmings: 12.8 %)	**Final Moisture Content**	15.7 %
Initial Bulk Density	1.87 Mg/m3	**Final Bulk Density**	2.16 Mg/m3
Initial Dry Density	1.69 Mg/m3	**Final Dry Density**	1.87 Mg/m3
Initial Void Ratio	0.5666	**Final Void Ratio**	0.4170
Initial Degree of Saturation	48.20%	**Final Degree of Saturation**	99.96 %

- Calculated from initial and dry weights of whole specimen

Pressure (Loading Stages)	**Coefficient of Volume Compressibility (m_v)**	**Coefficient of Consolidation (c_v)**
0.00		
20.0 kPa	0.80 m2/MN	7.12 m2/yr
40.0 kPa	0.75 m2/MN	4.75 m2/yr
80.2 kPa	0.62 m2/MN	2.90 m2/yr
160.3 kPa	0.28 m2/MN	1.78 m2/yr
320.7 kPa	0.15 m2/MN	2.02 m2/yr

Method of Time Fitting Used	Square Root Time

Tested By and Date:	KL 07/08/07
Checked By and Date:	[redacted] 13/8/07
Approved By and Date:	

Geotechnical Laboratory Test Results Summary Sheet

MAY GURNEY

Site: Chichester (Roussillion Barracks) | Contract No : SI1279 | Date: August 2007. | Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	σ_1-σ_3	C_u Kpa	$\varnothing_u$ (°)	
BH3	3	D6	20	57	21	36	CH														
	6	S14	15	28	14	11	CL														
	8	D18	22	54	22	32	CH														
	8.5	B19																			Wet Sieve & Sed
	9.5	D22	23	69	25	44	CH														

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water
Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage
σ_3 Cell Pressure
σ_1-σ_3 Deviator Stress
$\varnothing u$ Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2
(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098986
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007
	Page 1 of 1

PARTICLE SIZE DISTRIBUTION OF AGGREGATE BY SEDIMENTATION to BS 1377 : PART 2 : 1990 :SECTION 9.4 (Pipette Method)

Scheme	Chichester		
Chainage / location	BH3 / B19 / 8.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Bulk	**Sample mass**	10.70 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Stiff red, sandy, silty CLAY.		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

	TEST SPECIMEN
LOCATION	Not applicable
ORIENTATION	Not applicable
	PREPARATION DETAILS
METHOD OF DIVISION	Quartering
PREPARATION METHOD	Natural

PARTICLE SIZE	% PASSING
2mm	99
600µm	98
212µm	95
63µm	77
20µm	77
6µm	71
2µm	49

REMARKS

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [X]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

UKAS TESTING 0920

Test code = 612

Geotechnical Laboratory Test Results Summary Sheet

MAY GURNEY

Site: Chichester (Roussillion Barracks)	Contract No : SI1279	Date: August 2007.	Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	σ_1-σ_3	C_u Kpa	$\varnothing_u$ (°)	
BH4	6	B16						0.00		6.9											Wet Sieve
	8.5-8.95	U21	21.9										2.150	1.76	QU	102	170	298	149		Shear Failure, Oedometer

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water

Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage

σ_3 Cell Pressure
σ_1-σ_3 Deviator Stress
$\varnothing u$ Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2

(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098884
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	14/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	BH4 / B16 / 6.0-6.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Bulk	**Sample mass**	8.70 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Red, sandy, clayey, fine to coarse, flint GRAVEL with occasional cobbles		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	82
37.5mm	76
20mm	65
14mm	58
10mm	51
6.3mm	48
5mm	46
2mm	37
1.18mm	33
600µm	31
425µm	29
212µm	25
150µm	20
63µm	10

Uniformity coefficient 240.0

REMARKS

UKAS TESTING 0920

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

Test code = 610

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098976
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

DETERMINATION OF THE ONE DIMENSIONAL CONSOLIDATION PROPERTIES TO B.S.1377 :PART 5 : SECTION 3

Scheme	Chichester		
Chainage / location	BH4 / U21 / 8.5-8.95m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	08/08/2007		
Sample type	Undisturbed	**Sample mass**	5.00 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection.The accuracy of information provided by third parties cannot be guaranteed.

Material	Undisturbed soil sample in U100 tube		
Description	Very stiff reddish grey CLAY.		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

Results are presented on sheets 2 and 3.

Results are presented on sheets 2 and 3.

REMARKS :

R J Noakes (Group Manager) [redacted]
M L Bumstead (Section Engineer)
I D Brown (Section Engineer)
D N Houseago (Lead Technician)

Test code = 650

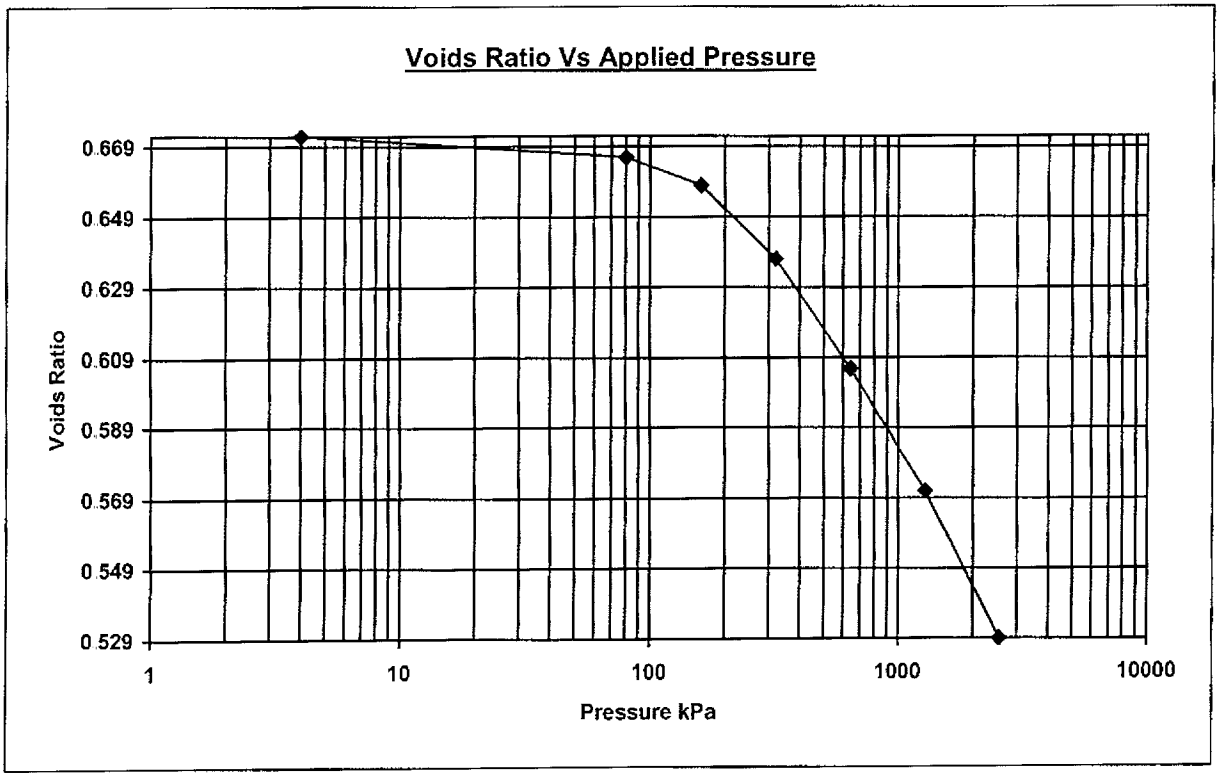
One Dimensional Consolidation Properties
(Oedometer)

Client	May Gurney	**Lab Ref**	
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	BH4	**Sample**	0000098976

Test Details			
Standard	BS 1377: Part 5 : 1990 : Clause 3	**Particle Density**	2.65 Mg/m3
Sample Type	Undisturbed sample - open drive	**Lab Temperature**	20.0 deg.C
Sample Depth	8.50 m		
Sample Description	Very stiff red - grey CLAY		
Variations from Procedure	None		

Specimen Details			
Specimen Reference	A	**Description**	
Depth within Sample	8.60mm	**Orientation within Sample**	Vertical
Specimen Mass	189.10 g	**Condition**	Natural Moisture
Specimen Height	22.40 mm	**Preparation**	
Comments			

Test Apparatus			
Ring Number	3	**Ring Diameter**	74.90 mm
Ring Height	22.40 mm	**Ring Weight**	116.14 g
Lever Ratio	9.00 : 1		



Height of Solid Particles	13.40 mm	**Swelling Pressure**	4.0 kPa

Geotechnical Laboratory Test Results Summary Sheet

MAYGURNEY

Site: Chichester (Roussillion Barracks) | Contract No : SI1279 | Date: August 2007. | Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	σ_1-σ_3	C_u Kpa	$\varnothing_u$ (°)	
BH7	2.5	B5																			
	3-3.45	U7	23.8																		Wet Sieve
	8	D19	34	80	28	52	CV														
	8.5	B20																			Wet Sieve & Sed
	10	D23	21																		
	10.5-10.95	U25	16	56	25	31	CH						2.240	1.91	QU	102	210	274	137		Barrel Failure
	14	D52	13	34	14	20	CL														
	16.5-16.95	U38	24	60	24	36	CH						2.140	1.77	QU	102	330	273	137		Shear Failure

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water

Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage

σ_3 Cell Pressure
σ_1-σ_3 Deviator Stress
$\varnothing u$ Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2

(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098885
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	BH7 B5 2.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Disturbed	**Sample mass**	7.20 kg

Sampled by Client who is not a member of Norfolk Partnership Laboratory. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Brown/Yellow sandy clayey fine, medium and coarse flint gravel		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	85
20mm	64
14mm	55
10mm	52
6.3mm	47
5mm	44
2mm	34
1.18mm	30
600µm	25
425µm	22
212µm	19
150µm	17
63µm	12

Uniformity coefficient 462.0

REMARKS

UKAS TESTING 0920

R J Noakes (Group Manager) ☐
M L Bumstead (Section Engineer) ☑
I D Brown (Section Engineer) ☐
D N Houseago (Lead Technician) ☐

Test code = 610

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098886
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	BH7 B20 8.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	07/08/2007		
Sample type	Disturbed	**Sample mass**	15.70 kg

Sampled by Client who is not a member of Norfolk Partnership Laboratory. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Very stiff red CLAY		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	100
20mm	100
14mm	100
10mm	100
6.3mm	100
5mm	100
2mm	100
1.18mm	99
600µm	99
425µm	99
212µm	96
150µm	93
63µm	90

Uniformity coefficient n/a

REMARKS

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

UKAS TESTING 0920

Test code = 610

www.maygurney.co.uk
www.norfolk.gov.uk

INVESTOR IN PEOPLE

AGS ASSOCIATION OF GEOTECHNICAL & GEOENVIRONMENTAL SPECIALISTS

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098987
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

PARTICLE SIZE DISTRIBUTION OF AGGREGATE BY SEDIMENTATION to BS 1377 : PART 2 : 1990 :SECTION 9.4 (Pipette Method)

Scheme	Chichester		
Chainage / location	BH7 / B20 / 8.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	08/08/2007		
Sample type	Bulk	**Sample mass**	15.70 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection.The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Very stiff, red CLAY.		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

	TEST SPECIMEN
LOCATION	Not applicable
ORIENTATION	Not applicable
	PREPARATION DETAILS
METHOD OF DIVISION	Quartering
PREPARATION METHOD	Natural

PARTICLE SIZE	% PASSING
2mm	100
600µm	99
212µm	96
63µm	90
20µm	90
6µm	85
2µm	75

REMARKS

UKAS TESTING 0920

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [X]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

Test code = 612

Geotechnical Laboratory Test Results Summary Sheet

MAY GURNEY

Site: Chichester (Roussillion Barracks) | Contract No : SI1279 | Date: August 2007. | Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	σ_1-σ_3	C_u Kpa	$\varnothing_u$ (°)	
BH8	8	D18	19	52	20	32	CH														
	10	D23	22	54	22	32	CH														Wet Sieve
	6.5	B18						0.00		6.7											

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water

Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage

σ_3 Cell Pressure
σ_1-σ_3 Deviator Stress
$\varnothing u$ Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2

(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000099046
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	21/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	BH8 B18 6.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	10/08/2007		
Sample type	Disturbed	**Sample mass**	10.00 kg

Sampled by Client who is not a member of Norfolk Partnership Laboratory. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Fine, medium and coarse FLINT GRAVEL and cobbles with occasional medium to coarse orange sand		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	96
20mm	72
14mm	59
10mm	48
6.3mm	38
5mm	35
2mm	26
1.18mm	23
600µm	19
425µm	18
212µm	11
150µm	5
63µm	2

Uniformity coefficient >10.0

REMARKS

UKAS TESTING 0920

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

Test code = 610

www.maygurney.co.uk
www.norfolk.gov.uk

INVESTOR IN PEOPLE

AGS ASSOCIATION OF GEOTECHNICAL & GEOENVIRONMENTAL SPECIALISTS

Geotechnical Laboratory Test Results Summary Sheet

MAY GURNEY

Site: Chichester (Roussillion Barracks) | Contract No : SI1279 | Date: August 2007. | Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	σ_1-σ_3	C_u Kpa	$\varnothing_u$ (°)	
BH9	0.2-0.4	D2						0.00		6.8											
	3.5	B4						0.00		6.7											
	7.5	U1	16	43	18	25	CI						2.220	1.88	QU	102	150	338	169		Barrel Failure

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water

Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage

σ_3 Cell Pressure
σ_1-σ_3 Deviator Stress
$\varnothing u$ Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2

(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Geotechnical Laboratory Test Results Summary Sheet

MAY GURNEY

Site: Chichester (Roussillion Barracks) | Contract No : SI1279 | Date: August 2007. | Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	σ_1-σ_3	C_u Kpa	$\varnothing_u$ (°)	
BH10	3-3.45	U8	21.4																		
	4	D11	23	28	NP	NP	NP														
	7.5	U21	19	55	21	34	CH														
	10	D28	12.1					0.00		6.9											

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water

Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage

σ_3 Cell Pressure
σ_1-σ_3 Deviator Stress
$\varnothing u$ Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2

(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098887
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	BH12 B7 9.0m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	07/08/2007		
Sample type	Disturbed	**Sample mass**	8.20 kg

Sampled by Client who is not a member of Norfolk Partnership Laboratory. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Firm to stiff dark grey silty CLAY		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	100
20mm	100
14mm	100
10mm	99
6.3mm	99
5mm	99
2mm	99
1.18mm	99
600µm	99
425µm	99
212µm	99
150µm	99
63µm	84

Uniformity coefficient n/a

REMARKS

R J Noakes (Group Manager) []
M L Burnstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

UKAS TESTING
0920

Test code = 610

www.maygurney.co.uk
www.norfolk.gov.uk

INVESTOR IN PEOPLE

AGS ASSOCIATION OF GEOTECHNICAL & GEOENVIRONMENTAL SPECIALISTS

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098988
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007
	Page 1 of 1

PARTICLE SIZE DISTRIBUTION OF AGGREGATE BY SEDIMENTATION to BS 1377 : PART 2 : 1990 :SECTION 9.4 (Pipette Method)

Scheme	Chichester		
Chainage / location	BH12 / B7 / 9.0m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Bulk	**Sample mass**	8.20 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	stiff dark grey, very clayey, slightly sandy SILT.		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

TEST SPECIMEN

LOCATION	Not applicable
ORIENTATION	Not applicable

PREPARATION DETAILS

METHOD OF DIVISION	Quartering
PREPARATION METHOD	Natural

PARTICLE SIZE	% PASSING
2mm	99
600µm	99
212µm	99
63µm	84
20µm	54
6µm	42
2µm	34

REMARKS

UKAS TESTING 0920

R J Noakes (Group Manager)
M L Bumstead (Section Engineer)
I D Brown (Section Engineer)
D N Houseago (Lead Technician)

Test code = 612

www.maygurney.co.uk
www.norfolk.gov.uk

Geotechnical Laboratory Test Results Summary Sheet

MAY GURNEY

Site: Chichester (Roussillion Barracks) | Contract No : SI1279 | Date: August 2007. | Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	$\sigma_1-\sigma_3$	C_u Kpa	$\varnothing_u$ (°)	
BH13	2-3.0	B4																			
	4-4.45	D5						0.00		6.6											Wet Sieve
	9-9.45	D9	22	55	22	33	CH														
	12-12.45	D11	21	38	18	20	CI														

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water

Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage

σ_3 Cell Pressure
$\sigma_1-\sigma_3$ Deviator Stress
$\varnothing u$ Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2

(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000099045
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	21/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	BH13 B4 2.0-3.0m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	10/08/2007		
Sample type	Disturbed	**Sample mass**	7.00 kg

Sampled by Client who is not a member of Norfolk Partnership Laboratory. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Fine, medium and coarse FLINT GRAVEL with occasional cobbles and some medium and coarse sand		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	85
20mm	66
14mm	54
10mm	45
6.3mm	35
5mm	32
2mm	21
1.18mm	17
600µm	12
425µm	11
212µm	9
150µm	8
63µm	7

Uniformity coefficient >10.0

REMARKS

[redacted]

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

UKAS TESTING
0920

Test code = 610

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098854
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	21/08/2007
	Page 1 of 1

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	TP1 B2 0.1-0.7m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Disturbed	**Sample mass**	12.80 kg

Sampled by Client who is not a member of Norfolk Partnership Laboratory If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample
Description	Orangey brown clayey fine, medium and coarse FLINT GRAVEL

Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	93
20mm	63
14mm	48
10mm	37
6.3mm	29
5mm	28
2mm	25
1.18mm	24
600µm	22
425µm	22
212µm	20
150µm	19
63µm	15

Uniformity coefficient >10.0

REMARKS

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

UKAS TESTING 0920

Test code = 610

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098847
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

DETERMINATION OF THE CALIFORNIA BEARING RATIO ON A SAMPLE REMOULDED AT NATURAL MOISTURE CONTENT TO BS 1377 : PART 4 : 1990

Scheme	Chichester		
Chainage / location	TP1 / B2 / 0.1-0.7m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	07/08/2007		
Sample type	Disturbed	**Sample mass**	12.80 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Orangey brown, clayey, fine to coarse, flint GRAVEL.		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

TEST SPECIMEN

LOCATION	Not applicable
ORIENTATION	Not applicable

PREPARATION DETAILS

METHOD OF DIVISION	Not Applicable
RETAINED 37.5mm	15
RETAINED 20mm	45
NO OF LAYERS	3
BLOWS PER LAYER	62
METHOD	2.5 Kg rammer
CONDITION	Unsoaked
BULK DENSITY (Mg/m³)	2.00
DRY DENSITY (Mg/m³)	1.78

	CBR VALUE (%)	MOISTURE CONT. (%)	@ 105-110 °C
TOP	50	13	
BOTTOM	48	12	
MEAN	49	13	

REMARKS : Precision of results on sheets 2 and 3 do not comply with BS requirements. Only CBR values on this page should be quoted

[redacted]

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

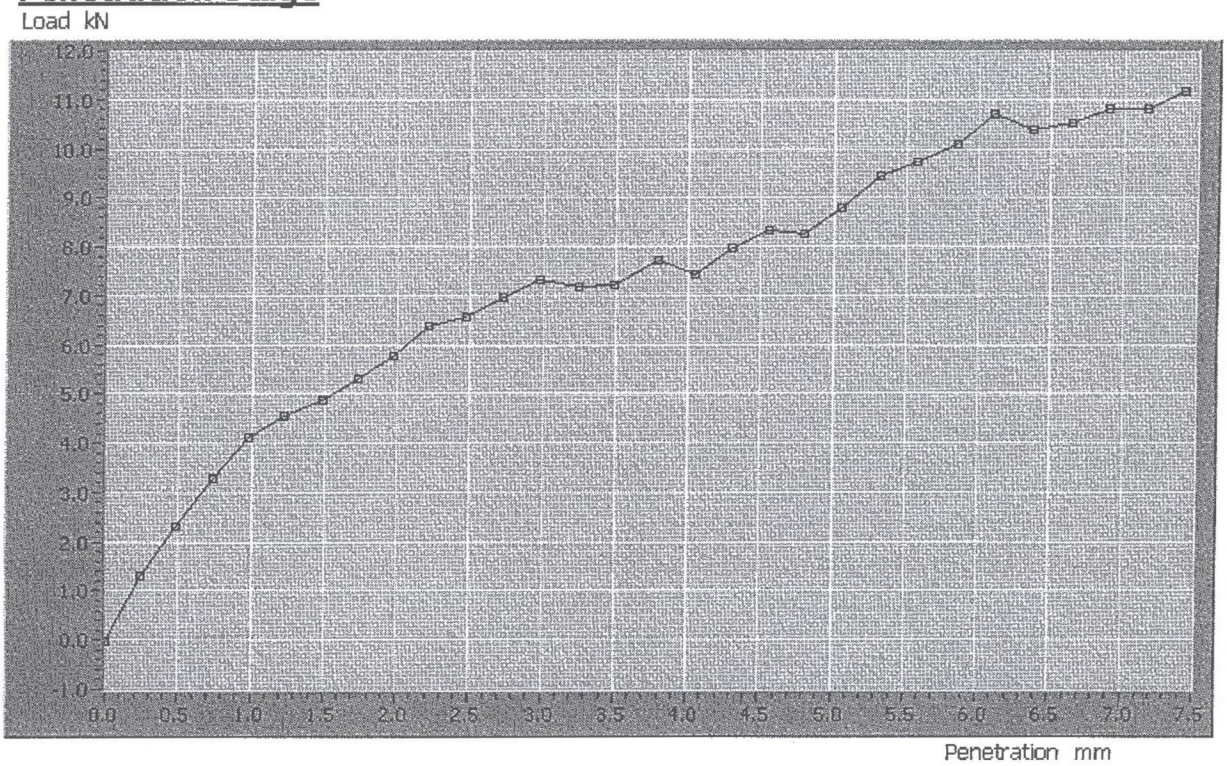
UKAS TESTING
0920

Test code = 642

Norfolk Partnership Laboratory
California Bearing Ratio

Client	May Gurney	**Lab Ref**	N/A
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	TP1 - B2	**Sample**	0000098847

Penetration Stage



Results - Top			
Penetration	2.50	5.00	mm
Load	6.62	8.70	kN
Standard Load	13.20	20.00	kN
California Bearing Ratio	50.18	43.48	%

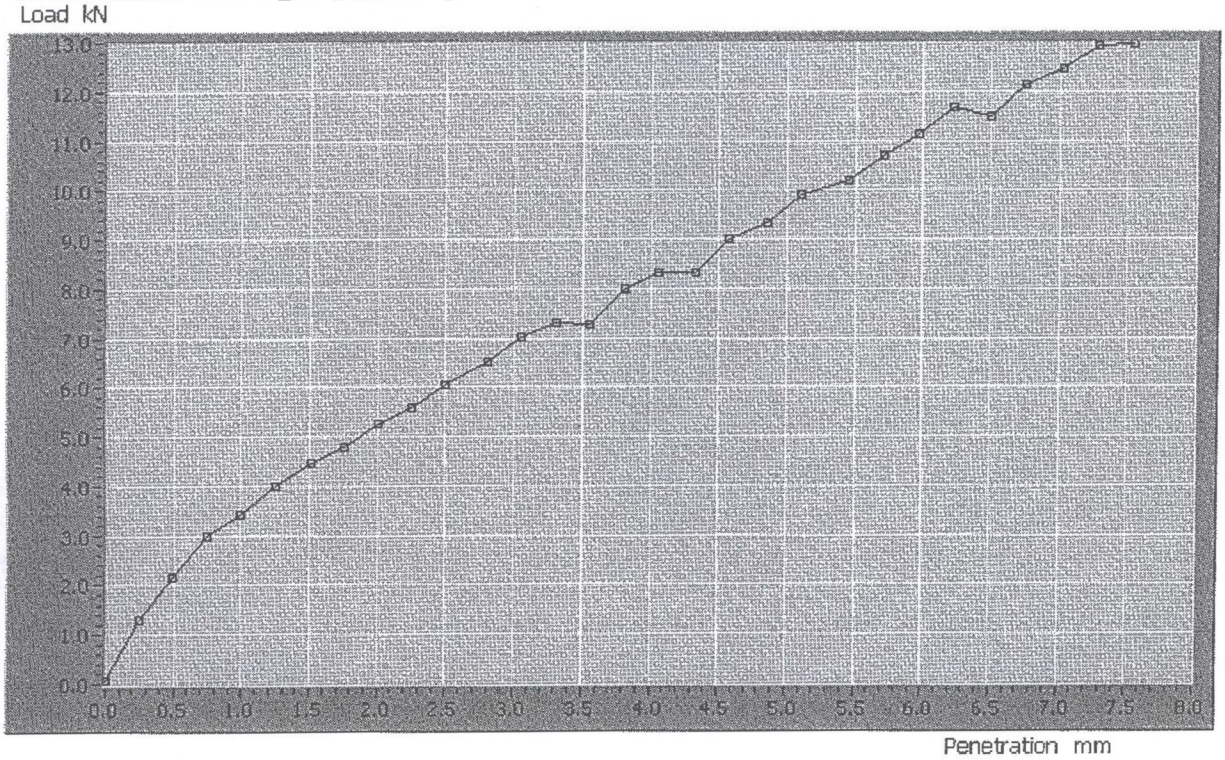
Authorised signatory
[ ] R J Noakes (Laboratory Manager)
[✓] M L Bumstead (Section Engineer)
[ ] I D Brown (Section Engineer)
[ ] D N Houseago (Lead Technician)

[redacted]

Norfolk Partnership Laboratory
California Bearing Ratio

Client	May Gurney	**Lab Ref**	N/A
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	TP1 - B2	**Sample**	0000098847

Penetration Stage (side 2)



Results - Bottom			
Penetration	2.50	5.00	mm
Load	6.05	9.65	kN
Standard Load	13.20	20.00	kN
California Bearing Ratio	45.85	48.23	%

Authorised signatory [ ] R J Noakes (Laboratory Manager)
[/] M L Bumstead (Section Engineer)
[ ] I D Brown (Section Engineer)
[ ] D N Houseago (Lead Technician)

[redacted]

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098855
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	21/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	TP1 B3 0.8-1.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Disturbed	**Sample mass**	14 70 kg

Sampled by Client who is not a member of Norfolk Partnership Laboratory. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Brown silty fine, medium and coarse FLINT GRAVEL with some brick rubble		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	91
20mm	66
14mm	60
10mm	53
6.3mm	47
5mm	46
2mm	39
1.18mm	35
600µm	25
425µm	21
212µm	14
150µm	10
63µm	7

Uniformity coefficient >10.0

REMARKS

R J Noakes (Group Manager) ☐
M L Bumstead (Section Engineer) ☑
I D Brown (Section Engineer) ☐
D N Houseago (Lead Technician) ☐

[redacted]

UKAS TESTING 0920

Test code = 610

www.maygurney.co.uk
www.norfolk.gov.uk

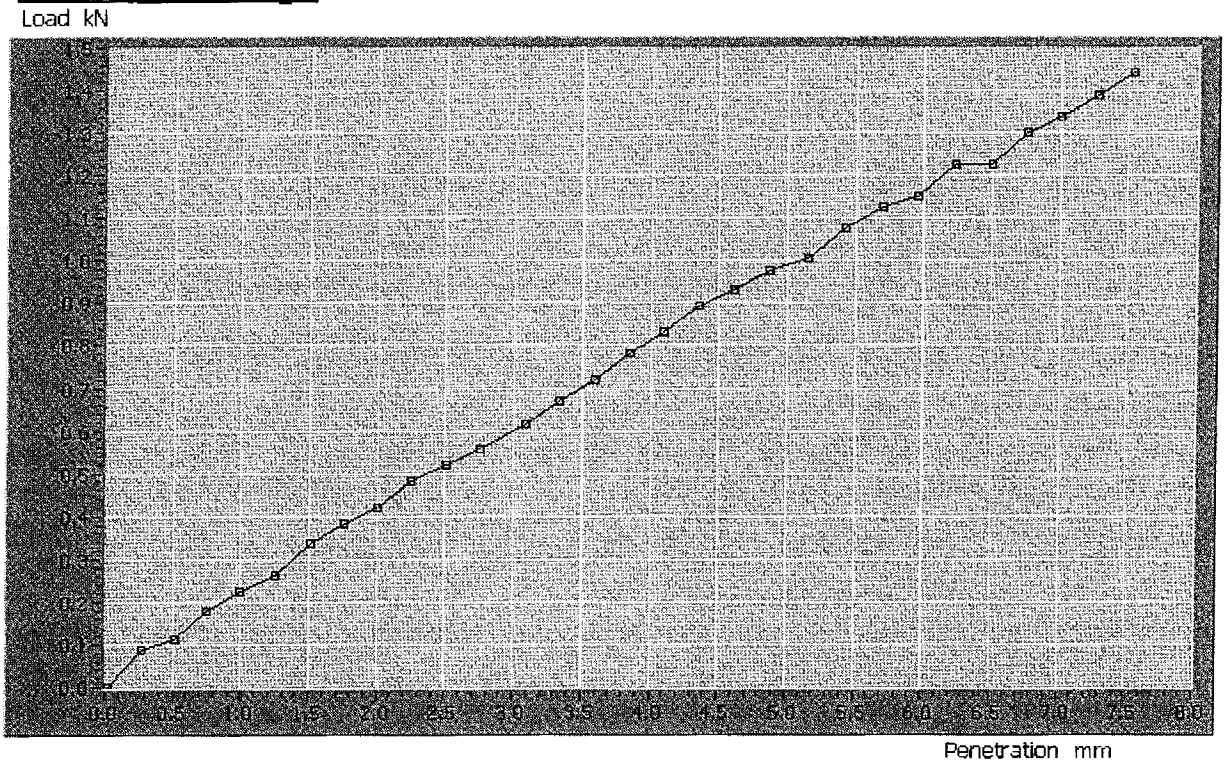
INVESTOR IN PEOPLE

AGS ASSOCIATION OF GEOTECHNICAL & GEOENVIRONMENTAL SPECIALISTS

Norfolk Partnership Laboratory
California Bearing Ratio

Client	May Gurney	**Lab Ref**	N/A
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	TP1 - B3	**Sample**	0000098848

Penetration Stage



Results - Top			
Penetration	2.50	5.00	mm
Load	0.52	0.99	kN
Standard Load	13.20	20.00	kN
California Bearing Ratio	3.94	4.95	%

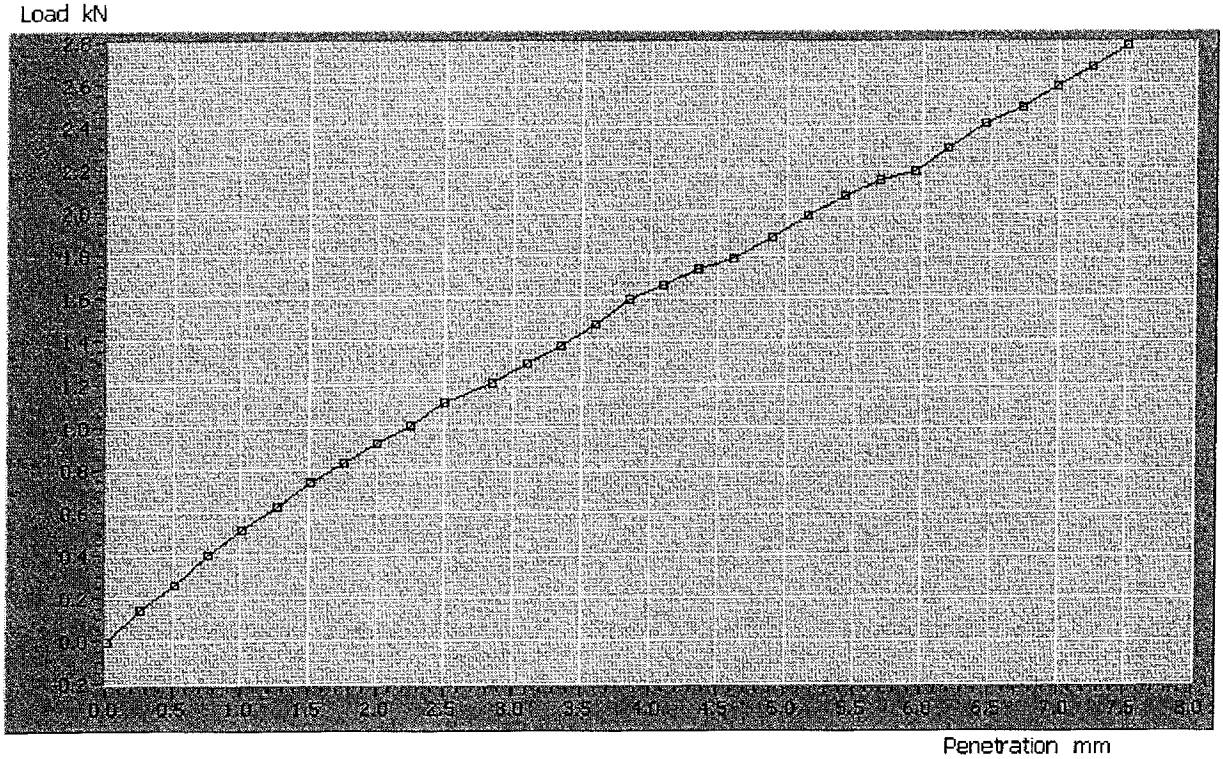
Authorised signatory [ ] R J Noakes (Laboratory Manager)
[/] M L Bumstead (Section Engineer)
[ ] I D Brown (Section Engineer)
[ ] D N Houseago (Lead Technician)

[redacted]

Norfolk Partnership Laboratory
California Bearing Ratio

Client	May Gurney	**Lab Ref**	N/A
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	TP1 - B3	**Sample**	0000098848

Penetration Stage (side 2)



Results - Bottom			
Penetration	2.50	5.00	mm
Load	1.12	1.93	kN
Standard Load	13.20	20.00	kN
California Bearing Ratio	8.47	9.63	%

Authorised signatory
[ ] R J Noakes (Laboratory Manager)
[✓] M L Bumstead (Section Engineer)
[ ] I D Brown (Section Engineer)
[ ] D N Houseago (Lead Technician)

Geotechnical Laboratory Test Results Summary Sheet

MAY GURNEY

Site: Chichester (Roussillion Barracks) | Contract No : SI1279 | Date: August 2007. | Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	$\sigma_1-\sigma_3$	C_u Kpa	$\varnothing_u$ (°)	
TP3	0.2-0.5	B3									2.7										Wet Sieve, Remoulded CBR

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water

Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage

σ_3 Cell Pressure
$\sigma_1-\sigma_3$ Deviator Stress
Øu Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2

(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098982
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	21/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	TP3 B3 0.2-0.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Disturbed	**Sample mass**	14.00 kg

The identity of the sampler is unknown If a Sample Certificate was provided it is available for inspection The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Grey silty fine, medium and coarse FLINT GRAVEL		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	90
20mm	76
14mm	68
10mm	57
6.3mm	51
5mm	49
2mm	42
1.18mm	39
600µm	33
425µm	30
212µm	24
150µm	21
63µm	17

Uniformity coefficient >10.0

REMARKS

UKAS TESTING
0920

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

Test code = 610

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098849
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

DETERMINATION OF THE CALIFORNIA BEARING RATIO ON A SAMPLE REMOULDED AT NATURAL MOISTURE CONTENT TO BS 1377 : PART 4 : 1990

Scheme	Chichester		
Chainage / location	TP3 / B3 / 0.2-0.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	07/08/2007		
Sample type	Bulk	**Sample mass**	14.00 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Grey silty, fine to coarse, flint GRAVEL		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

	TEST SPECIMEN
LOCATION	Not applicable
ORIENTATION	Not applicable
	PREPARATION DETAILS
METHOD OF DIVISION	Not Applicable
RETAINED 37.5mm	9
RETAINED 20mm	24
NO OF LAYERS	3
BLOWS PER LAYER	62
METHOD	2.5 Kg rammer
CONDITION	Unsoaked
BULK DENSITY (Mg/m³)	2.02
DRY DENSITY (Mg/m³)	1.76

	CBR VALUE (%)	MOISTURE CONT (%)	@ 105-110 °C
TOP	23	14	
BOTTOM	31	15	
MEAN	27	15	

REMARKS : Precision of results on sheets 2 and 3 do not comply with BS requirements. Only CBR values on this page should be quoted

UKAS TESTING 0920

R J Noakes (Group Manager) ☐
M L Bumstead (Section Engineer) ☑
I D Brown (Section Engineer) ☐
D N Houseago (Lead Technician) ☐

[redacted]

Test code = 642

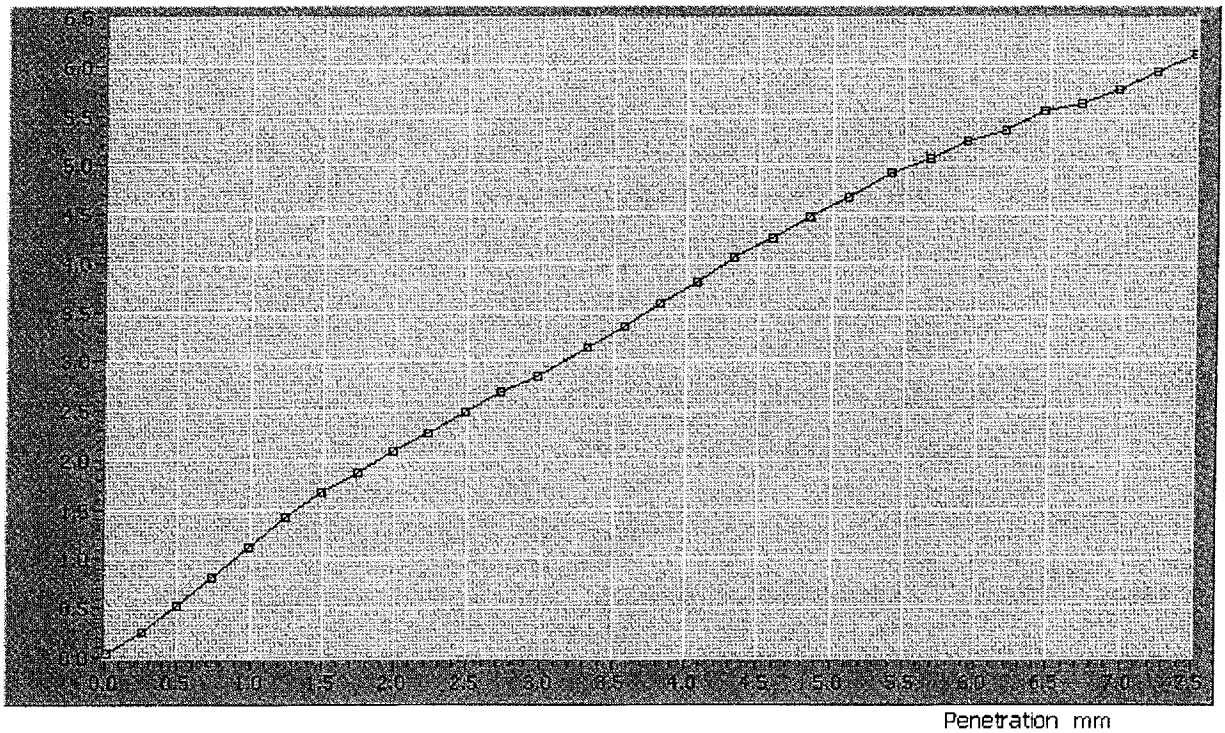
INVESTOR IN PEOPLE

AGS ASSOCIATION OF GEOTECHNICAL & GEOENVIRONMENTAL SPECIALISTS

Norfolk Partnership Laboratory
California Bearing Ratio

Client	May Gurney	**Lab Ref**	N/A
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	TP3 - B3	**Sample**	0000098849

Penetration Stage



Results - Top			
Penetration	2.50	5.00	mm
Load	2.50	4.58	kN
Standard Load	13.20	20.00	kN
California Bearing Ratio	18.96	22.89	%

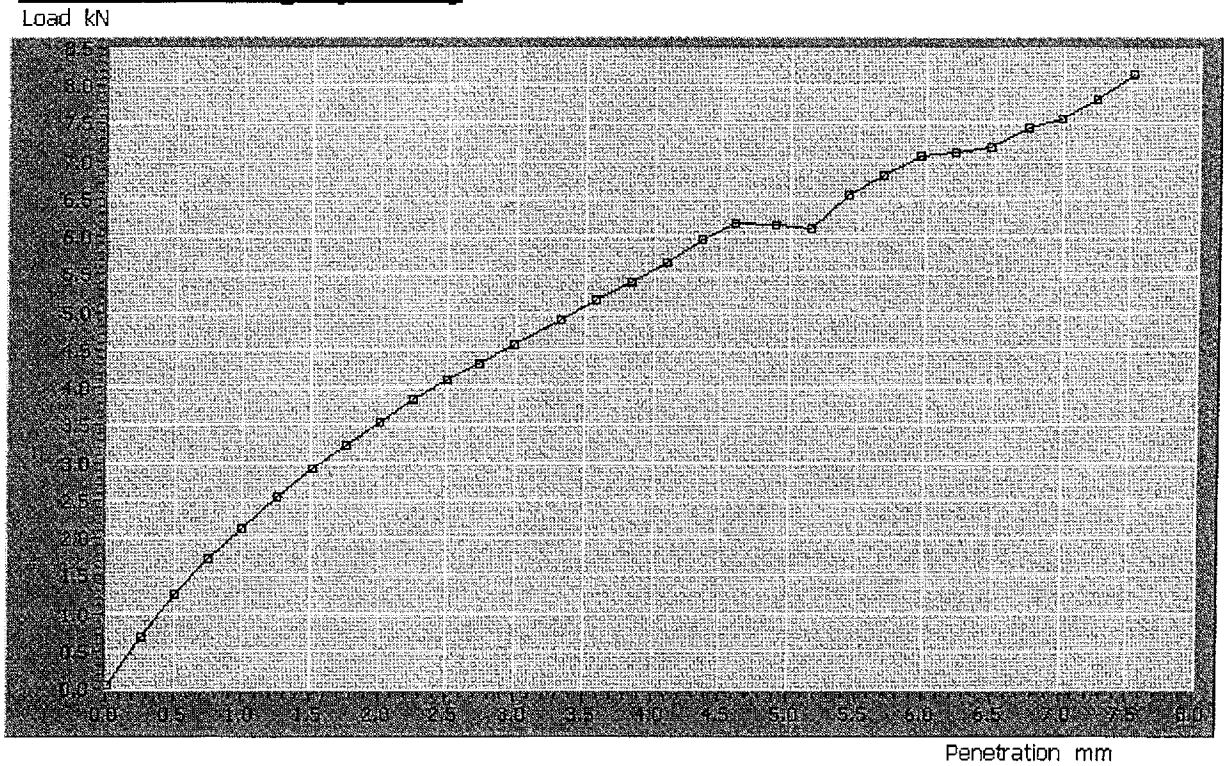
Authorised signatory
[ ] R J Noakes (Laboratory Manager)
[✓] M L Bumstead (Section Engineer)
[ ] I D Brown (Section Engineer)
[ ] D N Houseago (Lead Technician)

[redacted]

Norfolk Partnership Laboratory
California Bearing Ratio

Client	May Gurney	**Lab Ref**	N/A
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	TP3 - B3	**Sample**	0000098849

Penetration Stage (side 2)



Results - Bottom			
Penetration	2.50	5.00	mm
Load	4.10	6.12	kN
Standard Load	13.20	20.00	kN
California Bearing Ratio	31.06	30.59	%

Authorised signatory
[ ] R J Noakes (Laboratory Manager)
[✓] M L Bumstead (Section Engineer)
[ ] I D Brown (Section Engineer)
[ ] D N Houseago (Lead Technician)

Geotechnical Laboratory Test Results Summary Sheet

MAY GURNEY

Site: Chichester (Roussillion Barracks) | Contract No : SI1279 | Date: August 2007. | Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	σ_1-σ_3	C_u Kpa	$\varnothing_u$ (°)	
TP4	0.2-0.5	B2																			Wet Sieve, Remoulded CBR
	1.3-1.7	B4																			Wet Sieve
	2.9	D7	22	43	18	25	CI														

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water

Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage

σ_3 Cell Pressure
σ_1-σ_3 Deviator Stress
$\varnothing u$ Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2

(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098857
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	21/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	TP4 B2 0.2-0.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Disturbed	**Sample mass**	11.90 kg

Sampled by Client who is not a member of Norfolk Partnership Laboratory. If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Brown silty fine medium and coarse FLINT GRAVEL with some rootlets		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	100
20mm	81
14mm	66
10mm	56
6.3mm	48
5mm	46
2mm	40
1.18mm	37
600µm	29
425µm	25
212µm	19
150µm	17
63µm	14

Uniformity coefficient >10.0

REMARKS

UKAS TESTING
0920

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

Test code = 610

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098850
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

DETERMINATION OF THE CALIFORNIA BEARING RATIO ON A SAMPLE REMOULDED AT NATURAL MOISTURE CONTENT TO BS 1377 : PART 4 : 1990

Scheme	Chichester		
Chainage / location	TP4 / B2 / 0.2-0.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	09/08/2007		
Sample type	Bulk	**Sample mass**	11.90 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection.The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample
Description	Brown silty clayey fine to coarse, flint GRAVEL with rootlets.
Supplier	Ex site
Source	See Ch/Location above
Conveyance note no.	Not applicable

	TEST SPECIMEN
LOCATION	Not applicable
ORIENTATION	Not applicable
	PREPARATION DETAILS
METHOD OF DIVISION	Not Applicable
RETAINED 37.5mm	Unknown
RETAINED 20mm	Unknown
NO OF LAYERS	3
BLOWS PER LAYER	62
METHOD	2.5 Kg rammer
CONDITION	Unsoaked
BULK DENSITY (Mg/m³)	2.05
DRY DENSITY (Mg/m³)	1.77

	CBR VALUE (%)	MOISTURE CONT (%)	@ 105-110 °C
TOP	2.8	16	
BOTTOM	7.9	15	
MEAN	5.4	16	

REMARKS : Precision of results on sheets 2 and 3 do not comply with BS requirements Only CBR values on this page should be quoted

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [X]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

UKAS TESTING
0920

Test code = 642

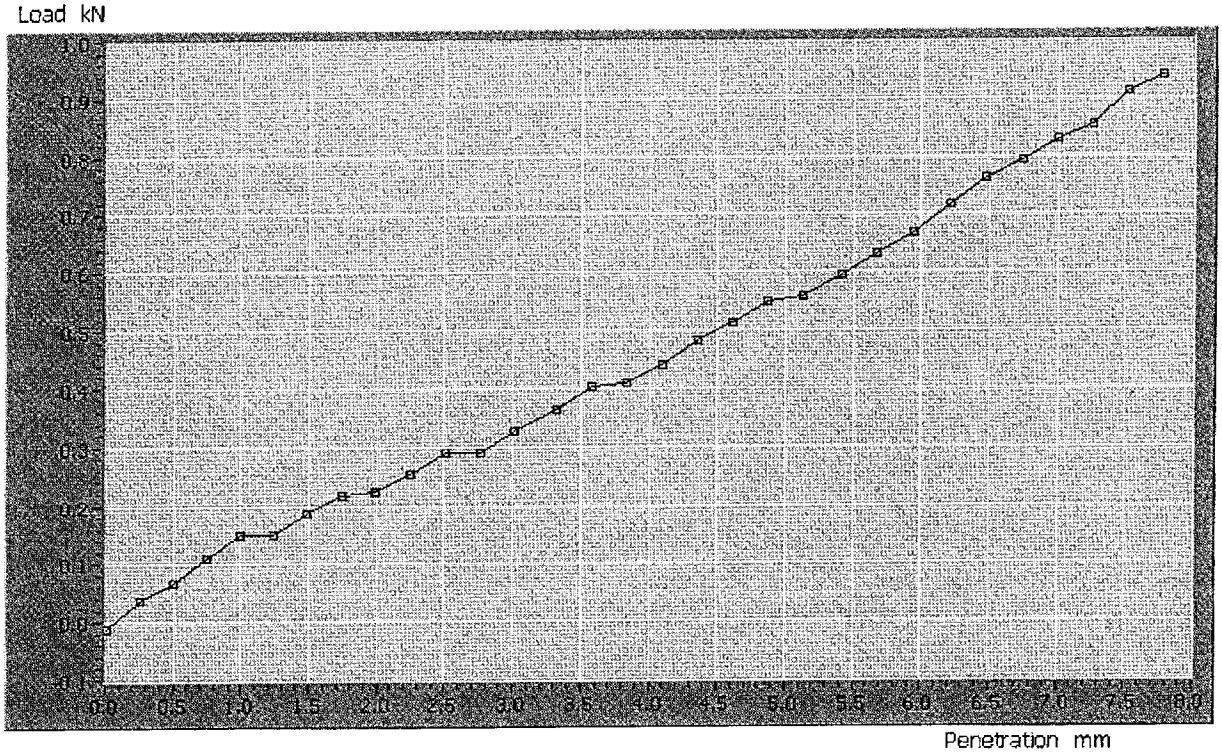
INVESTOR IN PEOPLE

AGS ASSOCIATION OF GEOTECHNICAL & GEOENVIRONMENTAL SPECIALISTS

Norfolk Partnership Laboratory
California Bearing Ratio

Client	May Gurney	**Lab Ref**	N/A
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	TP4 - B2	**Sample**	0000098850

Penetration Stage



Results - Top			
Penetration	2.50	5.00	mm
Load	0.29	0.55	kN
Standard Load	13.20	20.00	kN
California Bearing Ratio	2.19	2.77	%

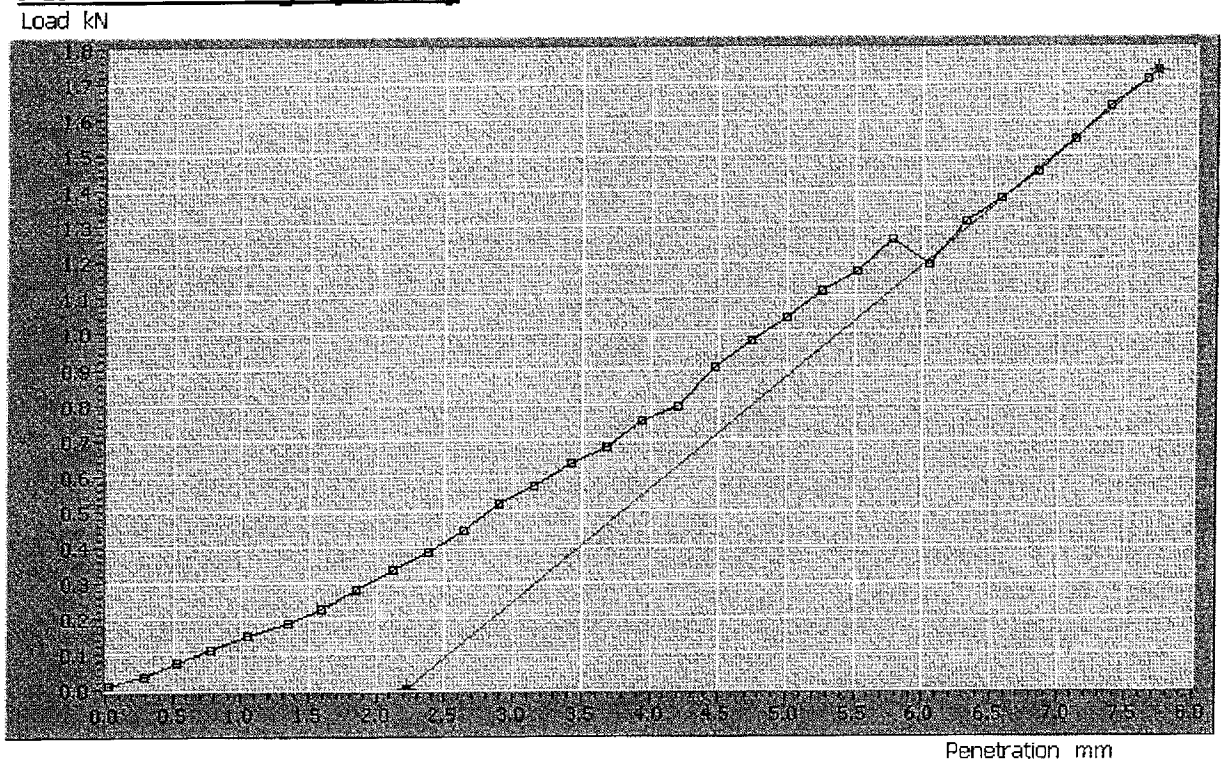
Authorised signatory
[ ] R J Noakes (Laboratory Manager)
[✓] M L Bumstead (Section Engineer)
[ ] I D Brown (Section Engineer)
[ ] D N Houseago (Lead Technician)

[redacted]

Norfolk Partnership Laboratory
California Bearing Ratio

Client	May Gurney	**Lab Ref**	N/A
Project	Roussillon Barracks	**Job**	MGSI1279
Borehole	TP4 - B2	**Sample**	0000098850

Penetration Stage (side 2)



Results - Bottom			
Penetration	2.50	5.00	mm
Load	0.97	1.58	kN
Standard Load	13.20	20.00	kN
California Bearing Ratio	7.38	7.90	%

Authorised signatory
[ ] R J Noakes (Laboratory Manager)
[/] M L Burnstead (Section Engineer)
[ ] I D Brown (Section Engineer)
[ ] D N Houseago (Lead Technician)

[redacted]

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098858
Your sample ref	None
Your project or order No.	SI1279
P & T project No.	
Date report issued	14/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	TP4 / B4 1.3-1.7m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Bulk	**Sample mass**	10 20 kg

The identity of the sampler is unknown. If a Sample Certificate was provided it is available for inspection The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Orangey brown clayey, fine to coarse flint GRAVEL		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	97
20mm	74
14mm	61
10mm	53
6.3mm	44
5mm	42
2mm	32
1.18mm	29
600µm	26
425µm	25
212µm	20
150µm	17
63µm	9

Uniformity coefficient 195.0

REMARKS

UKAS TESTING 0920

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

Test code = 610

Geotechnical Laboratory Test Results Summary Sheet

MAY GURNEY

Site: Chichester (Roussillion Barracks) | Contract No : SI1279 | Date: August 2007. | Sheet 1 of 1

SAMPLE DETAILS			INDEX TESTS					CHEMICAL				DENSITIES			STRENGTH						REMARKS
BH/TP	Depth (m)	TYPE	W %	LL%	PL%	PI (x)	Soil Classification	TOTAL SO3 % (%<2mm)	SOLUBLE SO3 g/l (%<2mm)	pH	ORG (%)	Particle Density Mg/m^3	BULK Mg/m^3	DRY Mg/m^3	TYPE	DIA (mm)	σ_3	σ_1-σ_3	C_u Kpa	$\varnothing_u$ (°)	
TP5	0.2-0.5	B2																			Wet Sieve, Remoulded CBR
	2.5	B5						0.00		6.4											Wet Sieve

Notes/Abbreviations:

U Undisturbed
D Disturbed
B Bulk
W Water

Hv Laboratory hand vane
Q Quick Undrained
S Single Stage
M Multi Stage

σ_3 Cell Pressure
σ_1-σ_3 Deviator Stress
$\varnothing u$ Angle of shear resistance
To convert SO_3 to SO_4 x by 1.2

(x) % passing B.S. 425um sieve
ORG Organic matter content
L.O.I. Loss on ignition

Norfolk County Council
working with
Mott MacDonald
MAY GURNEY

Norfolk Partnership Laboratory
County Hall, Martineau Lane
NORWICH, Norfolk NR1 2SG
Tel: 01603 222416
Fax: 01603 222457
Email: civil.laboratory@norfolk.gov.uk

May Gurney Ltd
Infrastucture Services
Geotechnical & Civils
Ayton Road

Wymondham
NR18 0RH

Our project number	MGSI0016
Our report and sample No.	0000098859
Your sample ref	SI1279
Your project or order No.	SI1279
P & T project No.	
Date report issued	17/08/2007

Particle Size Distribution by Wet Sieving to BS 1377 : Part 2 : 1990

Scheme	Chichester		
Chainage / location	TP5 B2 0.2-0.5m		
Date sampled	Unknown	**Date received**	06/08/2007
Date tested	06/08/2007		
Sample type	Disturbed	**Sample mass**	12.00 kg

Sampled by Client who is not a member of Norfolk Partnership Laboratory If a Sample Certificate was provided it is available for inspection. The accuracy of information provided by third parties cannot be guaranteed.

Material	Bulk soil sample		
Description	Dark brown silty SAND with occasional fine medium flint gravel and rootlets		
Supplier	Ex site	**Source**	See Ch/Location above
Conveyance note no.	Not applicable		

B.S. Sieve	% passing
75mm	100
63mm	100
50mm	100
37.5mm	100
20mm	96
14mm	90
10mm	84
6.3mm	78
5mm	76
2mm	68
1.18mm	62
600µm	52
425µm	45
212µm	28
150µm	22
63µm	14

Uniformity coefficient 35.0

REMARKS

UKAS TESTING 0920

R J Noakes (Group Manager) []
M L Bumstead (Section Engineer) [✓]
I D Brown (Section Engineer) []
D N Houseago (Lead Technician) []

[redacted]

Test code = 610