Annex 31.2

Factual Report on Geoenvironmental Ground Investigation Cherry Cobb Sands

(Delta-Simons)

delta-simons
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A different perspective

FACTUAL REPORT ON GEO-ENVIRONMENTAL GROUND INVESTIGATION CHERRY COBB SANDS, HU12 9JX

FOR ABLE (UK)

DELTA-SIMONS PROJECT NO. 10-2041.01

delta-simons
environmental consultants

FACTUAL REPORT ON GEOENVIRONMENTAL GROUND INVESTIGATION
CHERRY COBB SANDS, HU12 9JX

FOR ABLE (UK)

DELTA-SIMONS PROJECT NO. 10-2041.01

delta-simons
environmental consultants

This Report was issued in March 2011 and prepared by:
Delta-Simons Environmental Consultants, The Lawn, Union Road, Lincoln, LN1 3BL
Tel: 0870 0400 012 Fax: 01522 882567 www.deltasimons.com

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FACTUAL REPORT ON GEOTECHNICAL GROUND INVESTIGATION

CHERRY COBB SANDS, HU12 9JX

FOR

ABLE (UK)

DELTA-SIMONS PROJECT NO. 10-2041.01

1.0 INTRODUCTION

1.1 Authorisation

Delta-Simons Environmental Consultants Ltd (Delta-Simons) was instructed by Able (UK) to conduct an intrusive Geotechnical Ground Investigation at Cherry Cobb Sands (hereafter referred to as the "Site").

1.2 Purpose

The purpose of the Geotechnical Ground Investigation is to determine the ground and groundwater conditions at the Site to assist the Engineer in the geo-environmental appraisal of the Site in the context of the redevelopment of the Site as an environmental compensation scheme.

1.3 Scope

In summary, the scope of works of the Geotechnical Ground Investigation was as follows:

- Obtain a Phase I UXO (unexploded ordnance) desktop survey for the Site,
- Undertake fourteen CPT probe-holes to a maximum depth of 25.0 m bgl (metres below ground level), to include down-hole magnetometers,
- The drilling of one cable percussion borehole to a maximum depth of 15.0 m bgl,
- The excavation of fourteen machine-dug trial pits to a maximum depth of 4.0 m bgl,
- Obtain the level and co-ordinates of each exploratory location,
- Undertake both geotechnical and environmental laboratory analysis as instructed by the Engineer,
- Present the factual findings of the investigation in a Factual Geotechnical Site Investigation Report.

1.4 Limitations

Some of intrusive locations were limited by, and in some instance required moving, due to the requirements of the current land occupiers. Furthermore, the risk of UXO affected two of the trial-pit locations. In summary these limitations comprised;

- CPT 1 moved approximately 20m westwards,

- BH 1 moved from a location adjacent to CPT 5 to a location adjacent to CPT 4,
- CPT 10 advanced a three differing locations before target depth was reached in order to satisfy the current land occupier,
- CPTs 13 & 14 were not progressed due to objections from the land occupiers, and time constraints caused by the above access difficulties, and
- TPs 11 & 12 were terminated at depths of 2.50 m and 2.70 m bgl due to an unacceptable risk of UXO identified by magnetometer readings and desk-based information and these locations, and the potential for cross-contamination of the wider Site.

2.0 SITE DESCRIPTION

2.1 Site Location and Description

The Site, extending to approximately 100ha, is located approximately 5 km to the south-west of the village of Thorngumbald, approximately 15 km east of the city of Hull, in the East Riding of Yorkshire (Figure 1). The Site is centred, approximately, between National Grid Reference NGR TA 233192 and NGR TA 213218. The Site comprises arable farmland.

2.2 Published Geology

From the 1:50,000 scale Geological map (England and Wales, Sheet No. 81, Patrington, the Site is underlain by Marine and Estuarine Alluvium, overlying Glacial Till, rested on Cretaceous Chalk. The geological conditions identified during the intrusive Site Investigation are summaries in Section 4.0 of this Report.

Further background research such as a desk study was not required within the terms of reference for the work.

2.3 Anecdotal Information

Anecdotal information derived from members of the public during the course of carrying out the intrusive investigation indicates that a former landfill area, located in the south-eastern area of the Site and identified in the Desk Top Study, accepted unregistered and unrecorded industrial waste from heavy industrial processes in Hull.

3.0 SITE INVESTIGATION

3.1 General

The locations of the exploratory holes were determined on Site by the Engineer, with amendments to their locations as per the limitations detailed in Section 1.0 of this Report, to provide a representative coverage of the Site, taking account of the presence of existing structures, and known underground field drainage. In order to avoid damage to underground services, intrusive locations were positioned with reference to the results of a service avoidance exercise undertaken by Delta-Simons.

The approximate locations of the exploratory holes are shown in Figure 2.

3.2 CPT Probeholes

Twelve CPT probeholes (CPT 1 to CPT 12) were advanced using a 20-tonne CPT truck, to depths of between 20 and 25 m bgl on the 1st, 2nd and 3rd of February 2011 under the supervision of Delta-Simons. Prior to the CPT probeholes being advanced, a desk based UXO assessment was undertaken for the Site, a copy of which is presented in Appendix V.

The locations of the CPT probeholes are shown on Figure 2 and logs are provided as Appendix I.

3.3 Borehole

One cable-percussion borehole (BH 1) was advanced using a Dando cable percussion rig to a depth of 15.65 m bgl, on the 3rd and 4th of February 2011 under the supervision of Delta-Simons. Standard penetration tests were carried out at approximately 1.5 m intervals in all materials encountered, while bulk and undisturbed samples were recovered from throughout the borehole at regular intervals. Furthermore, three in-situ vane tests were undertaken, and four piston samples were obtained from within the borehole.

Groundwater was recorded as a strike at 4.30 m bgl, rising to 4.10 m bgl after 20 minutes. The resting level was later recorded at 4.15 m bgl.

The borehole location was installed as a nominal 50 mm internal diameter monitoring well completed with an upstanding cover, in order to facilitate groundwater and ground gas monitoring. The location of the borehole is shown on Figure 2 and logs are provided as Appendix II.

3.4 Trial-Pits

Fourteen trial-pits (TP 1 – TP 14) were advanced using a wheeled backhoe excavator to depths of between 2.50 m and 4.10 m bgl, on the 3rd and 4th February 2011. Hand-vane tests were carried out at depths of 0.50 m and 1.00 m bgl, while both bulk and small disturbed samples were recovered from the trial pits. Groundwater was recorded as seepages and damp in all trial pits below 3.0 m bgl, except in TP 11 and TP 12 where a body of water was found resting at approximately 1.50 m bgl. The location of the trial-pits is shown on Figure 2 and logs are provided as Appendix III. A selection of photographs is presented in Appendix IV.

The Co-ordinates and levels of all of the exploratory holes are given in Appendix VIII.

3.5 Soil Sampling

Soil samples were recovered for geotechnical and environmental analysis at selected intervals during the advancement of the trial pits and the borehole. Samples were stored and transported in appropriate containers, at suitable temperatures, in order to avoid cross-contamination of samples or degradation of sample quality.

3.6 Laboratory Analysis

The location, depth and suite of analysis selected for each soil sample and location is presented in Table 1 and Table 2. The full set of geotechnical analytical results is presented in Appendix VI and the full set of environmental analytical results is presented in Appendix VII.

Table 1 –Geotechnical Analysis

Sample Location	Depth (m)	Strata	Analysis
BH 1	1.20	Clay	PI, w
BH 1	2.00	Clay	Oed, PI, w
BH 1	5.00	Silt	PI, w
BH 1	9.30	Sand	Oed
TP 1	1.00	Clay	PI, w
TP 1	2.00	Silt	PI, w
TP 1 (BC1)	1.00-1.50	Clay	MCR, MCV
TP 2 (BC2)	1.00-1.50	Clay	MCR, MCV
TP 2 (GS1)	3.00-3.50	Silt	MCR, MCV
TP 3 (BC3)	1.00-1.50	Clay	MCR
TP 3	4.00	Sand	PI, w
TP 4	1.00	Clay	PI, w
TP 4 (BC4)	1.00-1.50	Clay	MCR, MCV

TP 4	2.00	Silt	PI, w
TP 4	3.00	Silt	PI, w
TP 4 (GS2)	3.00-3.50	Silt	MCR, MCV
TP 5	1.00	Clay	PI, w
TP 5	2.00	Silt	PI, w
TP 5 (GS3)	2.00-2.50	Silt	MCR
TP 6	1.00	Clay	PI, w
TP 6 (BC5)	1.00-1.50	Clay	MCR, MCV
TP 6	2.00	Silt	PI, w
TP 6 (GS4)	2.00-2.50	Silt	MCR, MCV
TP 7	1.00	Clay	PI, w
TP 7	2.00	Silt	PI, w
TP 7 (GS5)	2.00-2.50	Silt	MCR
TP 8	1.00	Clay	PI, w
TP 8	2.00	Silt	PI, w
TP 8 (GS6)	3.00-3.50	Silt	MCR, MCV
TP 9	1.00	Clay	PI, w
TP 9 (BC6)	1.00-1.50	Clay	MCR
TP 9	2.00	Silt	PI, w
TP 9 (GS7)	3.00-3.50	Silt	MCR
TP 10	1.00	Clay	PI, w
TP 10 (BC7)	1.00-1.50	Clay	MCR
TP 10	2.00	Silt	PI, w
TP10 (GS8)	2.00-2.50	Silt	MCR, MCV
TP 12	0.50	Made Ground	MCR
TP 13	1.00	Clay	PI, w
TP13 (BC8)	1.00-1.50	Clay	MCR, MCV
TP 13	2.00	Silt	PI, w
TP13 (GS9)	3.00-3.50	Silt	MCR
TP 14	1.00	Clay	PI, w
TP 14 (BC9)	1.00-1.50	Clay	MCR
TP 14	2.00	Silt	PI, w
TP 14 (GC1)	2.00-2.50	Silty Clay	MCR
TP 14	4.00	Clay	PI, w

Note: *w* = Moisture content
PI = Plasticity Index, determined from Liquid Limit (LL) and Plastic Limit (PL)
MCR = Dry Density/Moisture Content Relationship Test
MCV = Moisture Condition Value
Oed = One dimensional Consolidation test

Table 2 –Chemical Analysis

Sample Location	Depth (m)	Strata	Analysis
TP 1	0.30	Topsoil	Pe
TP 2	0.00	Topsoil	m, TPH, sPAH, Ph, LOI, th, TOC, cy
TP 3	1.00	Clay	m, TPH, sPAH, Ph, LOI, th TOC, cy
TP 6	0.00	Topsoil	m, TPH, sPAH, Ph, LOI, th TOC, cy
TP 7	0.30	Topsoil	Pe
TP 8	1.00	Clay	m, TPH, sPAH, Ph, LOI, th, TOC, cy
TP 11	0.20	Topsoil	m, sTPH, sPAH, VOC, Ph, LOI, acm, th, TOC, cy
TP 11	0.50	Made Ground	m, sTPH, sPAH, VOC. Ph, LOI, acm, th, TOC, cy
TP 11	1.50	Made Ground	m, sTPH, VOC, Ph, LOI, acm, th, tOC, cy, WAC
TP 12	0.50	Made Ground	m, sTPH, sPAH, VOC, acm, LOI, WAC
TP 12	1.20	Made Ground	m, sTPH, VOC, Ph, LOI, th, TOC, cy, sacm
TP 12	1.90	Made Ground	m, TPH, sPAH, Ph, LOI, th, TOC, cy
TP 13	0.3	Topsoil	Pe
TP 14	0.30	Topsoil	m, TPH, sPAH, Ph, LOI, th, TOC, cy
TP 2	1.00	Clay	S04, Cl, p, w
TP 4	2.00	Silt	S04, Cl, p, w
TP 6	1.00	Clay	S04, Cl, p, w
TP 9	3.00	Silt	S04, Cl, p, w
TP 10	0.00	Topsoil	S04, Cl, p, w
TP 12	0.00	Topsoil	S04, Cl, p, w
TP 13	1.00	Clay	S04, Cl, p, w
TP 14	3.00	Clay	S04, Cl, p, w

Note:
w = Moisture content including pH value
m = Heavy metals suite
cy = Cyanide
th = Thiocyanate
TPH = Total Petroleum Hydrocarbons (C6-10, 12-20, 20-40)
sTPH = Total Petroleum Hydrocarbons (aliphatic/aromatic split)
sPAH = Poly Aromatic Hydrocarbons (EPA-16)
VOC = Volatile Organic Carbons (including semil-volatile)
Ph = Total phenol
LOI = Loss On Ignition
TOC = Total Organic Carbon
Pe = Pesticide Suite
acm = Asbestos Containing Material
WAC = Waste Acceptance Criteria
sacm = Asbestos (speciated)

4.0 OBSERVED GROUND CONDITIONS

4.1 Ground Conditions

Full details of the ground conditions encountered during the investigation are shown on the exploratory hole logs in Appendix I, II & III. In general, the ground conditions encountered during the investigation comprised:

TOPSOIL overlying variable deposits of SILTY VERY SANDY CLAY and CLAYEY VERY SANDY SILT (possibly Made Ground associated with historically reclaimed estuarine alluvium) rested upon LOOSE TO MEDIUM DENSE SANDY SILT, SAND and PEAT.

In the vicinity of TP 11 & TP 12 ground conditions generally comprised:

TOPSOIL overlying MADE GROUND (anthropogenic waste including asbestos) overlying PEAT.

It should be noted that the Made Ground that is considered to be potentially associated with historical reclamation of estuarine materials at a generally shallow depth includes numerous subtle variations within the geological unit that comprise silts, sands and clays often encountered in either discrete beds or pockets. Therefore, there is uncertainty with regard to the 'general' composition of this material.

4.2 Groundwater Monitoring

Groundwater monitoring was carried out in monitoring location BH1 on the 10th and 17th of February, 2011, using an electronic dip meter in order to measure the depth to any groundwater present in the monitoring locations.

The depths to groundwater are summarised in Table 3 below.

Table 3 – Groundwater Monitoring

Monitoring Location	10th Feb 2011			17th Feb 2011		
	DTP (m)	DTW (m)	DTB (m)	DTP (m)	DTW (m)	DTB (m)
BH 1	n/a	1.71	5.30	n/a	1.70	5.12

Note: DTW = Depth to groundwater
DTP = Depth to product
DTB = Depth to base of well
NP = No product

5.0 LIMITATIONS TO GEO-ENVIRONMENTAL ASSESSMENTS

Delta-Simons obtained, reviewed and evaluated information from the Client, property owner, local authority and others. Delta-Simons' conclusions, opinions and recommendations are based on this information, on observations made during the Site reconnaissance, on ground conditions encountered during the site work, and on the results of laboratory and field tests performed during the investigation. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata and water conditions between or below intrusive locations. It should also be noted that groundwater levels vary due to seasonal or other effects and may at times differ to those measured during the investigation.

The observations contained in this Report represent our findings within the limitations of agreed scope of works. These observations were arrived at in accordance with currently accepted industry best practices, and, as such, are not a guarantee that the Site is free of hazardous or potentially hazardous materials or conditions.

Delta-Simons Environmental Consultants Limited prepared this Report for our Client. Any third parties using this Report do so entirely at their own risk. Delta-Simons makes no warranty or representation whatsoever, express or implied, with respect to the use by a third party of any information contained in this Report or its suitability for any purpose. Delta-Simons assumes no responsibility for any costs, claims, damages or expenses (including any consequential damages) resulting from the use of this Report or any information contained in this Report by a third party.

This Report was prepared by:

Kevin McGee
Geo-Environmental Consultant

26-4-11
Date

This Report was reviewed and authorised by:

Alex Ferguson
Projects Director

26/4/11
Date

Figures

Figures

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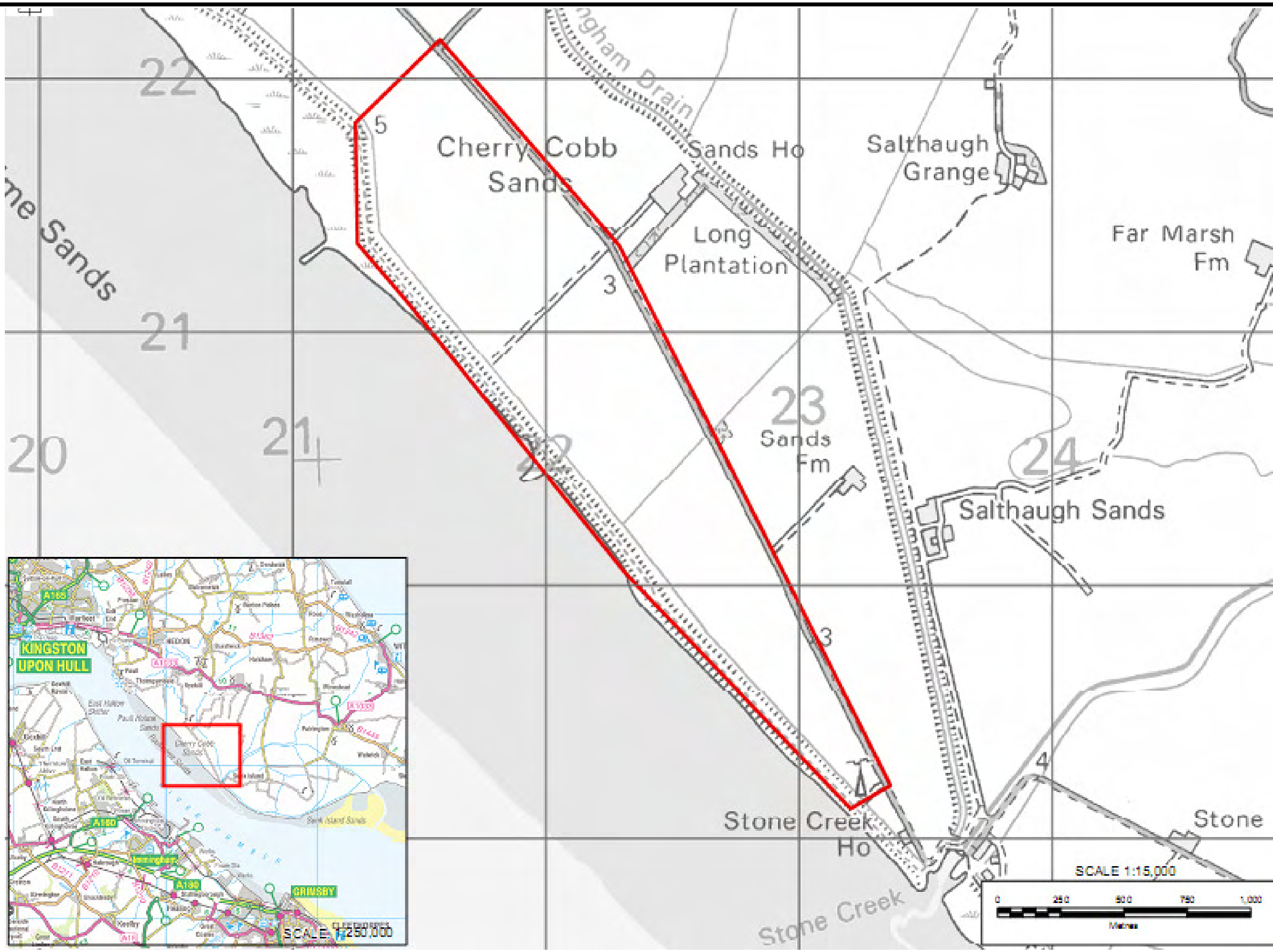
A different perspective



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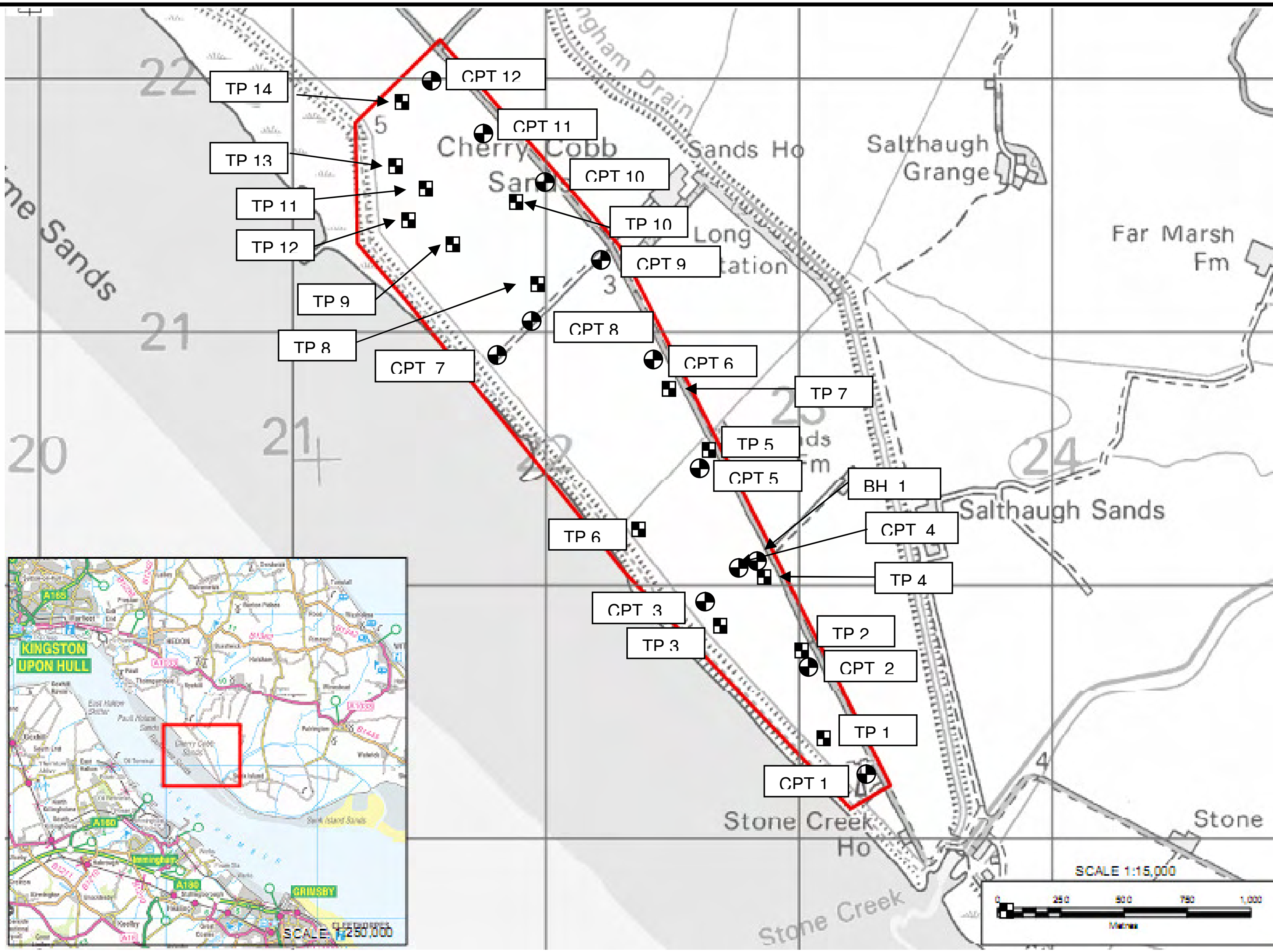
TITLE:
Site Layout Plan
Cherry Cobb Sands

DWN: KDM

DATE: Jan 2010

PROJECT NO.: 10-2041.01

FIGURE NO.: 1



delta-simons environmental consultants	TITLE: Approximate Borehole Location Plan Cherry Cobb Sands	DWN: KDM	PROJECT NO.: 10-2041.01
		DATE: Jan 2010	FIGURE NO.: 2

Appendix I

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A different perspective

BACTEC | Globally Trusted Locally Dependable

Report on Cone Penetration Testing in respect of Able Marine Energy Park, Humberside for Delta-Simons Environmental Consultants Ltd February 2011

3433 CPT

21st February 2011

BACTEC

Report on Cone Penetration Testing

in respect of

Able Marine Energy Park,

Humberside

for

Delta-Simons Environmental Consultants Ltd

February 2011

3433 CPT

21st February 2011

THE QUEEN'S AWARDS FOR ENTERPRISE 2008

BACTEC International Limited

37 Riverside, Sir Thomas Longley Road, Rochester, Kent ME2 4DP, UK

Tel: +44 (0) 1634 296757 **Fax:** +44 (0) 1634 296779

Email: bactec.int@bactec.com

www.bactec.com

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Contents

Annexes

Report on Cone Penetration Testing

in respect of

Able Marine Energy Park,
Humberside

1. Introduction

1.1. Background

Delta-Simons Environmental Consultants Ltd is carrying out site investigation works at Able Marine Energy Park on Humberside. The site is located on the northern bank of the Humber Estuary, to the east of Kingston upon Hull, and is bounded by Cherry Cobb Sands Road to the north-east and existing flood defences and mudflats to the south-west. Location maps and an outline plan are shown at Annex A.

BACTEC International Limited has previously carried out a desk-top Explosive Ordnance Threat Assessment[1] for the site. Hull was heavily bombed throughout WWII. The site is located in close proximity to a number of bombing decoy sites, heavy anti-aircraft batteries and coastal batteries, all of which are likely to have been attacked throughout the course of the war. However, due to the undeveloped nature of the site, which comprised open agricultural land during WWII, no specific references could be found to bombing incidents within its boundary. The wider surrounding region, (particularly to the north) historically housed numerous military camps, including an unnamed site at Camerton, 3.5km to the north-west. It is known that military and Home Guard training exercises would often take place in areas of open countryside, such as the site, although there are very few available records of where these exercises took place. The site is not known to have been subject to any significant post-war intrusive works; consequently a risk from shallow buried UXO and deeper buried UXBs remains across the entire site area.

1.2. Initial Scope of BACTEC's Works

As part of the geotechnical investigations at the site, BACTEC International Limited was commissioned to carry out electrical cone penetration tests (CPTs) at 14 positions. Since there is a risk from ordnance on site, all CPT positions were simultaneously checked for the presence of ferromagnetic anomalies that might have indicated the presence of unexploded WWII high explosive bombs.

[1] *Report reference 3433TA dated 19/01/2011*

2. Cone Penetration Testing Method

2.1. CPT Equipment

The BACTEC CPT wheeled/crawler unit No 4 used at the site was equipped with CPT equipment manufactured by GeoMil Equipment B.V. Alphen a/d Rijn, The Netherlands. Rig information is provided at Annex B.

The cone penetration tests were conducted using 15 ton capacity, $15cm^2$ tip, $225cm^2$ sleeve electrical cones, in accordance with the ISSMGE[2] International Reference Test Procedure 1999 (Corrected 2001), with measurement of the following parameters:

- Cone Resistance
- Sleeve Friction
- Friction Ratio
- Inclination
- Pore Pressure
- Pore Pressure Ratio
- Soil Behaviour Type
- Derived Standard Penetration Test (SPT) N Values
- Derived Shear Strength
- Derived Relative Density
- Depth

Interval and resolution measurements meet ISSMGE Class 2 requirements. Class 2 measuring tolerances are listed in the following table:

Class	Measurement parameter	Maximum tolerance	Maximum distance between measurements
2	Cone Resistance Sleeve Friction Pore Pressure Depth	0.20 MPa or 3% 0.025 MPa or 15% 0.025 MPa or 3% 0.2m or 2%	20 mm

2.2. Soil Type Interpretation

Soil type interpretation was carried out in accordance with the classification by Robertson (1986).

2.3. Calibration and Maintenance

Two cones were used whose reference numbers are S15CFIIP.C86 and S15CFIIP.D42. Calibration and maintenance sheets for all cones are held at BACTEC's offices.

2.4. Magnetometry Clearance

The CPTs were undertaken with a BACTEC combined CPT/magnetometer probe that is used to ensure the electrical cone does not come into contact with a ferromagnetic object that could be ordnance-related.

BACTEC's intrusive magnetometry survey systems detect underground anomalies in the earth's magnetic field that are the result of variations in the geological strata, electrical fields or man-made ferromagnetic objects, including unexploded ordnance.

[2] *International Society for Soil Mechanics and Geotechnical Engineering*

The magnetometer used for the CPTs employed sensitive fluxgate sensors incorporated into the same probe as the CPT electrical cone; this was inserted into the ground using hydraulic force from a specialised vehicle. The magnetometer system is capable of detecting the magnetic field from a 50kg WWII airdropped bomb ahead of the probe and at a horizontal distance of up to 2m from the sensor in a clean magnetic environment, but at a lesser distance in magnetically contaminated ground. The magnetic field data is monitored in real-time during the survey using AGSProc[3] software; when required, the software can be used later to model the source of any magnetic anomalies and identify those that originate from discrete objects. In addition, in clean magnetic environments, the software is able to provide an estimate of the object's mass and this information can then be used to assess the risk that the object is ordnance and to recommend appropriate actions.

A copy of the Method Statement is included at Annex C.

3. Details of Cone Penetration Tests

3.1. Timetable of Works

The tests were carried out during the period 1st to 4th February 2011.

3.2. Marking Out

The client's site engineer marked out the test positions; no coordinates were issued.

3.3. Variations

CPT tests at two positions were cancelled by the client. A copy of the Variation Agreement is shown at Annex D.

3.4. Results

CPTs were carried out at a total of 13 positions, supported by a representative from In Situ Site Investigation, who also interpreted the data. The tests were typically conducted to the maximum depth obtainable at a safe working load.

A second test (CPT01A) was conducted in close proximity to CPT01 due to the increasing angle of inclination experienced at this location. Following examination of the data from the two tests, the gradual nature of the increasing inclination was considered acceptable by the In Situ site representative.

The date, final depth and cone used for each test are shown in the following table.

Test Ref.	Date of Test	Cone	Depth (m)
CPT01	01/02/11	S15CFIIP.C86	15.4
CPT01A	01/02/11	S15CFIIP.C86	25.1
CPT02	01/02/11	S15CFIIP.C86	18.7
CPT03	01/02/11	S15CFIIP.C86	14.2
CPT04	01/02/11	S15CFIIP.C86	18.6
CPT05	01/02/11	S15CFIIP.D42	20.1
CPT06	03/02/11	S15CFIIP.D42	20.2
CPT07	04/02/11	S15CFIIP.D42	18.9
CPT08	04/02/11	S15CFIIP.D42	20.0
CPT09	04/02/11	S15CFIIP.D42	20.0
CPT10	04/02/11	S15CFIIP.D42	20.1
CPT11	04/02/11	S15CFIIP.D42	20.0
CPT12	04/02/11	S15CFIIP.D42	20.0

[3] *Advanced Geophysical Systems GmbH, Berlin*

Results in graphical format can be found at the following Annexes:

- Annex E
  - Cone End Resistance, qc (MPa)
  - Sleeve Friction, fs (kPA)
  - Friction Ratio, Rf (%)
  - Inclination (degrees)
  - Estimated Soil Type and Description
- Annex F
  - Corrected Cone End Resistance, qt (MPa)
  - Sleeve Friction, fs (kPa)
  - Pore Pressure Ratio, Bq
  - Pore Pressure, U (kPA)
- Annex G
  - Corrected Cone End Resistance, qt (MPa)
  - Sleeve Friction, fs (kPa)
  - Soil Behaviour Type, Ic
  - Derived SPT N values
- Annex H
  - Corrected Cone End Resistance, qt (MPa)
  - Sleeve Friction, fs (kPa)
  - Derived Shear Strength, Su (kPa)
  - Derived Relative Density, Dr (%)

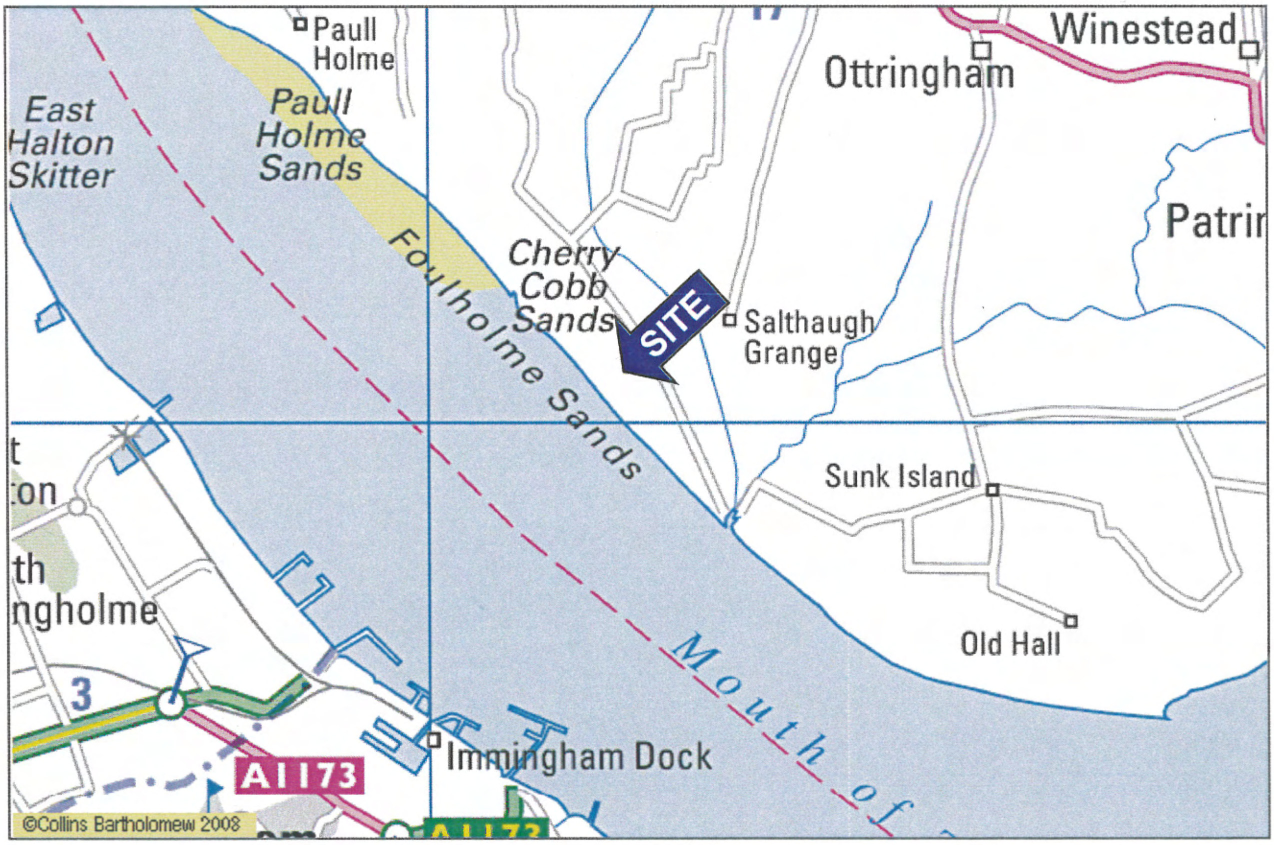
BACTEC International Limited 21st February 2011

Annex A: Site Location Maps and Outline Plan

North

Site Location Maps

Annex
A-1



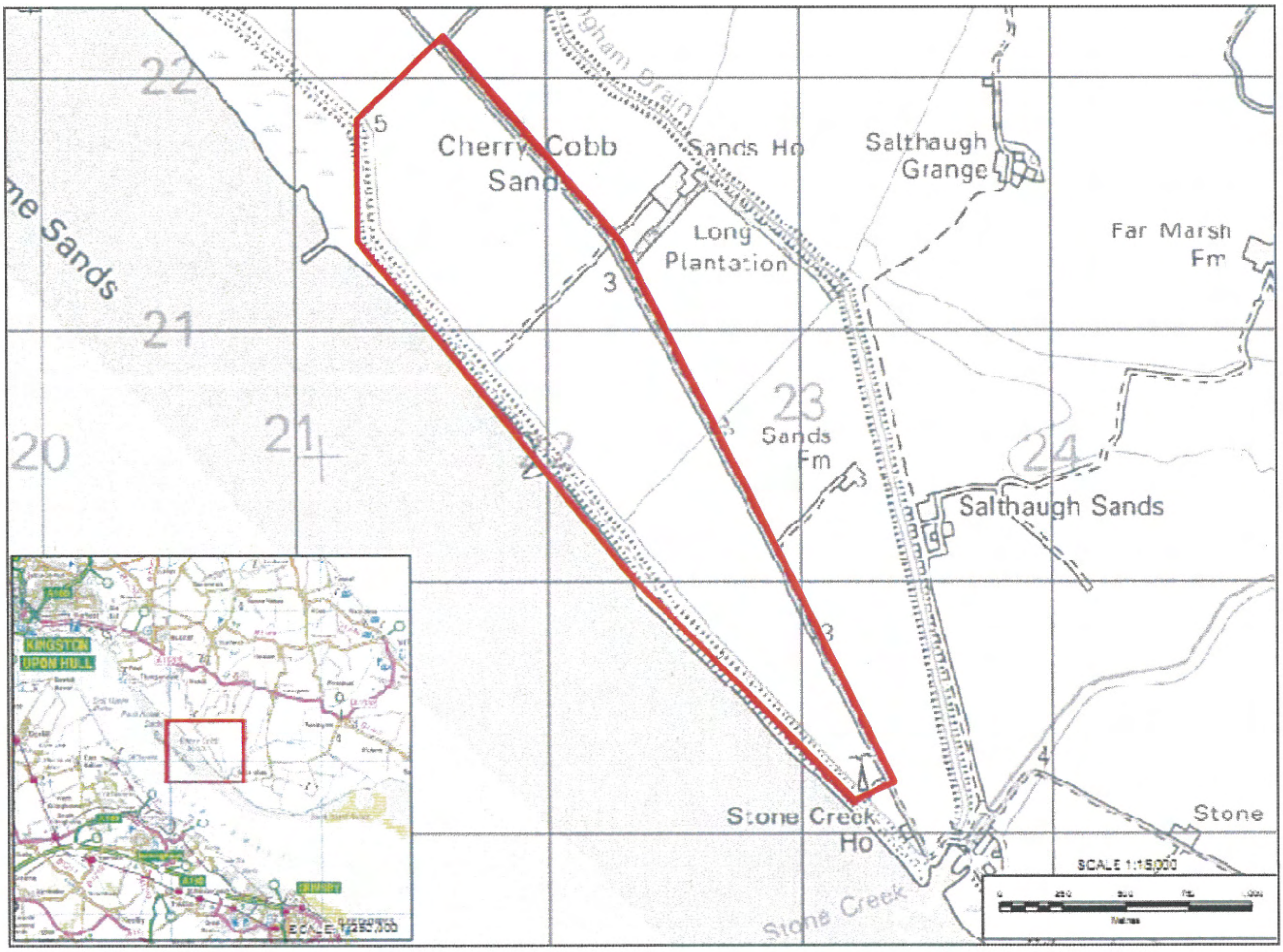
Report Reference:	Client:	
3433CPT	Delta-Simons Environmental Consultants Ltd	BAC TEC
	Project: Able Marine Energy Park, Humberside	

Source:

North

Outline Plan

Annex **A-2**



Approximate site boundary

Report Reference:	Client:	Delta-Simons Environmental Consultants Ltd
3433CPT	Project:	Able Marine Energy Park, Humberside

Source: Delta-Simons Environmental Consultants Ltd

Annex B: CPT Rig Information

Rig Description: 6X6 WheeledCPT/BXP Rig

Specifications:

General:

Manufacturer	Geomil Equipment Alphen a.d. Rijn
Registration number	BN-38-HP
Model	2628AK
Year of construction	1985
Drive system	6x6
Hydraulic oil type	Bio-degradable 32

Dimensions:

Length	8160mm
Width	2500mm
Height	3800mm
Working Height	5300mm
Weight	21,770Kg
Wheel Base	

CPT Equipment:

CPT Hydraulic Rams	Geomil Equipment Alphen a.d. Rijn
Data acquisition systems	GeoMil
CPT system	Electrical
Pushing force, nominal	200kN
Pushing force, maximum	250kN

Intrusive Survey Equipment:

Magnetometry Detectors	BACTEC International
Data Acquisition system	Advanced Geophysical Systems GmBH
Maximum Survey Depth	20m (depending on ground conditions)

Annex C: Method Statement

<table>
<tr><td rowspan="2">Bactec International Ltd
37 Riverside, Sir Thomas Longley Road, Rochester, Kent ME2 4DP</td><td>METHOD STATEMENT</td><td>Revision 0</td></tr>
<tr><td>EXPLOSIVE ORDNANCE DISPOSAL

Intrusive Magnetometry Survey (CPT).</td><td>Written by: J Heald
Date: 31st January 2011

Signed…………………………</td></tr>
<tr><td rowspan="2">Ref:
BIMS 06- 3433-CPT-rev0</td><td rowspan="2">ABLE MARINE ENERGY PARK

for

DELTA SIMONS</td><td>Approved by: C Reid
Date: 31st January 2011

Signed…………………………</td></tr>
<tr><td>Amended by :
Date:

Signed…………………………</td></tr>
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<table>
<tr><td colspan="4"><u>CLIENT APPROVAL</u></td></tr>
<tr><td>NAME</td><td>POSITION</td><td>SIGNATURE</td><td>DATE</td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td></tr>
</table>

METHOD STATEMENT

MAGNETOMETRY SURVEY (CPT)

1.0 METHOD STATEMENT BRIEFING LOG

I/We* the undersigned have been given and fully understood the briefing of the contents of this method statement.

Name	Signature	Trade	Company	Induction No	Date

Briefing given by:

Name: **Title:** **Date:**

Signature:

2.0 INTRODUCTION

Delta Simons has commissioned BACTEC International Limited to conduct a Intrusive Magnetometer Survey, Cone Penetration Testing Survey (CPT) for the geological investigation on the Able Marine Energy Park site, Humberside.

3.0 PURPOSE

The purpose of this document is to provide an overview of how BACTEC International Ltd. intends to carry out the Intrusive Magnetometer and CPT survey.

4.0 SCOPE

The scope of this Method Statement is to establish a consistent system of work to be applied to the Intrusive Survey Methods carried out by BACTEC International Ltd personnel and their sub-contractors.

Including (but not limited to);

Pre-works – Enabling works (to be carried out by others prior to Bactec International Ltd deployment).

Works – the intrusive magnetometer survey and collection / interpretation of data.

5.0 RESPONSIBILITIES

5.1 Client

- Provision of safe working platform for all survey activities.
- Provide clear, unrestricted access throughout the site in order to carry out survey works.
- Provision of Welfare facilities.
- Carryout a review of all services on-site, from available sources, physically mark all services on site, CAT & Genny scan ahead of the drilling/survey works.
- Provide permits to work/dig and clearance from underground service.
- Provide site safety inductions to all personnel.
- Provide additional information that may be requested by the BACTEC site manager.
- Site liaison with BACTEC Site Manager
- Marking out of positions to be surveyed and provide coordinates to BACTEC Site Manager.

5.2 BACTEC International Ltd

The Site Manager shall:

- Ensure all BACTEC personnel (including BACTEC sub-contractors) are suitably briefed in order to carry out their respective duties in a safe & controlled manner; briefings are to be conducted daily, prior to work commencing.

- Ensure that the contractor's site team members are suitably briefed on the requirements of the accepted method statement before work commences and that all work is carried out in accordance with these requirements, including any accepted revisions.
- Ensure that all BACTEC personnel and their sub-contractors are inducted to the site and have completed a BACTEC site induction; they are then to sign the BACTEC "Certificate of Compliance Operations, Health & Safety at Work" form and the method statement sign off sheet prior to any involvement with work activities on site.
- Keep a copy of or have ready access to the accepted method statement whilst carrying out the work.
- Identify any change that may be required, and inform the BACTEC Project Manager. The BACTEC Project Manager, in consultation with the site manager, will submit to the Client for review an updated method statement; which then must be approved prior to the works being carried out.
- Determine what other works are being undertaken on the site, if any, and whether they will impact on BACTEC's works.
- Comply with safety requirements as dictated by the Client.

6.0 PERSONNEL

On site personnel and responsibilities;

NAME	CONTACT DETAILS	POSITION	REMARKS
B KINSMAN	07809 583738	SENIOR PROJECTS MANAGER	OFF SITE
J HEALD	07850 503793	PROJECTS MANAGER	OFF SITE
B TODD	07738 890813	SITE MANAGER	ON SITE
G BOAKES	07855 028517	SURVEY RIG OPERATOR	ON SITE

Personnel may be changed throughout the project; the client will be informed of personnel changes. Personnel changed throughout the project will conform to the clients and BACTEC site induction process.

7.0 PROCEDURES

7.1 Introduction

The scope of this works consists of the Intrusive Magnetometer and Cone Penetration Testing.

7.2 Methodology

- The BACTEC site Manager will liaise with the clients' representative, in order to be issued with a permit to work/dig and certification confirming clearance from underground services for all survey locations.

- All works require an exclusion zone of 15m from the nearest asset. This ensures that site personnel are not in areas of danger while machines / rigs are working or manoeuvring. This distance can be reduced if adequate barriers are employed on site by the client.

- The client's engineer will set-out and mark the proposed centre of each survey location, marking each position with a numbered peg/pin. Each position surveyed will be identified by a unique letter/number pre-fix. The engineer will locate these positions using co-ordinates taken from the layout drawings, issued prior to works commencing.

- Survey phase of works

  The intrusive survey phase of the work will be conducted from a survey truck unit; one or more may be deployed throughout the duration of the works. Each survey rig will be manoeuvred onto the surveyed position on level ground under the supervision of a competent banks man. Once on position a calibrated sensor is inserted into the ground using continual hydraulic pressure. The sensor is calibrated and tested at the beginning of each day and the results recorded on the BACTEC daily diary by the BACTEC Site Manager. During each survey, data is recorded in real time by a BACTEC survey operator on a computer mounted inside the truck; during the survey the computer plots continuous graphical records of the CPT data, the rate of penetration of all tests shall be kept constant throughout the test at not greater than 2cm/sec. Once the survey data has been recorded it will receive first line interpretation on site by the BACTEC survey operator or BACTEC site manager. The data will then be returned to BACTEC Head Office to complete QA procedures prior to clearance being given.

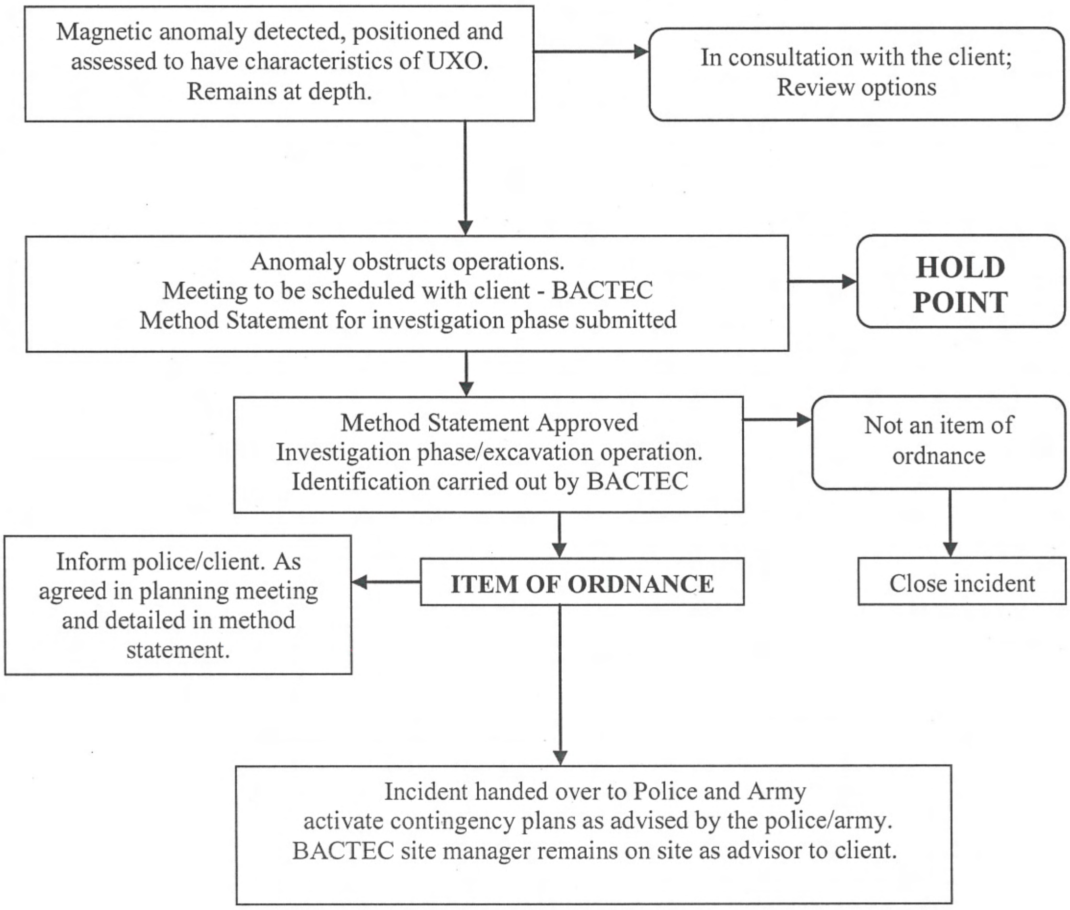
- During each survey, magnetic field data is recorded in real time by a BACTEC survey operator on a computer mounted inside the truck to give the a look ahead capability which identifies any ferrous anomalies at depth before the CPT cone strikes the object. During the survey the computer plots continuous graphical records of magnetic field data to provide survey data for ferrous anomalies.

  On completion of the penetration phase of the test the probe and rods are retracted. As the rods re-enter the test vehicle they are cleaned of soil and fluid by using rubber scrapers fitted in the vehicle's guide casing hanging beneath the vehicle. Similarly during penetration the rods pass through the cleaning system preventing contaminants present on the rods entering the ground. During the fieldwork the operators wear appropriate site PPE, gloves are worn at all times by all operators handling the survey rods.

- If an anomaly is identified during the survey works, the BACTEC Site Manager may require additional data as a confirmatory measure. This will require additional survey positions to the agreed works. This process is referred to as 'triangulation'. Triangulation works will not be carried out on site without consultation with the client before hand.
  If possible the BACTEC Site Manager, with the client's consultation, will relocate to an alternative position.

  The diagram below outlines the procedures followed if an anomaly is identified on site that has the characteristics of explosive ordnance.

Flow Diagram Showing Sequence of Events.



8.0 PROGRAMME / WORK SCHEDULE

The programme of works will be dependant on the clients' priorities. The client is to brief the BACTEC site manager on a daily basis as to their requirements. Any change to this instruction is to be given, to the BACTEC site manager, during the daily co-ordination meeting.

9.0 CLEARANCE

Clearance will be issued once all internal Quality Assurance procedures have been complete by BACTEC. If the client requires clearance of specific zones on the site, clearance will be issued within 48 hrs of request. This time frame is subject to all works having been complete prior to the requested clearance and no outstanding issues remaining on site.

The data will be constantly reviewed throughout the project.

10.0 TRAINING

All BACTEC operatives working on site will attend a site induction.

Operation / Personnel	Training Required
All Operatives	BACTEC site induction / Tool Box Talks

11.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

PPE to be used on the site.

PPE	Req.	Grade	When	Additional information
Safety Helmet	Y	BS EN397	At All Times	
Safety Boots	Y	BS EN 345	At All Times	
High Visibility Jackets	Y	BS EN 471	At All Times	
Work Gloves	Y	BS EN 388	At All Times	
Eye protection	Y	BS EN 166.1.F	At All Times	

12.0 SYSTEMS / CODES of PRACTICE

12.1 BACTEC

BACTEC International Ltd work to an internal company code of practice; Essential Standard Operating Procedures (ESOPs).

BACTEC International Ltd is an accredited ISO 9001:2000 company (Cert No: LRQ 0961114)

12.2 Sub-contractors

All sub-contractors employed by BACTEC on site, will have all relevant certification, records of competence/training and in-date equipment certification on site throughout the works. These records will be retained by the BACTEC site manager and will be available for audit at all times.

12.3 Statutory Records

Record	Kept by	Location	Notes
Accident book (BI510)	Site manager	Held at site office	
Statutory form 2508 or 2508A (RIDDOR)	J Culver	BACTEC Head office	

13.0 ENVIRONMENTAL

13.1 Survey Operations

No environmental impact.

14.0 RISK ASSESSMENT

SEE ATTACHED

15.0 COSHH

COSHH data sheets are carried within folders on each item of plant machinery and will be available for review during all works.

BACTEC International Ltd
37 Riverside, Sir Thomas Longley Road
Rochester, Kent ME2 4DP
Tel: 01634 296757 Fax : 01634 296779

Form ref. **7-B**
Version 7-B.2

RISK ASSESSMENT PROCEDURE

Client	DELTA SIMONS	**Site**	ABLE MARINE ENERGY PARK	**Tasks covered by this assessment:**	INTRUSIVE SURVEY (BXP/CPT)	**INO**	3433

The following matrix is to be used to assess the risk to health and safety due to site working conditions. The tasks covered by this assessment are those shown above. A separate risk assessment should be made for additional tasks or if the nature of the task changes significantly during the job execution.

Severity, Likelihood and Risk Rating Tables

TABLE 1 - Severity Table and Definitions

Description	Code	Definition
Fatality	A	Multiple or Single fatality per event
Severe Injury	B	Major (Multiple or Single) severe/disabling injury or occupational illness per event, e.g. broken limbs
Major Injury	C	RIDDOR injury per event-injury resulting in more than 3 days absence from work including broken toes or fingers
Minor Injury	D	Injury requiring medical attention and leading to absence from work not exceeding 3 days

TABLE 2 - Likelihood Table and Definitions

Description	Code	Definition
Frequent	A	Occurs at least every month
Likely	B	Occurs at least once a year
Possible	C	Occurs every few years
Unlikely	D	Expected to occur within 20 - 150 years
Remote	E	Unlikely to occur within 20 - 150 years
Improbable	F	Extremely unlikely to occur within 20-150 years

TABLE 3 – Risk Rating Matrix

	LIKELIHOOD OF EXPOSURE TO HARM					
	Frequent A	Likely B	Possible C	Unlikely D	Remote E	Improbable F
Fatality A						
Severe Injury B	HIGH		MED’			LOW
Major Injury C						
Minor Injury D						

TABLE 4 – Risk Definitions

HIGH	Immediate requirement to review and investigate the case removing / reducing the risk or improving the controls
MEDIUM	Risks not clear “ broadly acceptable” need investigating to consider reasonable practicable improvements
LOW	Detailed working to support

Use more sheets if necessary

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Form ref. **7-B**
Version 7-B.2

Risk Assessment Work Sheet

Ref	Activity	Hazard	Consequences	Persons Affected	Pre Control Risk Rating S	L	R	Control Measure	Post Control Risk Rating S	L	R
1	Unloading Equipment	Crush injuries	Injury to personnel	operators	B	C	M	a) Competent operators & banks men only. b) All unloading to take place on level firm ground.	C	D	L
2	Survey Works.	Manual Handling	Injury to personnel	operator	C	C	M	a) Use mechanical means where possible. b) As per manual lifting training through tool box briefings. c) Use correct tools for the job. d) Do not improvise.	D	C	L
3	Survey works.	Trip hazards	Injury to personnel	operator	C	C	M	a) Site husbandry, site awareness.	C	D	L
4	Survey works	Service Disruption Damage to Infrastructure	Damage to underground services.	Operators & property	A	C	H	a) Certified Operatives. b) Experienced Operatives. c) Tool Box talk / MS Briefings. d) Clearance of underground services certificates to be issued by client prior to work commencing. e) All personnel briefed as to exclusion zones. f) Underground service drawings to be reviewed & held on site.	A	F	L
5	Survey Works.	Absorption /ingestion of greases & oils	Injury to personnel.	operator	C	B	M	a) Provide & Monitor correct use of PPE (gloves). b) Washing facilities. c) Tool box briefings (COSHH).	C	D	L

Use more sheets if necessary

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Form ref. **7-B**
Version 7-B.2

6	Movement of survey vehicle.	Overturning of vehicle. Collisions.	Injury to personnel.	Operator	B	C	M	a) Competent operators. b) Competent banks men to control all movement. c) All movement on level ground. d) Site traffic plan when possible.	B	E	L
7	Unexploded Ordnance	Detonation of weapon (explosion)	Fatality/injury. Damage to infrastructure.	- Contractor. - Personnel working nearby.	A	D	H	a) Competent/trained Explosive Ordnance trained operators/surveyors. b) Correct use, following approved methodology, of the EO survey equipment in order to clear ahead of any intrusive works.	A	F	L
9	Discovery of Hydrocarbons/Pollutants	Toxic/chemical burns	Injury to personnel	Operators	B	B	H	a) Wearing of gloves and coveralls b) Toolbox briefings and site inductions.	D	D	L

Assessed by	B KINSMAN	Signed		Date	31.01.11
Reviewed by		Signed		Date	

Annex D: Variation Agreement

BACTEC International Ltd
37 Riverside, Sir Thomas Longley Road
Rochester, Kent ME2 4DP
Tel: 01634 296757 Fax: 01634 296779

Form ref: **7-R**
Version 7-R 2

VARIATION AGREEMENT

This document is used to record variations / additional works to the agreed Scope of Works, required by the client to be undertaken by BACTEC or its sub-contractors.

Client Delta Simons	**Site** Humberside	**INO** 3433
Date 03/2/11	**Day** Thursday	**Serial No.** 1

Serial	REQUIREMENT
	CPT positions 13-14 ~~not to be~~ dropped from Scope of Survey works – As instructed By ABLE (UK) on Tuesday 2nd Feb 2011.

BACTEC SITE MANAGER			
Name:	[signature]	**Date:**	03/2/11
Signed:	[signature]		

CLIENT REPRESENTATIVES			
Name:	Kevin Myer	**Date:**	04/02/2011
Signed:	[signature]	**Position:**	Consultant
Name:		**Date:**	
Signed		**Position:**	

ESOP (5th Ed.) Form ref. 7-R

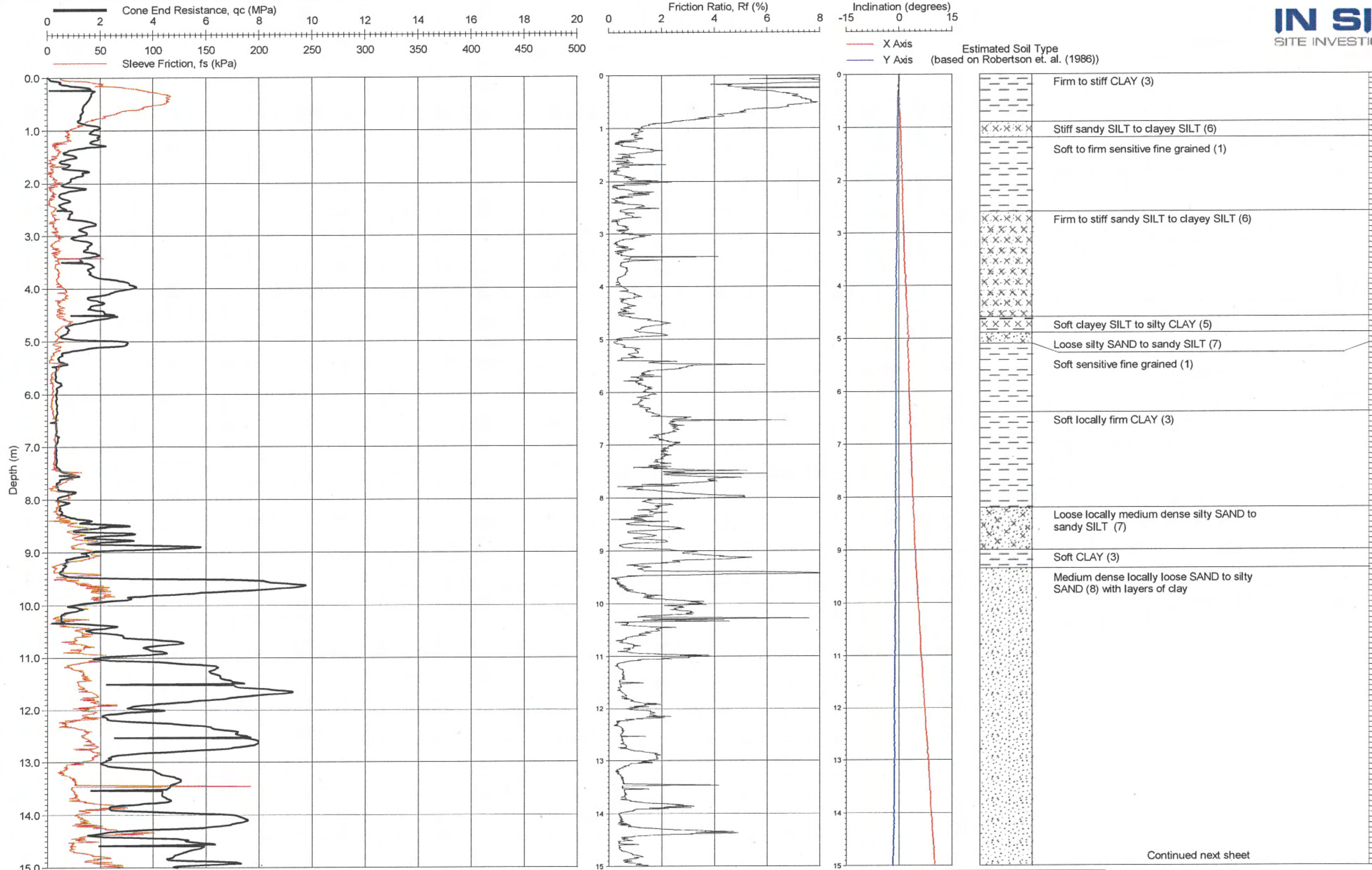
Annex E: CPT Results in Graphical Format

- Cone End Resistance, qc (MPa)
- Sleeve Friction, fs (kPA)
- Friction Ratio, Rf (%)
- Inclination (degrees)
- Estimated Soil Type and Description

IN SITU SITE INVESTIGATION

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Continued next sheet

Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 01
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

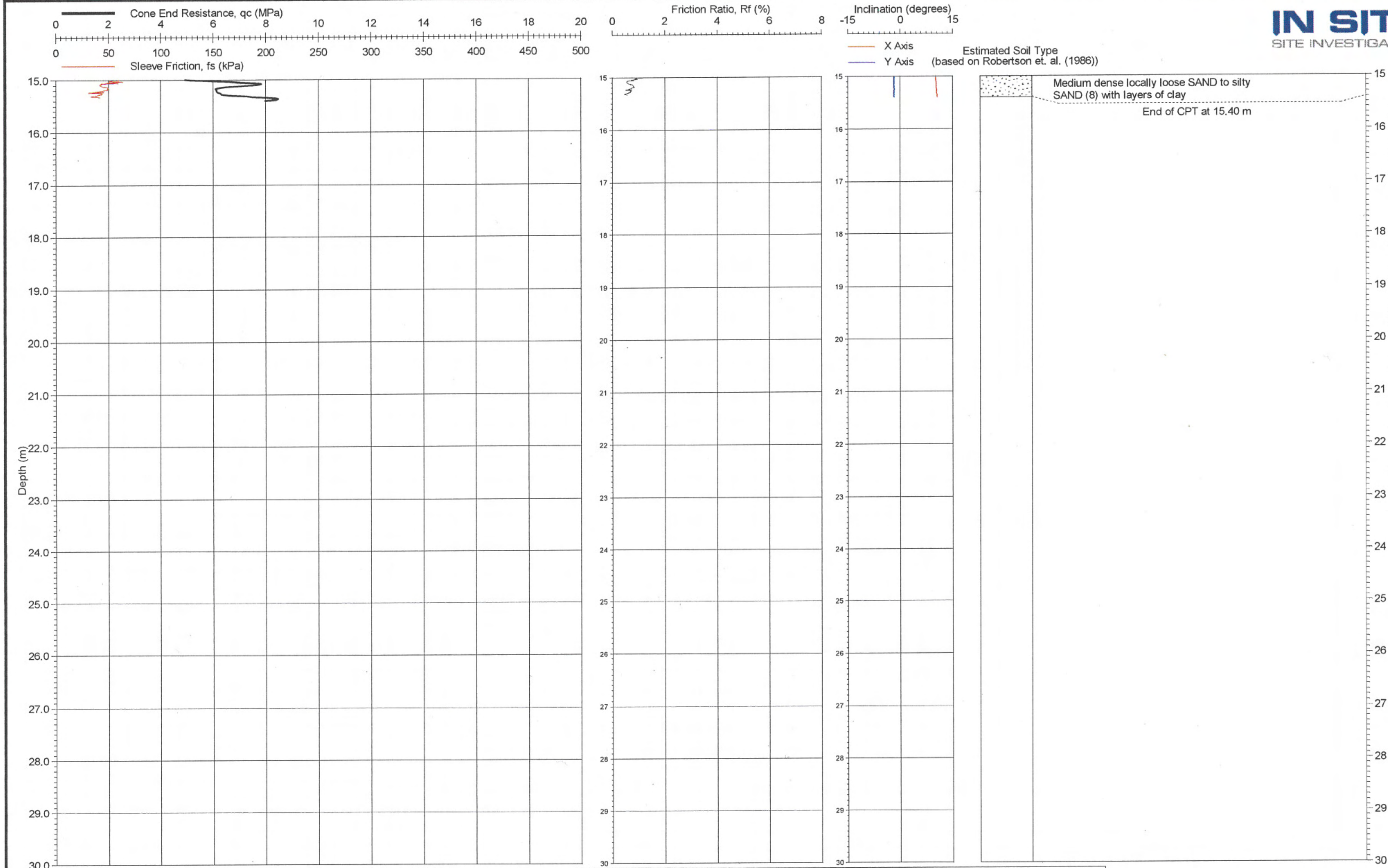
CPT 01

insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE
Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.C86 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	01/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 01
Checked By:	

PCPT Zero Values

Tip Zero Pre: 0.2281 mV	Tip Zero Post: 0.2278 mV	Tip Zero Difference: -2.8000 %
Sleeve Zero Pre: 0.2945 mV	Sleeve Zero Post: 0.2944 mV	Sleeve Zero Difference: 0.0409 %
Pore Pressure Zero Pre: 0.3208 mV	Pore Pressure Zero Post: 0.3179 mV	Pore Pressure Difference: 0.9028 %
X Inclinometer Zero Pre: 1.2221 mV	X Inclinometer Zero Post: 1.2269 mV	X Inclinometer Difference: -0.3894 %
Y Inclinometer Zero Pre: 1.2357 mV	Y Inclinometer Zero Post: 1.2359 mV	Y Inclinometer Difference: -0.0162 %

PIEZO CONE PENETRATION TEST

CPT 01

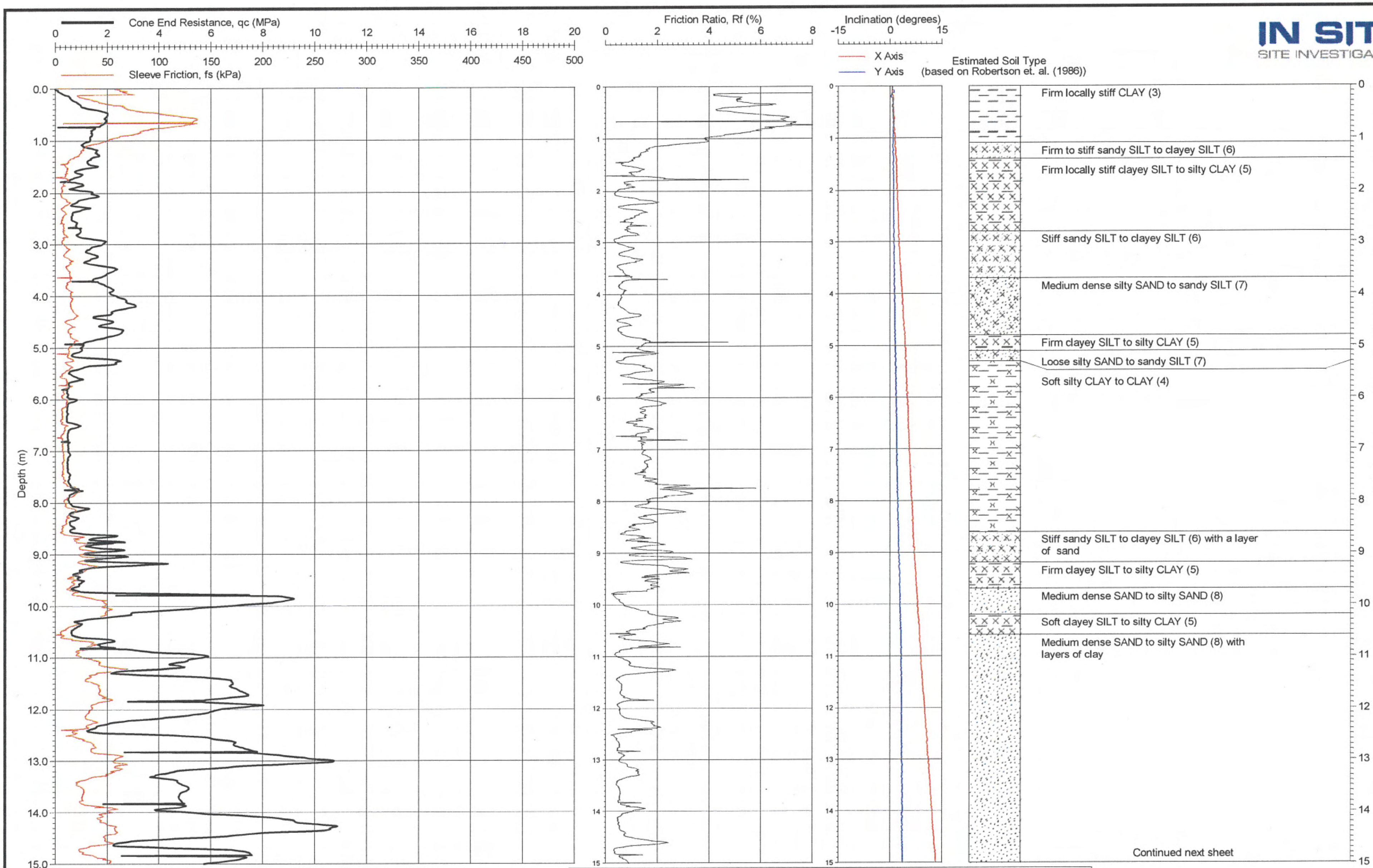
insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

IN SITU SITE INVESTIGATION



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Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.C86 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	01/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 01A
Checked By:	

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

CPT 01A

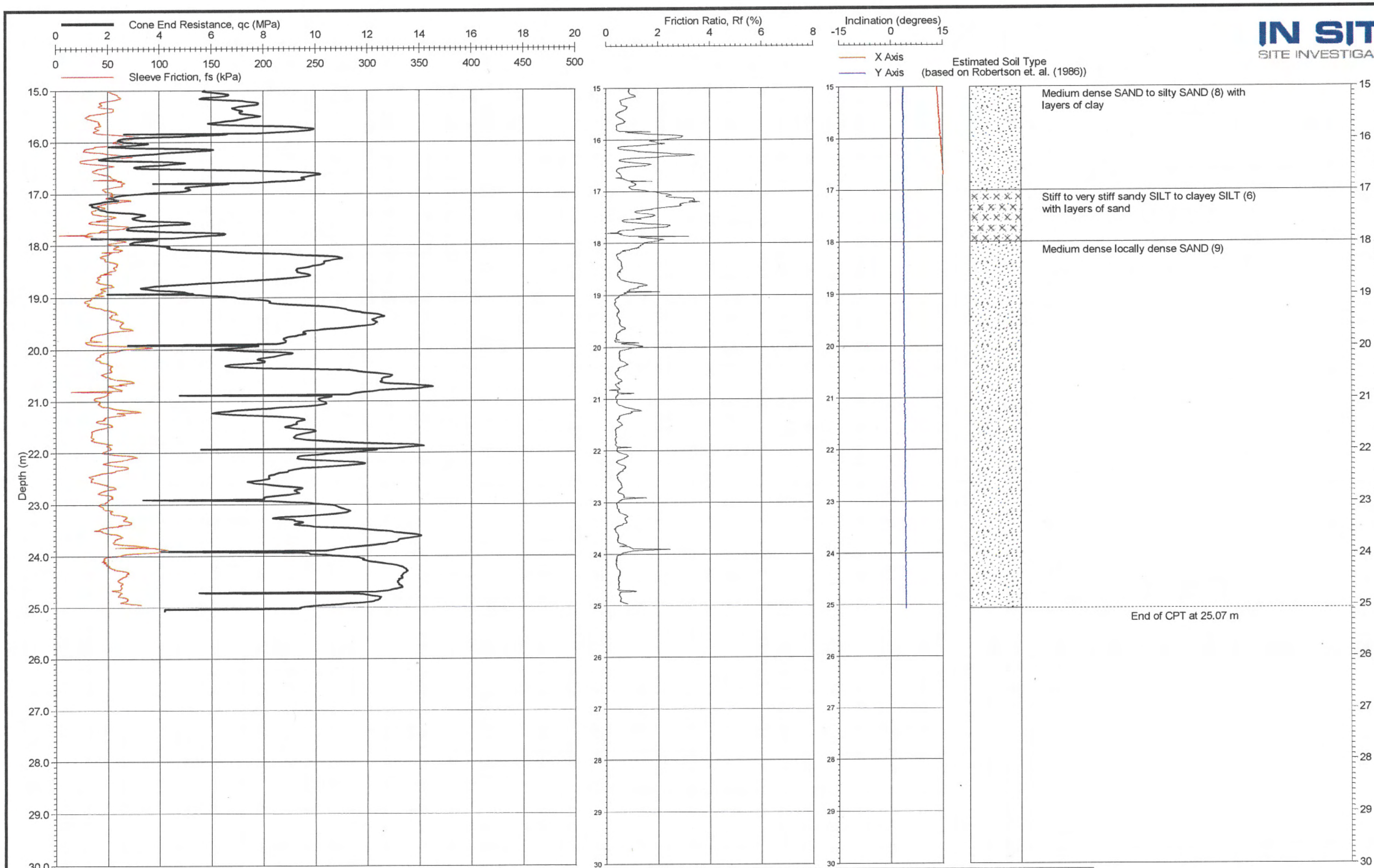
insitusi.com

Form: CPT0001

IN SITU SITE INVESTIGATION

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 01A
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

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Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

CPT 01A

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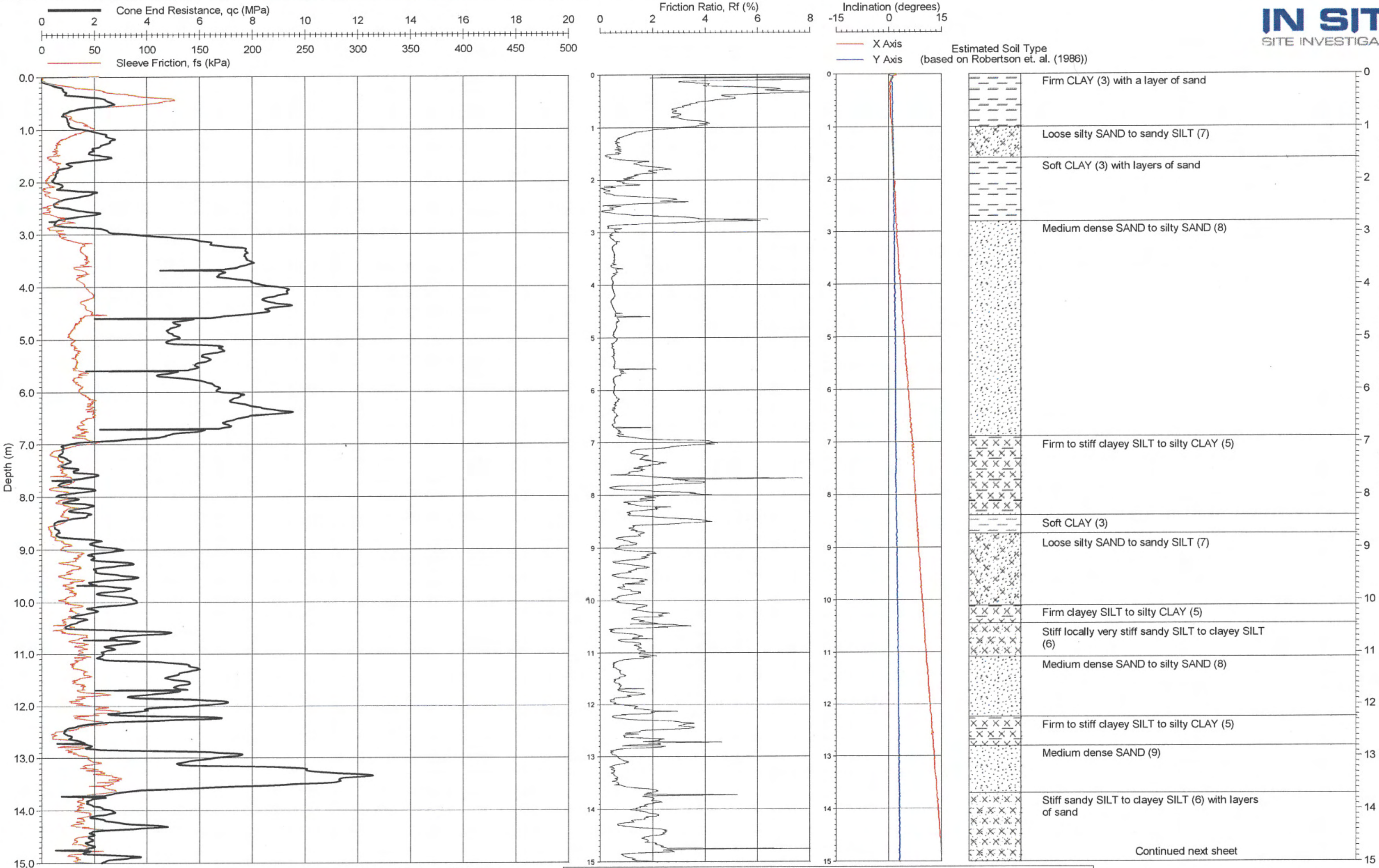
Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

IN SITU SITE INVESTIGATION



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 02
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

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Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

CPT 02

insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

Location:	HUMBERSIDE
Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.C86 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	01/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 02
Checked By:	

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

CPT 02

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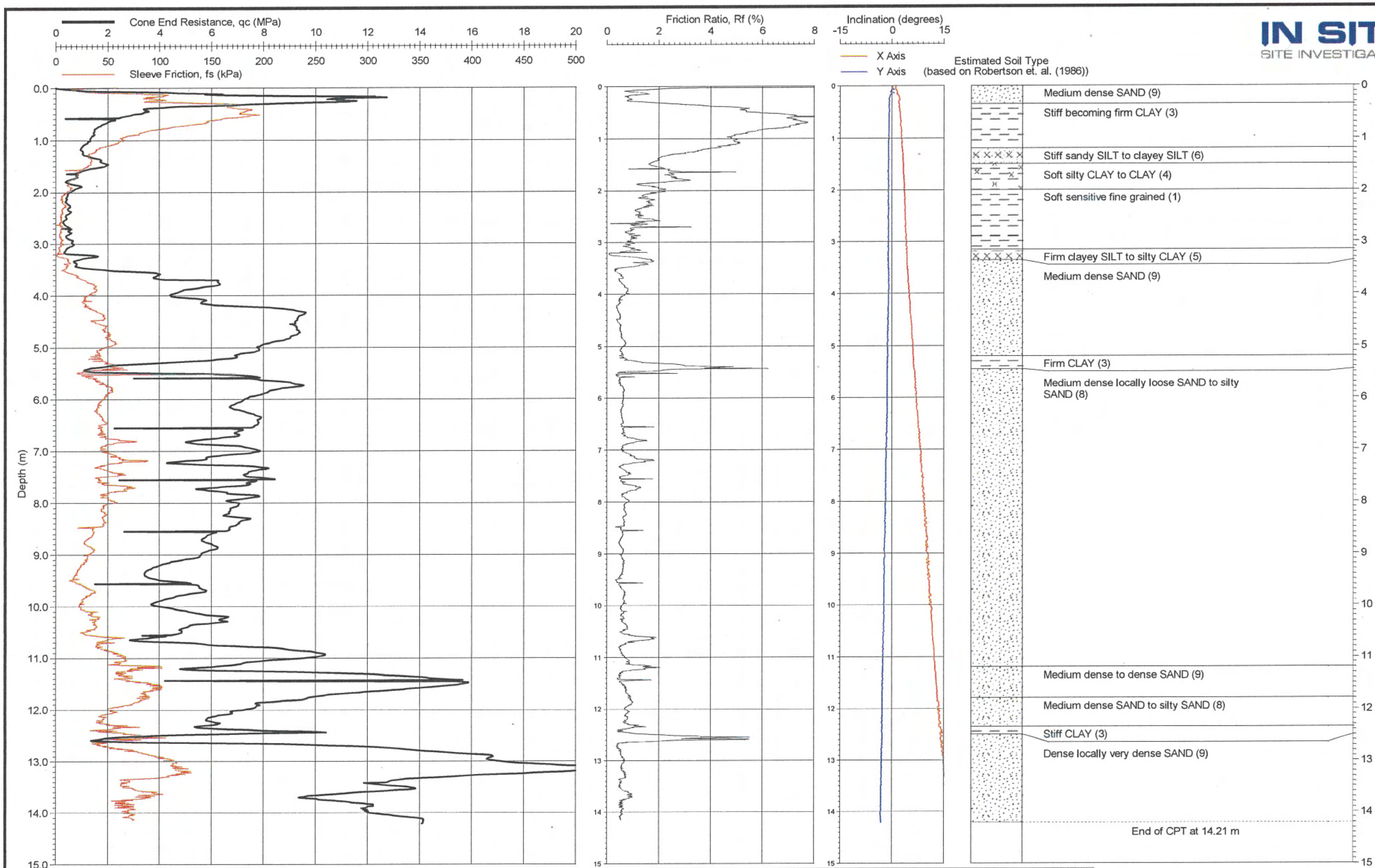
Form: CPT0001

IN SITU SITE INVESTIGATION

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 03
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

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Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

CPT 03

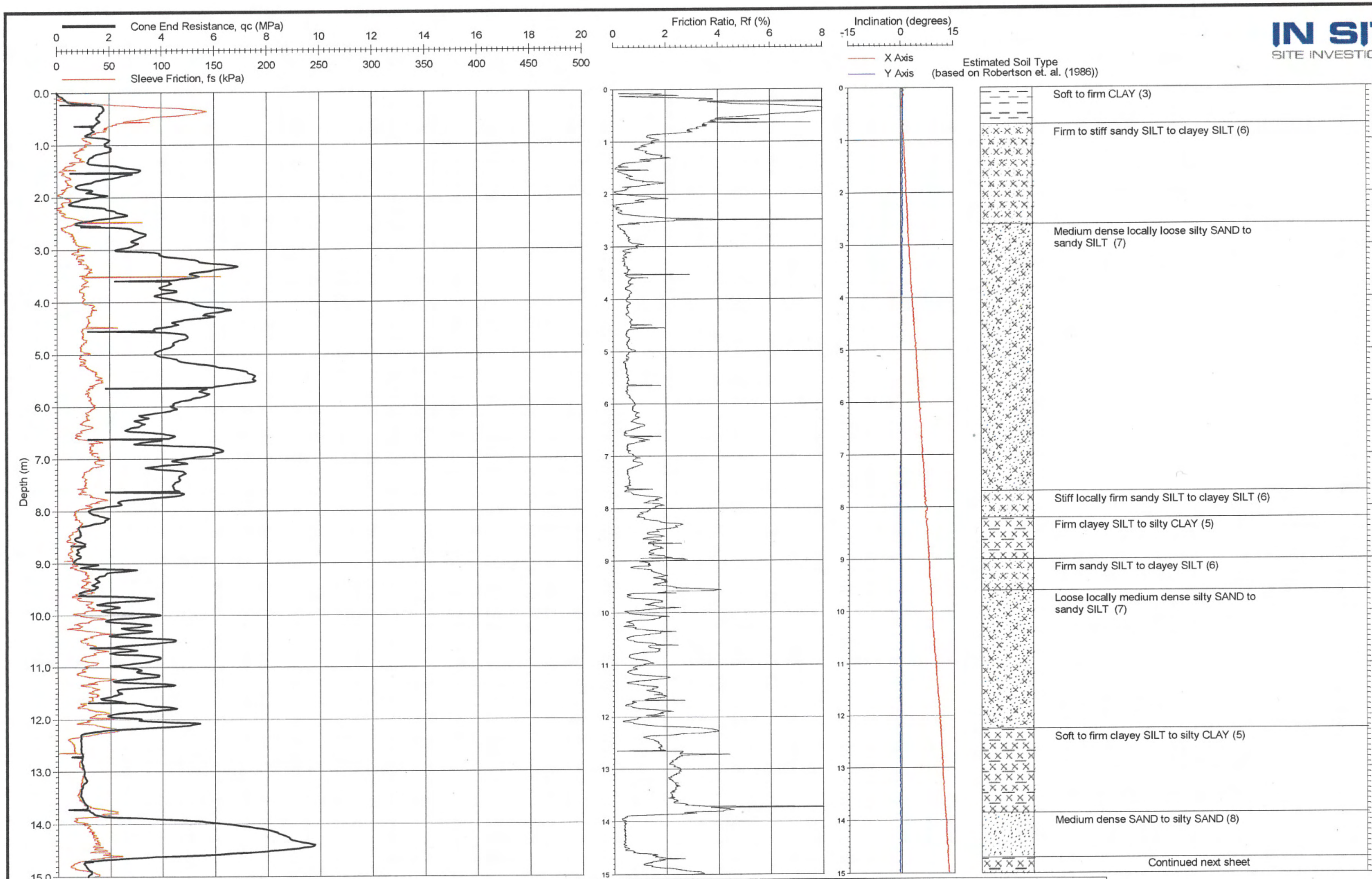
insitusi.com

Form: CPT0001

IN SITU SITE INVESTIGATION

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 04
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

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Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

CPT 04

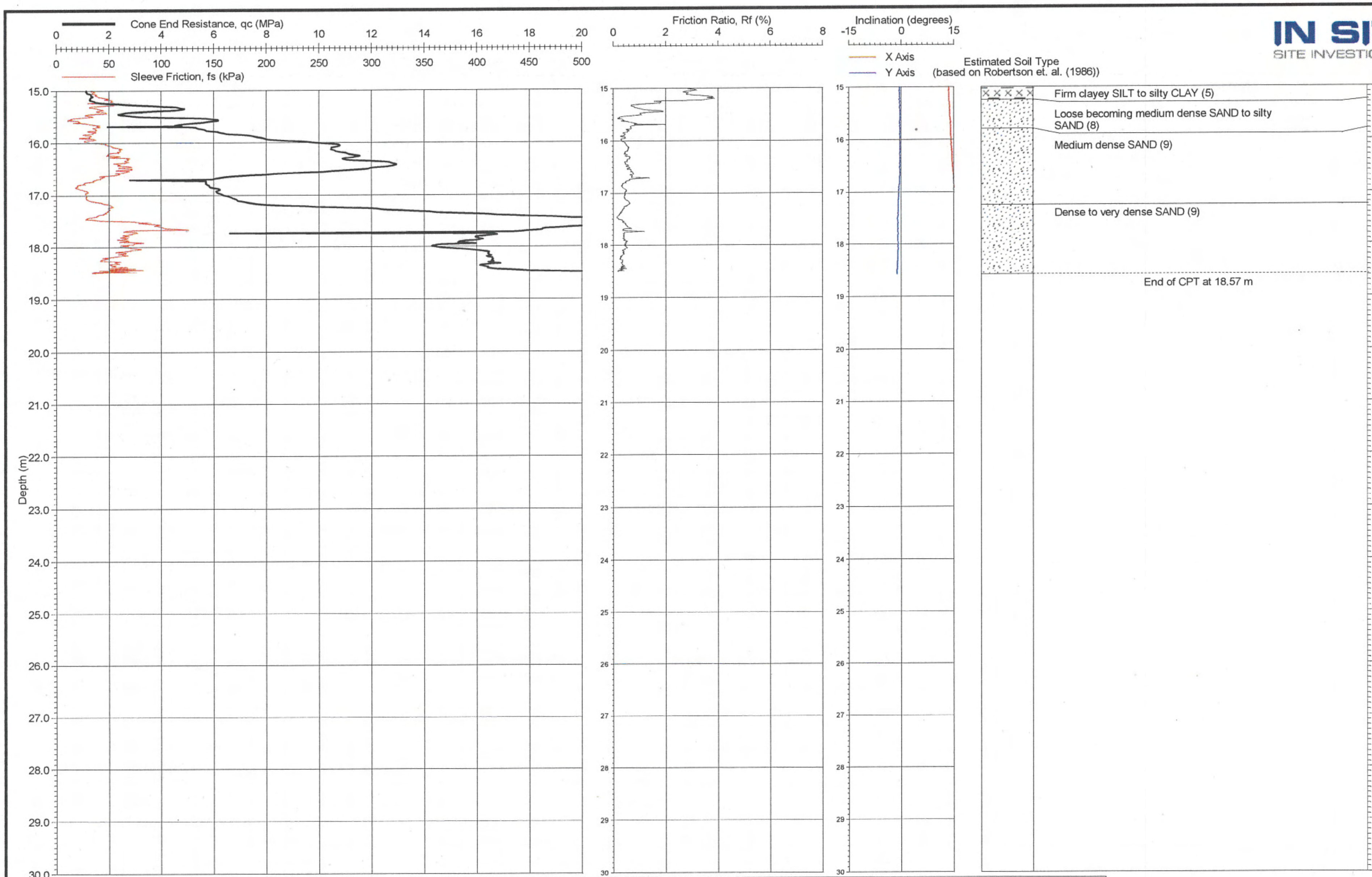
insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

IN SITU SITE INVESTIGATION



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 04
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

CPT 04

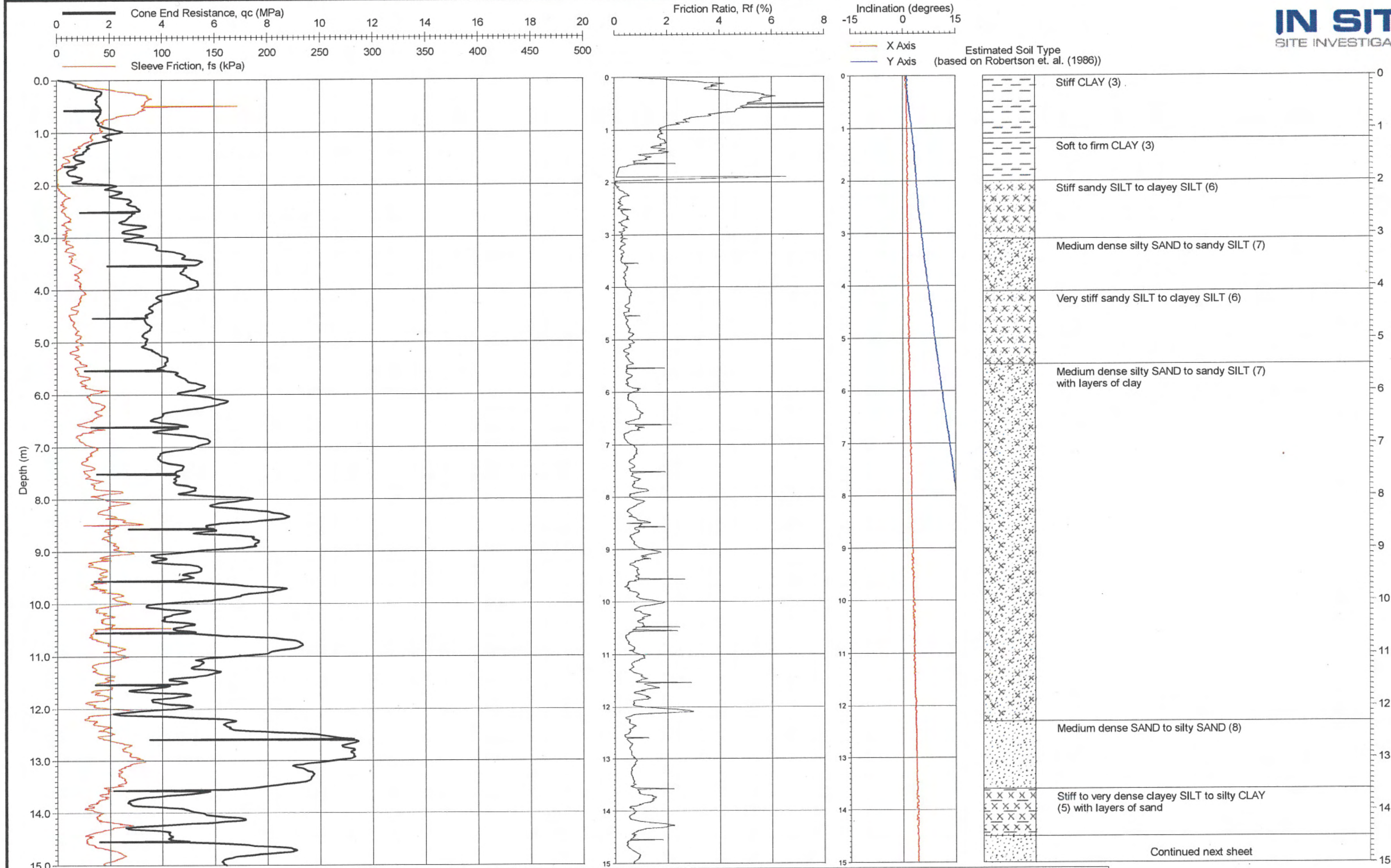
insitusi.com

Form: CPT0001

IN SITU SITE INVESTIGATION

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 05
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

Tip Zero Pre: 0.2281 mV	Tip Zero Post: 0.2278 mV	Tip Zero Difference: -2.8000 %
Sleeve Zero Pre: 0.2945 mV	Sleeve Zero Post: 0.2944 mV	Sleeve Zero Difference: 0.0409 %
Pore Pressure Zero Pre: 0.3208 mV	Pore Pressure Zero Post: 0.3179 mV	Pore Pressure Difference: 0.9028 %
X Inclinometer Zero Pre: 1.2221 mV	X Inclinometer Zero Post: 1.2269 mV	X Inclinometer Difference: -0.3894 %
Y Inclinometer Zero Pre: 1.2357 mV	Y Inclinometer Zero Post: 1.2359 mV	Y Inclinometer Difference: -0.0162 %

PIEZO CONE PENETRATION TEST

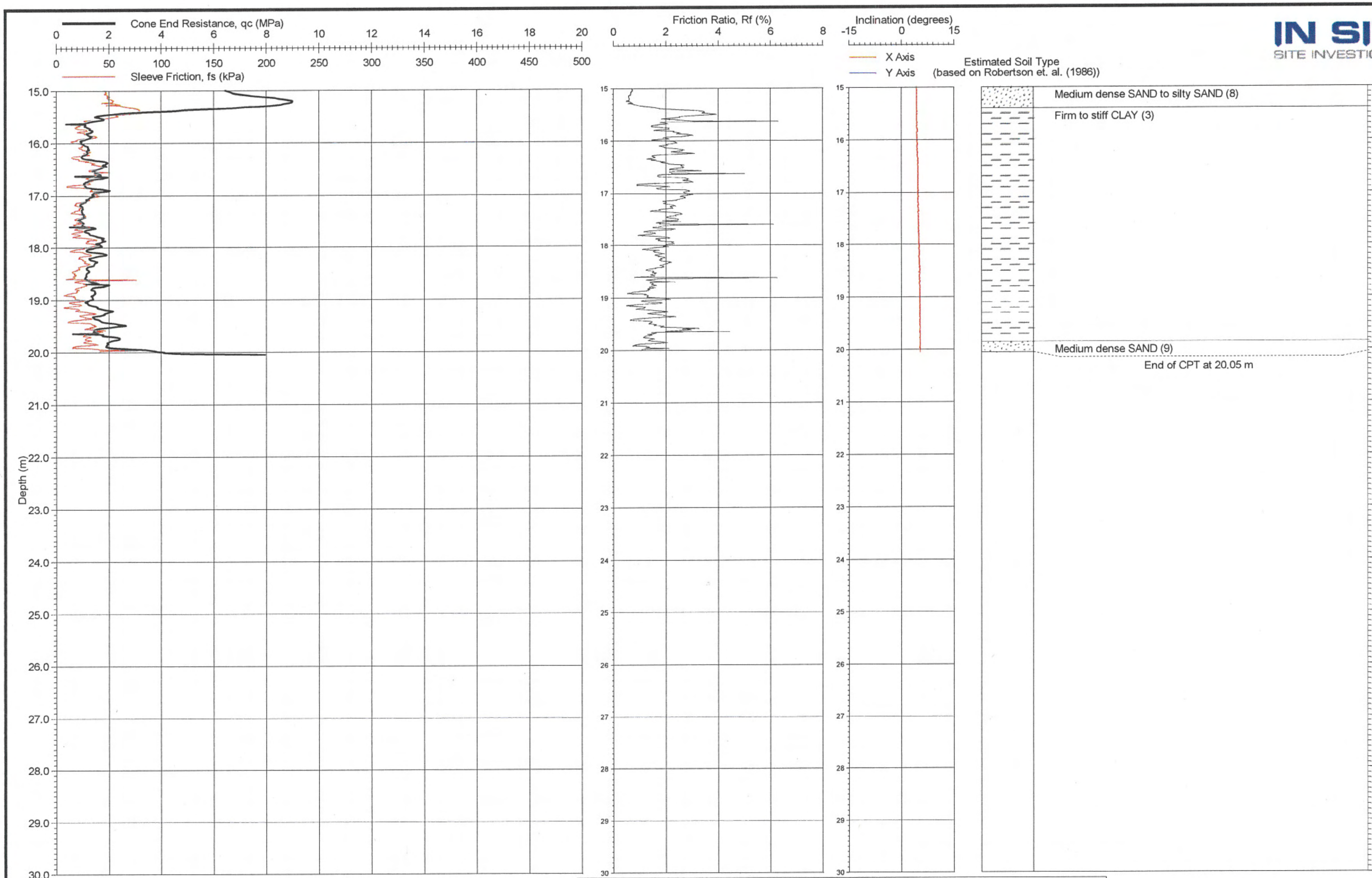
CPT 05

insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 05
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

CPT 05

insitusi.com

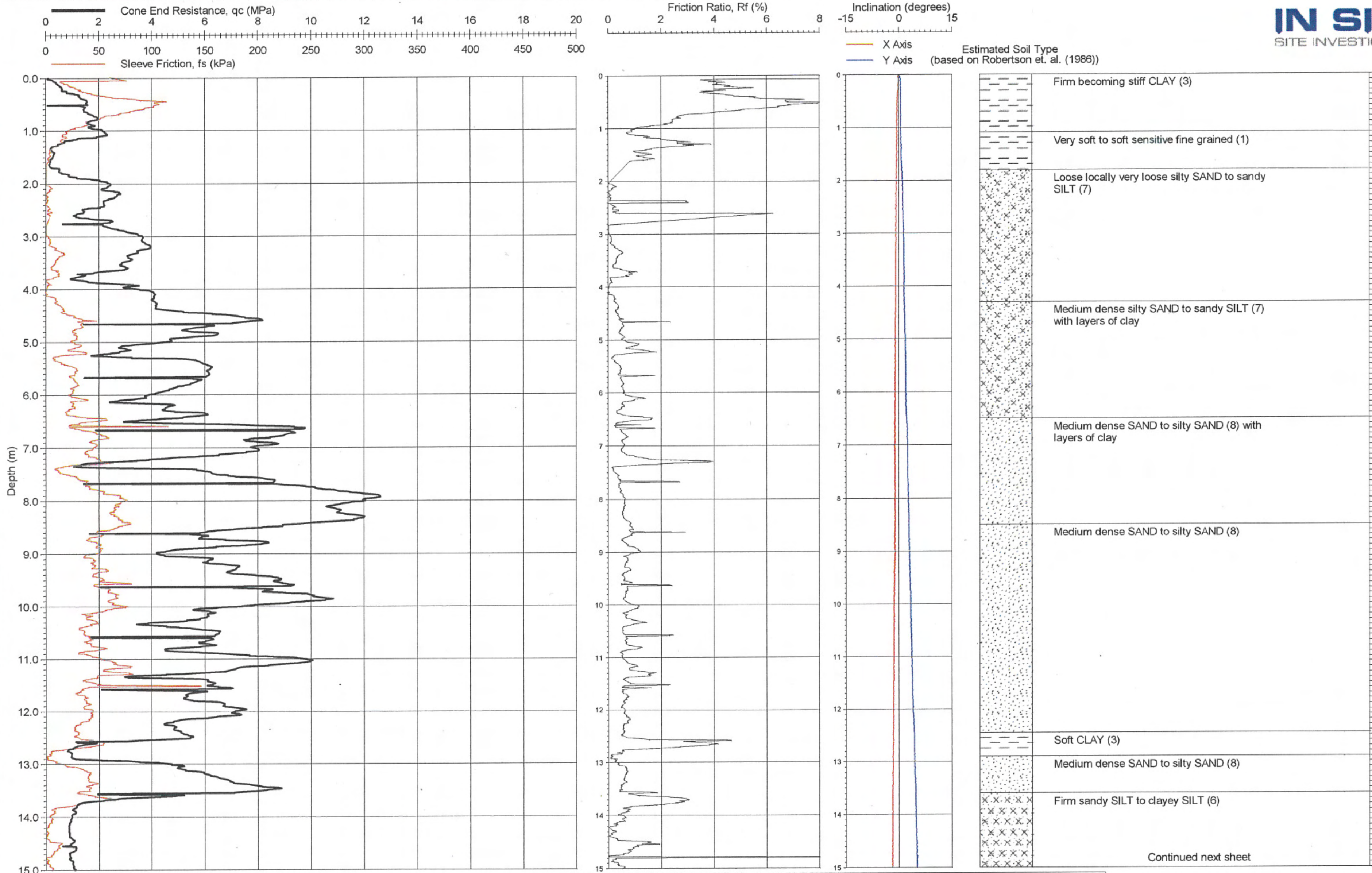
Form: CPT0001

IN SITU
SITE INVESTIGATION

Client: DELTA SIMONS
Job Title: ABLE MARINE ENERGY PARK

PIEZO CONE PENETRATION TEST

CPT 06



Location:	HUMBERSIDE
Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.D42 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	03/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 06
Checked By:	

PCPT Zero Values

Tip Zero Pre: 0.2281 mV	Tip Zero Post: 0.2278 mV	Tip Zero Difference: -2.8000 %
Sleeve Zero Pre: 0.2945 mV	Sleeve Zero Post: 0.2944 mV	Sleeve Zero Difference: 0.0409 %
Pore Pressure Zero Pre: 0.3208 mV	Pore Pressure Zero Post: 0.3179 mV	Pore Pressure Difference: 0.9028 %
X Inclinometer Zero Pre: 1.2221 mV	X Inclinometer Zero Post: 1.2269 mV	X Inclinometer Difference: -0.3894 %
Y Inclinometer Zero Pre: 1.2357 mV	Y Inclinometer Zero Post: 1.2359 mV	Y Inclinometer Difference: -0.0162 %

insitusi.com

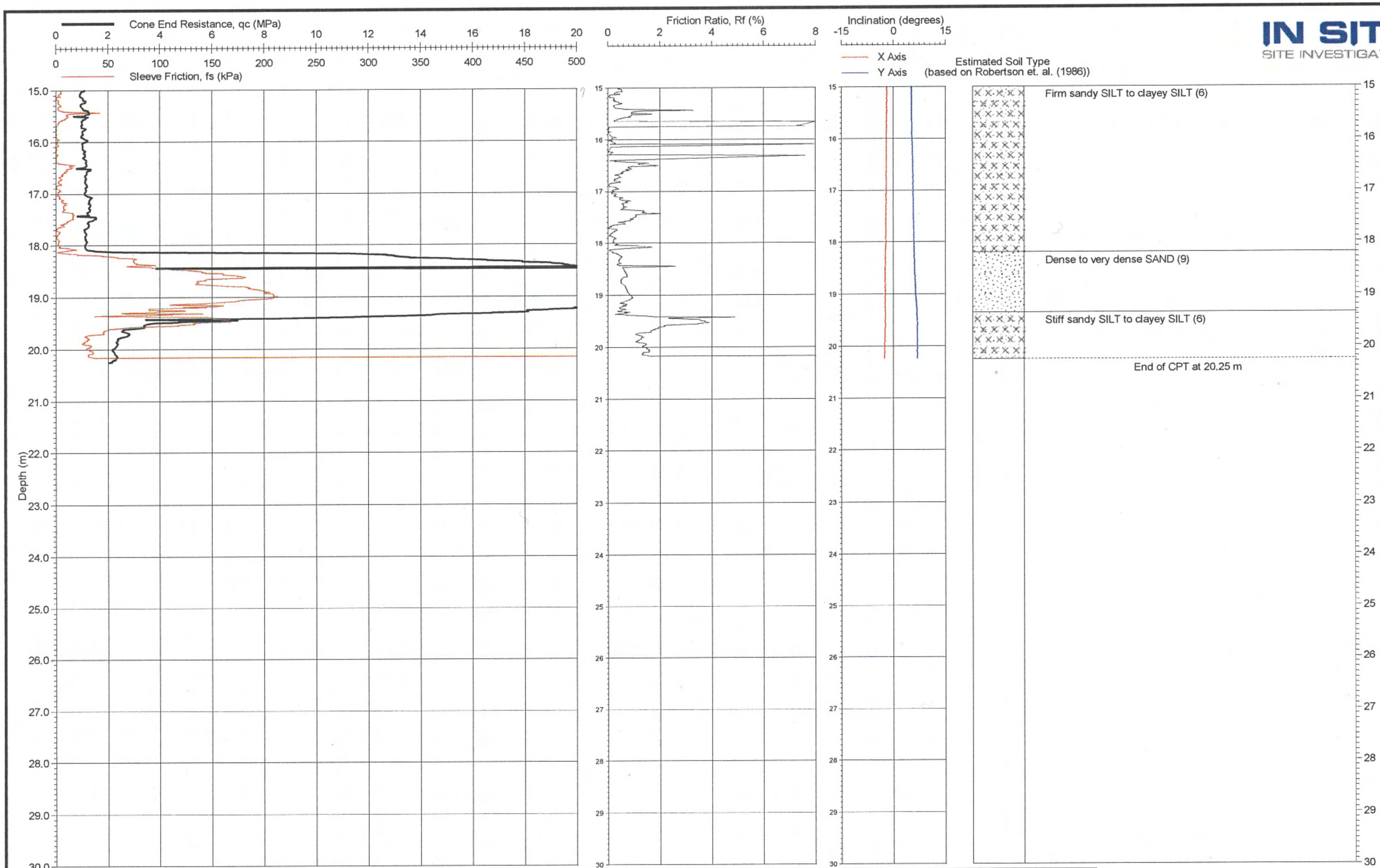
Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

PIEZO CONE PENETRATION TEST

CPT 06



Location:	HUMBERSIDE	Date of Test:	03/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 06
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

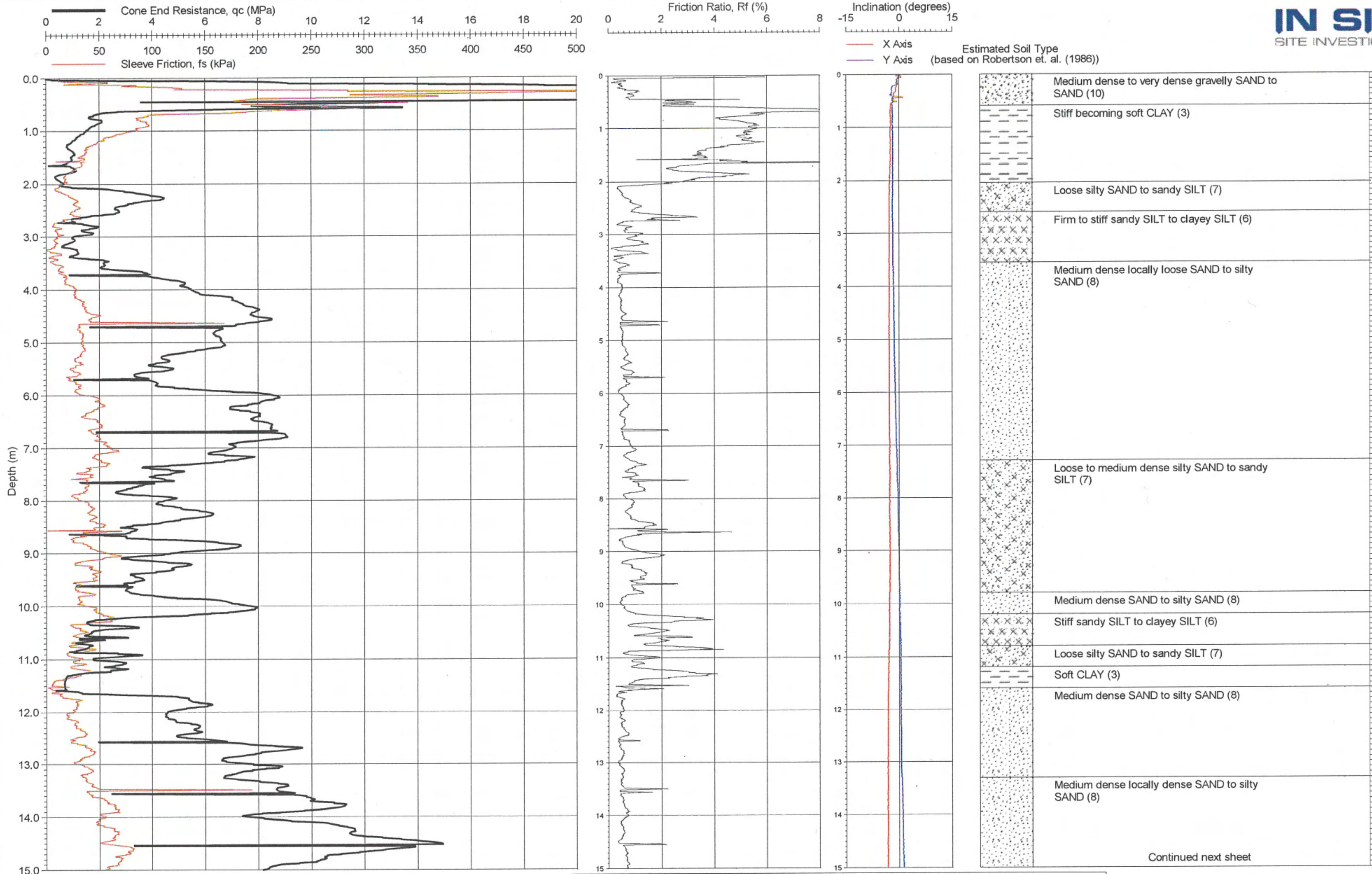
IN SITU SITE INVESTIGATION

insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE
Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.D42 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	04/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 07
Checked By:	

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

CPT 07

IN SITU SITE INVESTIGATION

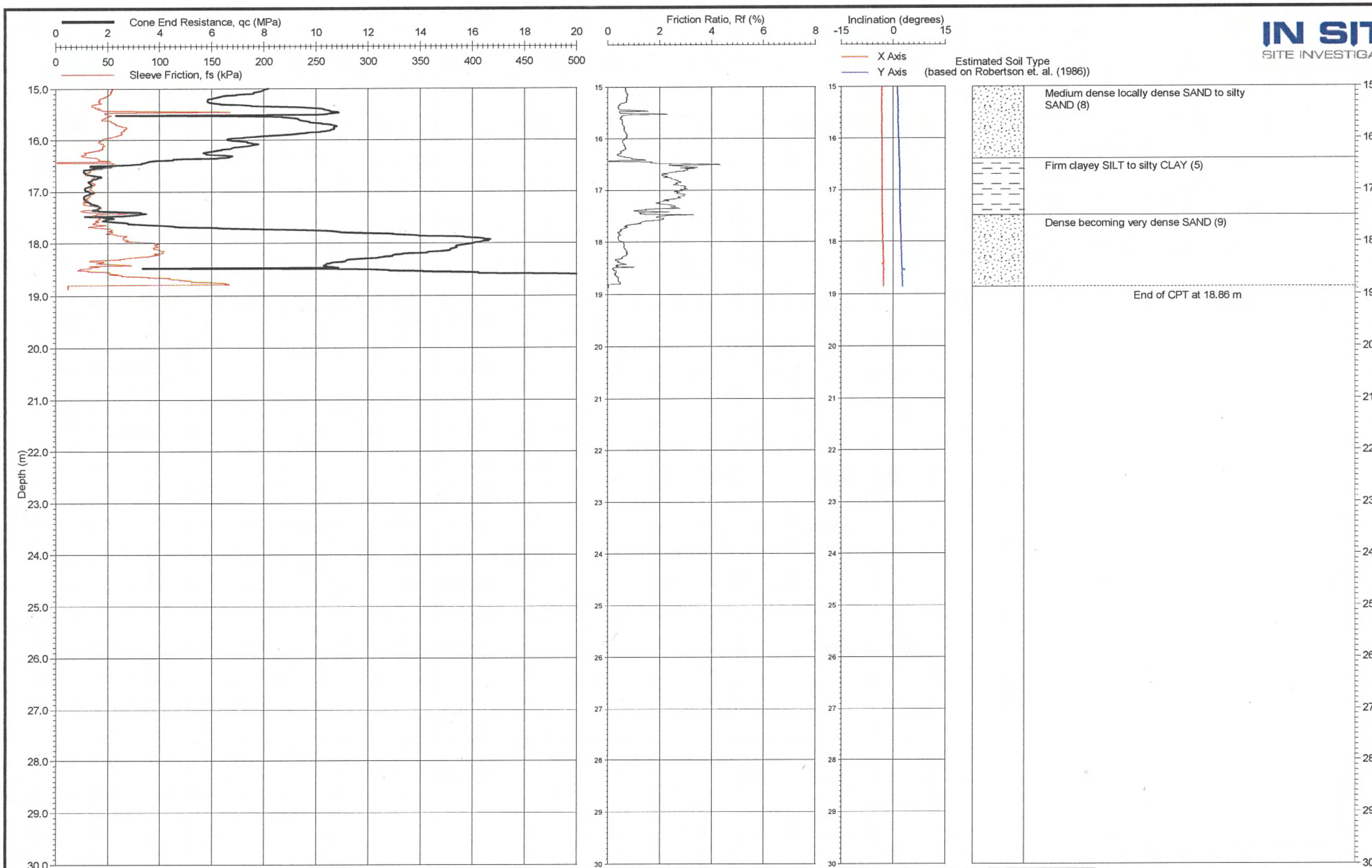
insitusi.com

Form: CPT0001

IN SITU SITE INVESTIGATION

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 07
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

CPT 07

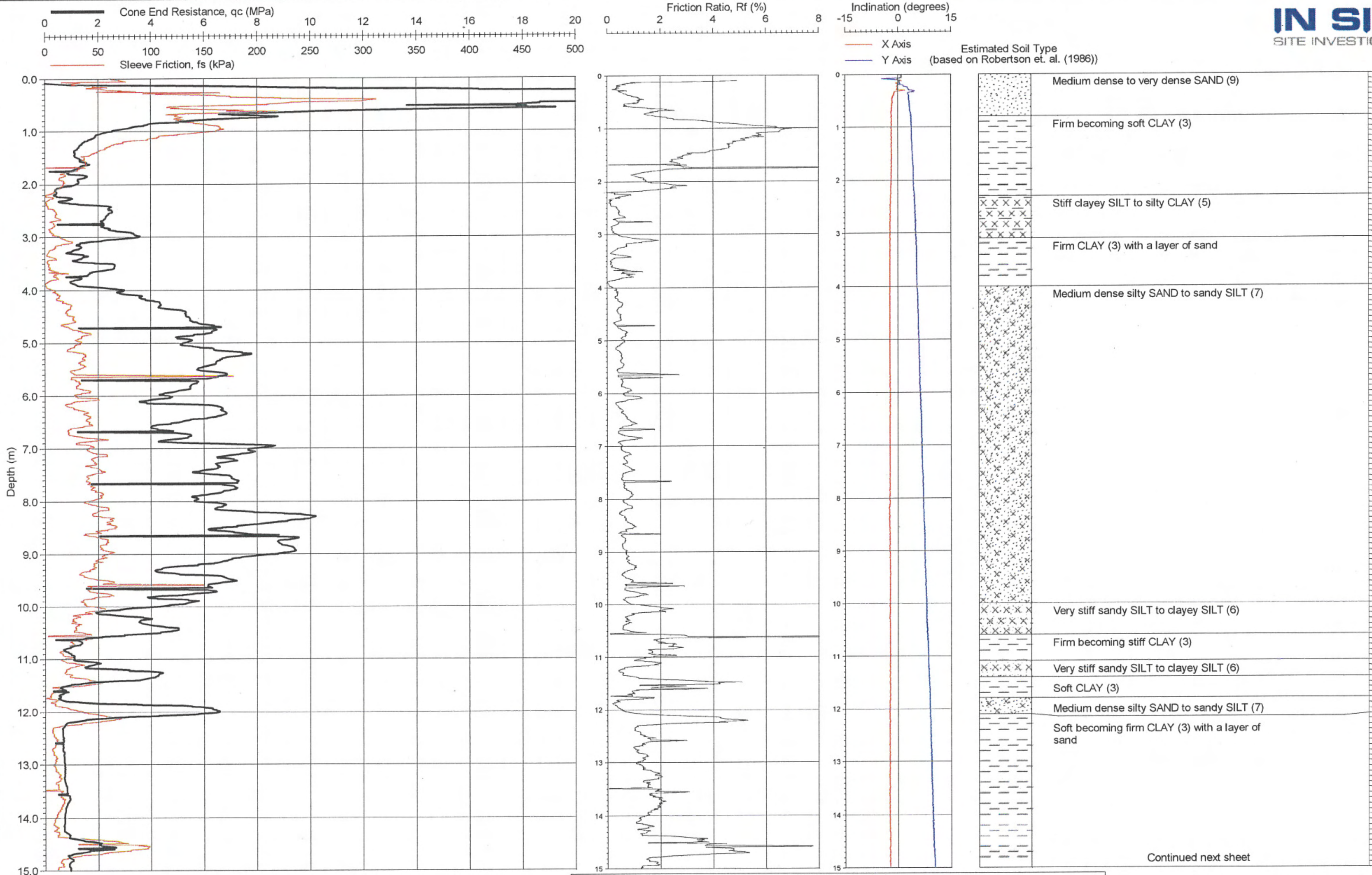
insitusi.com

Form: CPT0001

IN SITU
SITE INVESTIGATION

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE
Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.D42 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	04/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 08
Checked By:	

PCPT Zero Values

Tip Zero Pre: 0.2281 mV	Tip Zero Post: 0.2278 mV	Tip Zero Difference: -2.8000 %
Sleeve Zero Pre: 0.2945 mV	Sleeve Zero Post: 0.2944 mV	Sleeve Zero Difference: 0.0409 %
Pore Pressure Zero Pre: 0.3208 mV	Pore Pressure Zero Post: 0.3179 mV	Pore Pressure Difference: 0.9028 %
X Inclinometer Zero Pre: 1.2221 mV	X Inclinometer Zero Post: 1.2269 mV	X Inclinometer Difference: -0.3894 %
Y Inclinometer Zero Pre: 1.2357 mV	Y Inclinometer Zero Post: 1.2359 mV	Y Inclinometer Difference: -0.0162 %

PIEZO CONE PENETRATION TEST

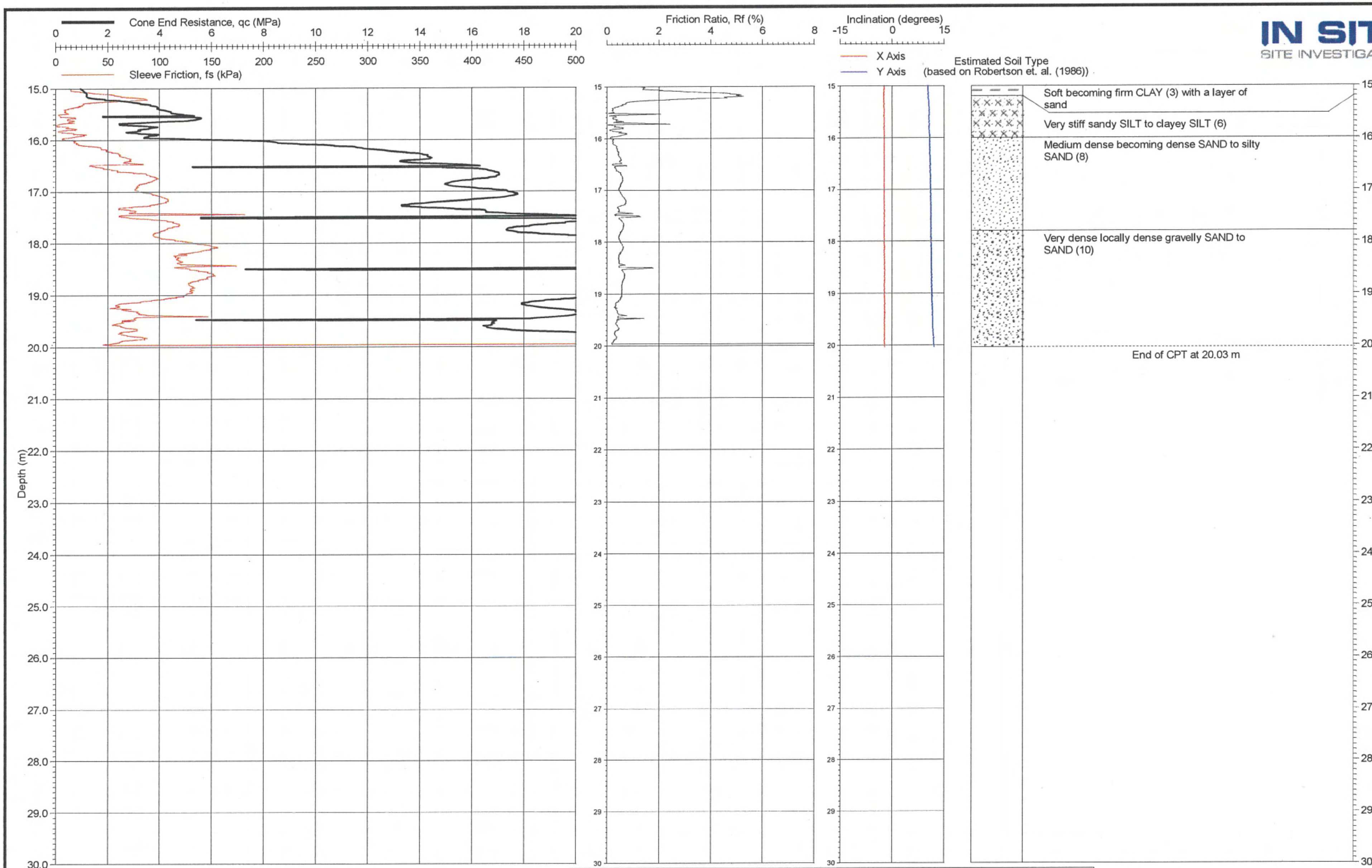
CPT 08

insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 08
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

IN SITU SITE INVESTIGATION

PIEZO CONE PENETRATION TEST

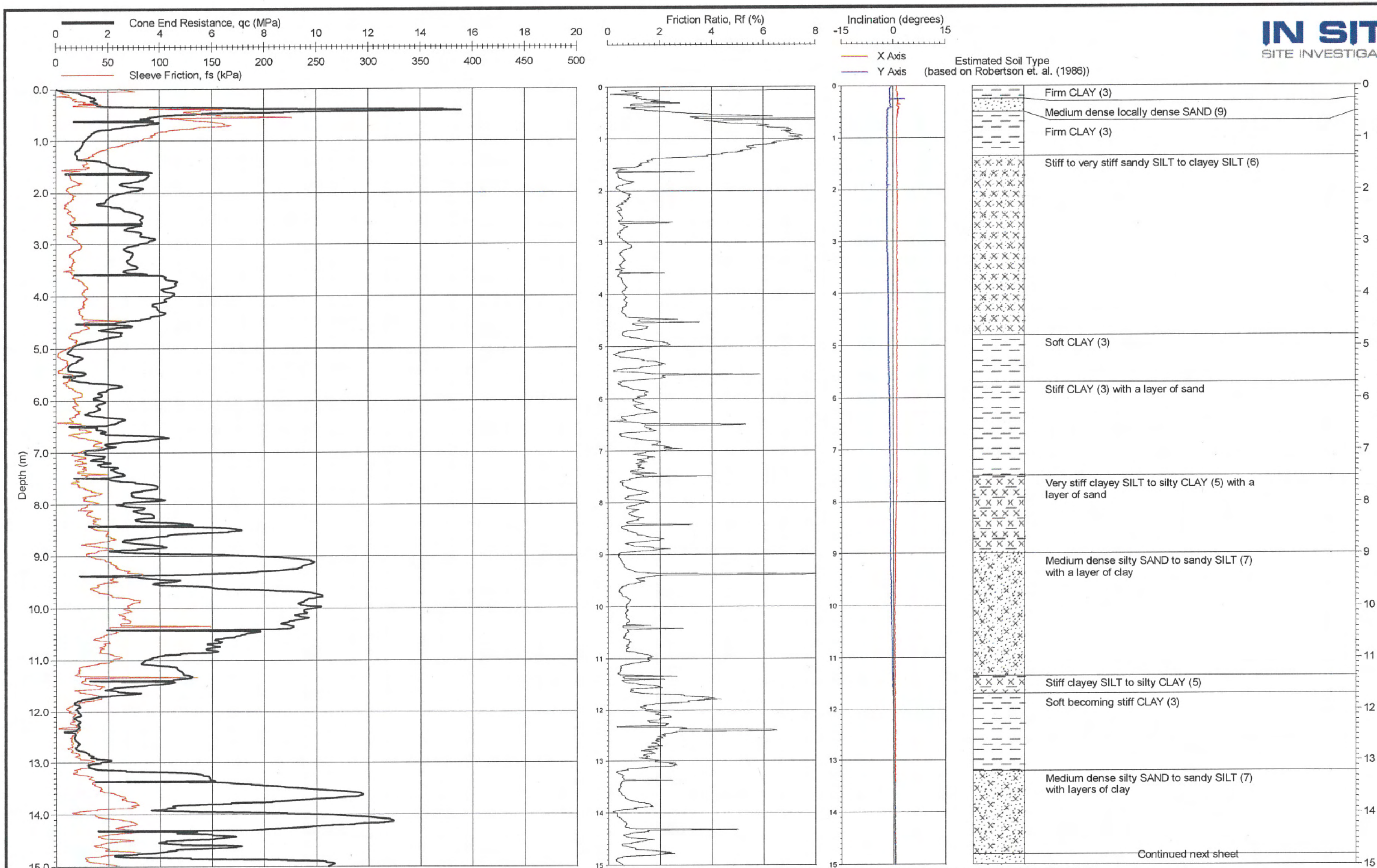
CPT 08

insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.D42 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 04/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 09

Checked By:

PCPT Zero Values

Tip Zero Pre: 0.2281 mV	Tip Zero Post: 0.2278 mV	Tip Zero Difference: -2.8000 %
Sleeve Zero Pre: 0.2945 mV	Sleeve Zero Post: 0.2944 mV	Sleeve Zero Difference: 0.0409 %
Pore Pressure Zero Pre: 0.3208 mV	Pore Pressure Zero Post: 0.3179 mV	Pore Pressure Difference: 0.9028 %
X Inclinometer Zero Pre: 1.2221 mV	X Inclinometer Zero Post: 1.2269 mV	X Inclinometer Difference: -0.3894 %
Y Inclinometer Zero Pre: 1.2357 mV	Y Inclinometer Zero Post: 1.2359 mV	Y Inclinometer Difference: -0.0162 %

PIEZO CONE PENETRATION TEST

CPT 09

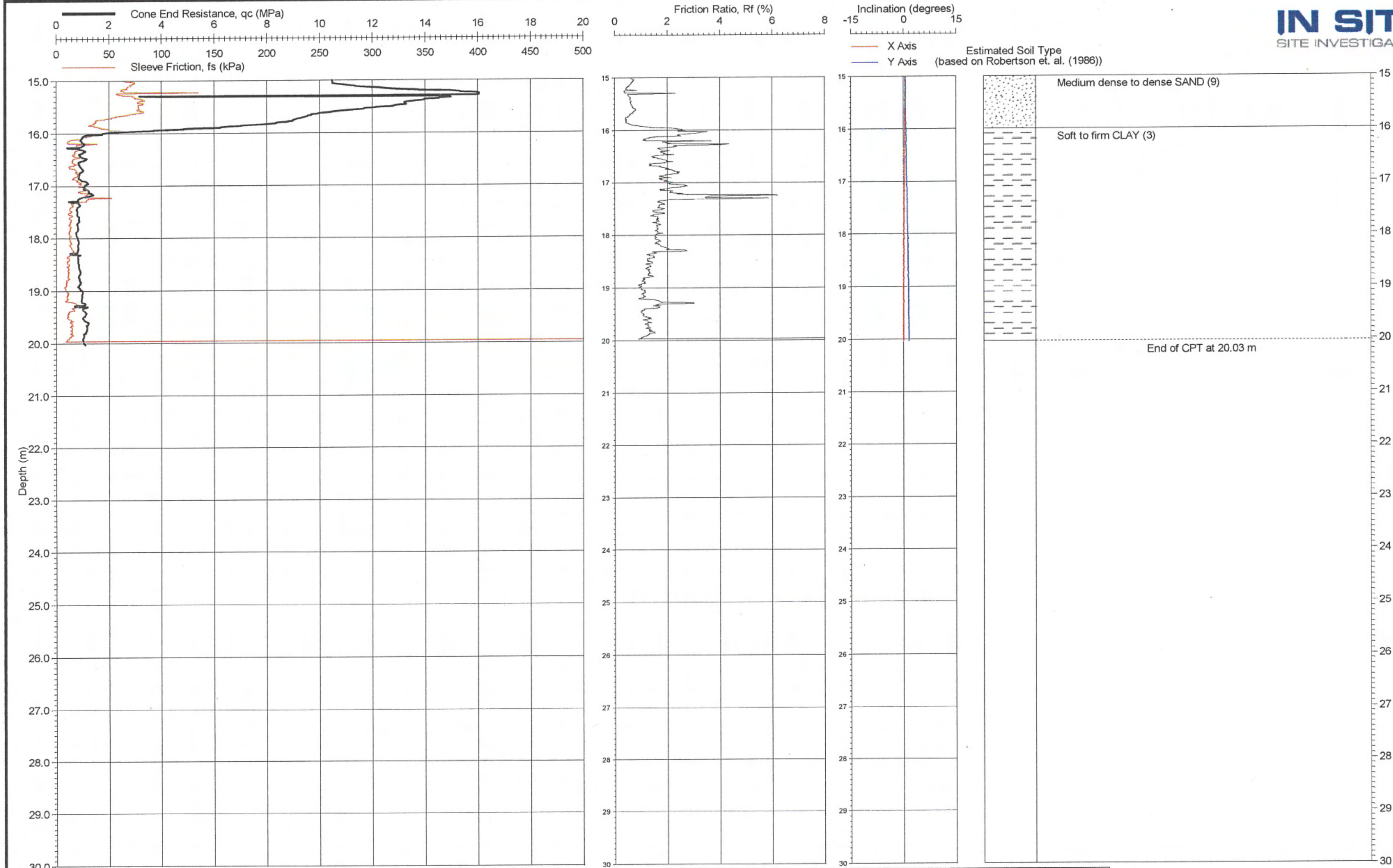
insitusi.com

Form: CPT0001

IN SITU SITE INVESTIGATION

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE
Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.D42 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	04/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 09
Checked By:	

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

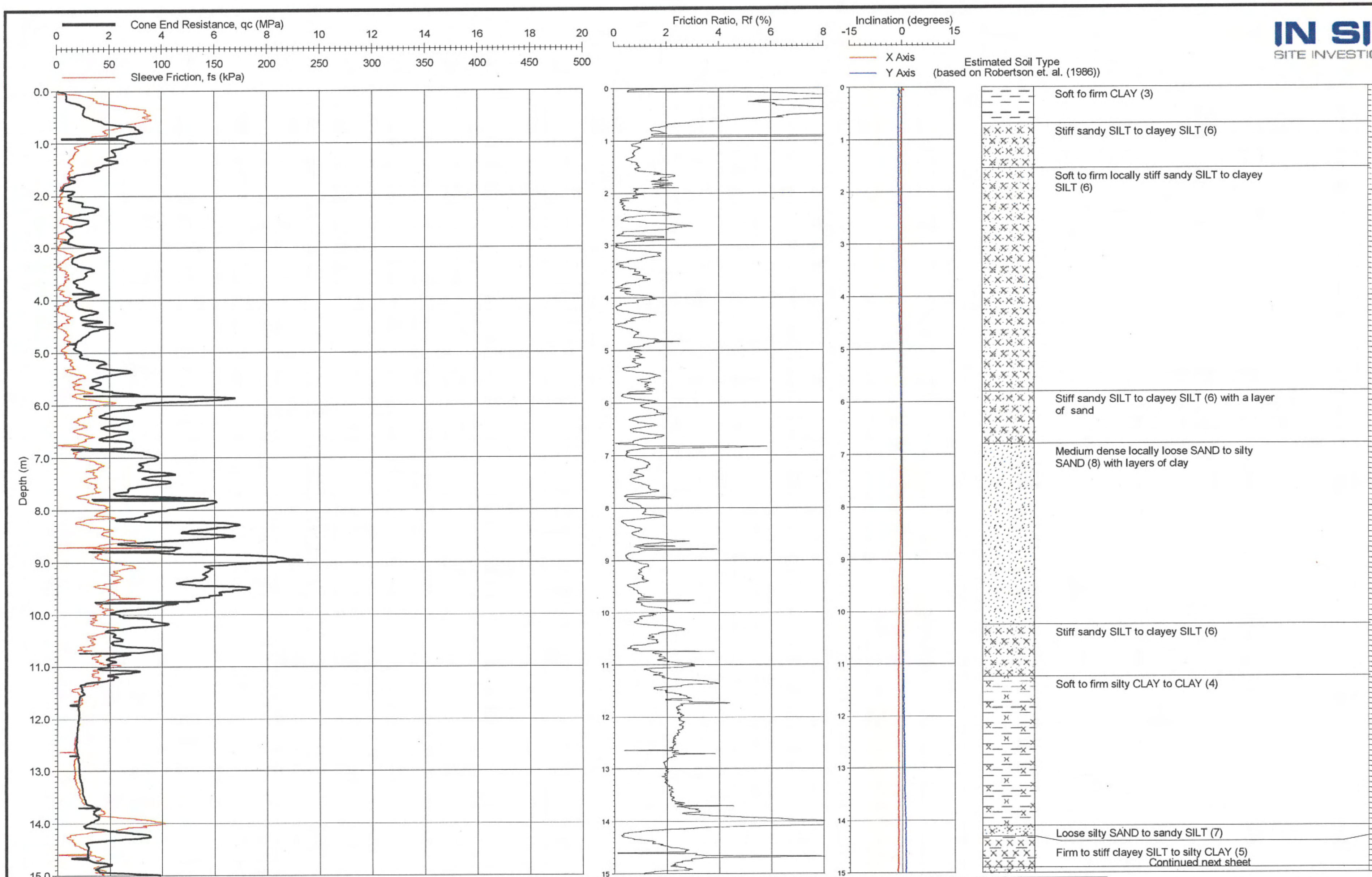
CPT 09

insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE
Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.D42 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	04/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 10
Checked By:	

PCPT Zero Values

Tip Zero Pre: 0.2281 mV	Tip Zero Post: 0.2278 mV	Tip Zero Difference: -2.8000 %
Sleeve Zero Pre: 0.2945 mV	Sleeve Zero Post: 0.2944 mV	Sleeve Zero Difference: 0.0409 %
Pore Pressure Zero Pre: 0.3208 mV	Pore Pressure Zero Post: 0.3179 mV	Pore Pressure Difference: 0.9028 %
X Inclinometer Zero Pre: 1.2221 mV	X Inclinometer Zero Post: 1.2269 mV	X Inclinometer Difference: -0.3894 %
Y Inclinometer Zero Pre: 1.2357 mV	Y Inclinometer Zero Post: 1.2359 mV	Y Inclinometer Difference: -0.0162 %

PIEZO CONE PENETRATION TEST

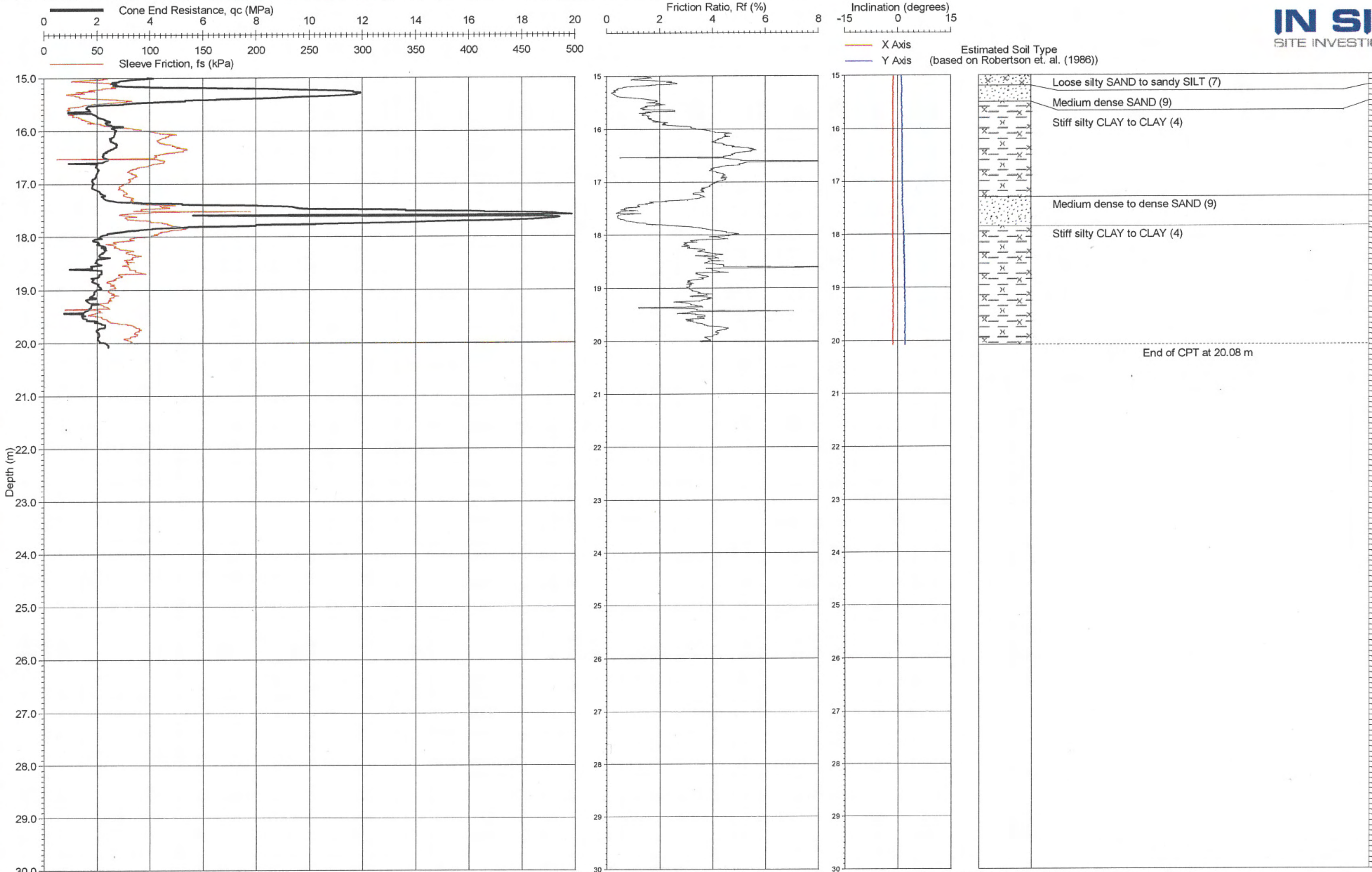
CPT 10

insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE
Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.D42 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	04/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 10
Checked By:	

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

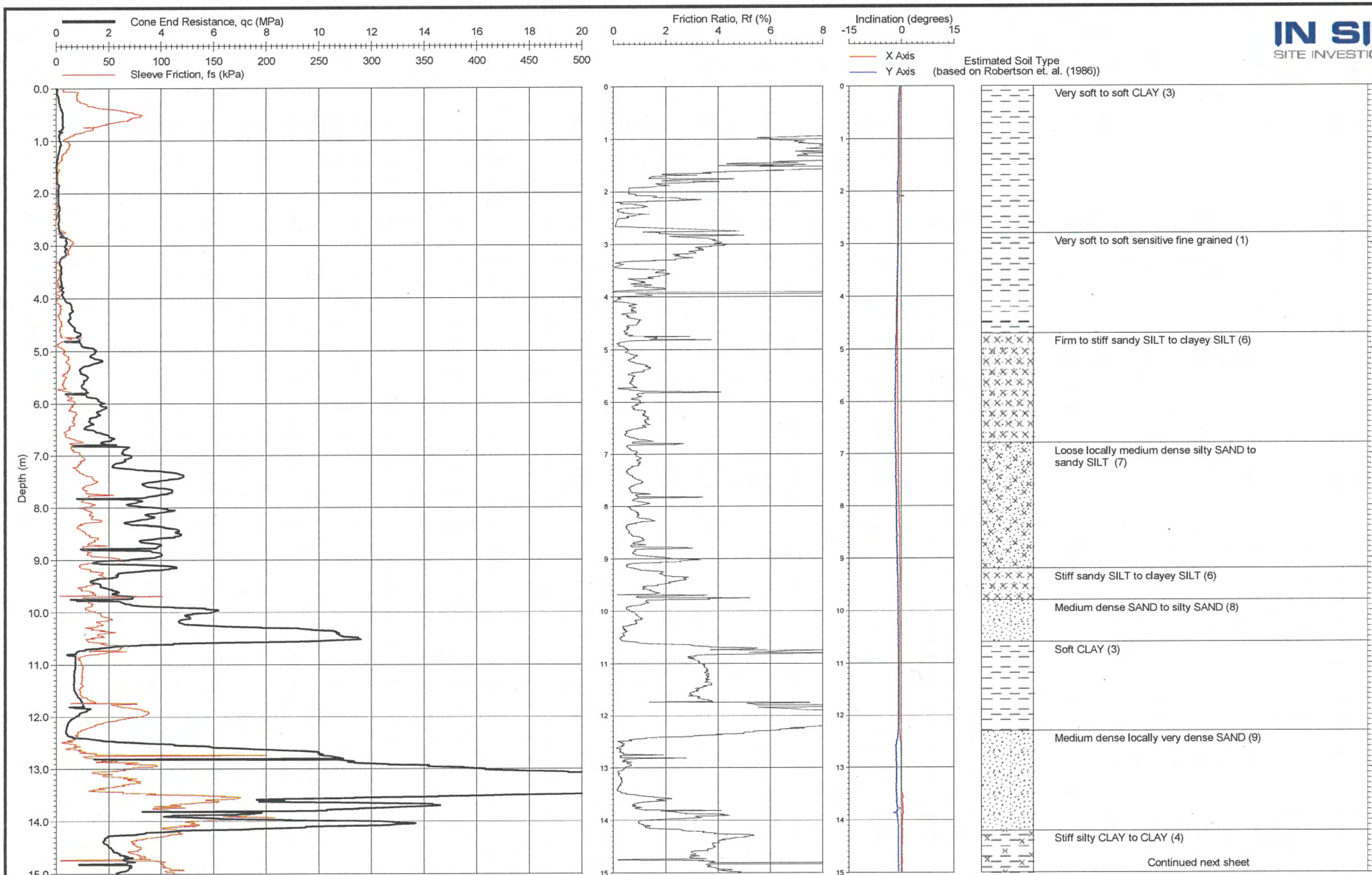
CPT 10

insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE
Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.D42 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	04/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 11
Checked By:	[signature]

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

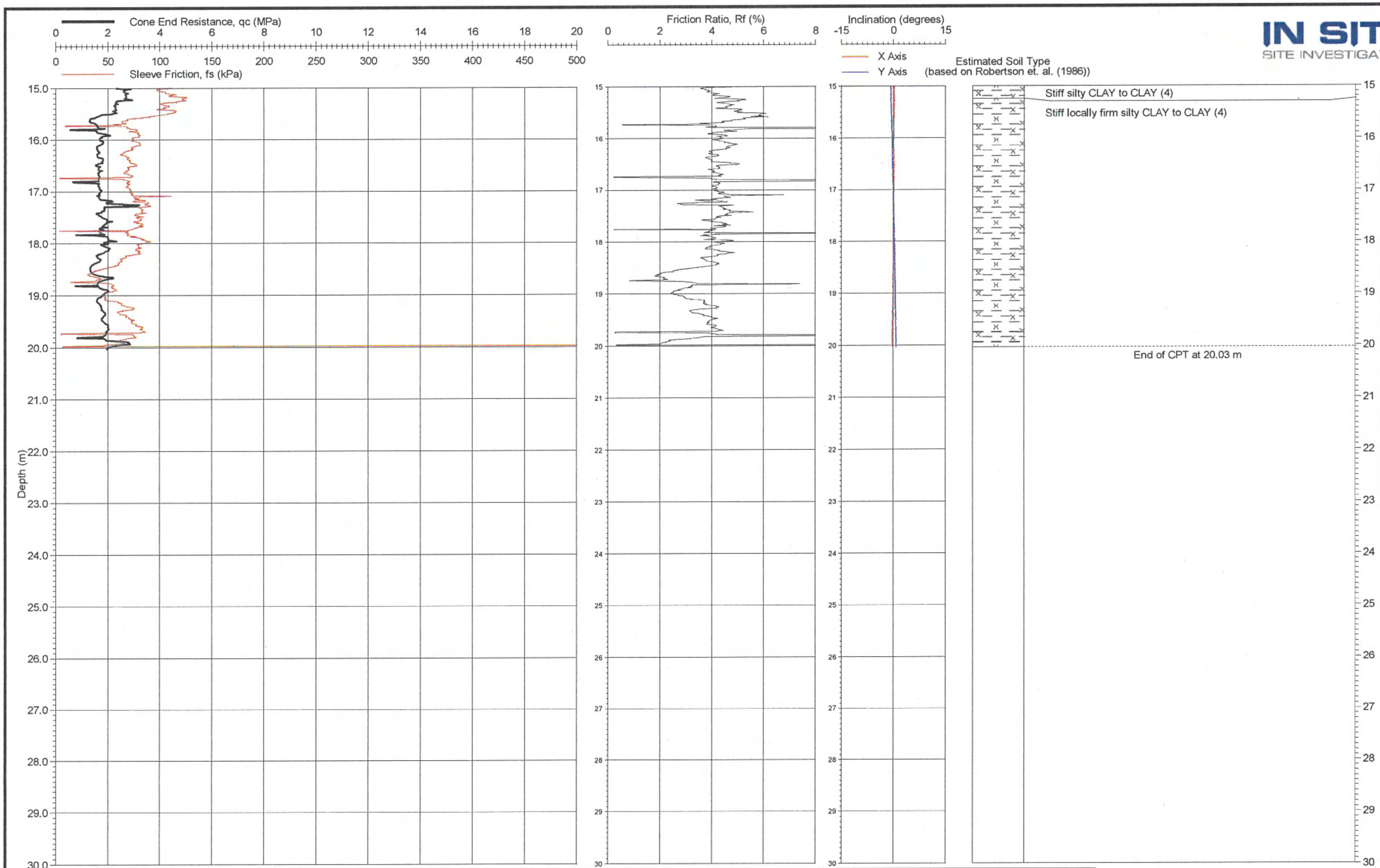
CPT 11

insitusi.com

Form: CPT0001

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 11
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

IN SITU SITE INVESTIGATION

PIEZO CONE PENETRATION TEST

CPT 11

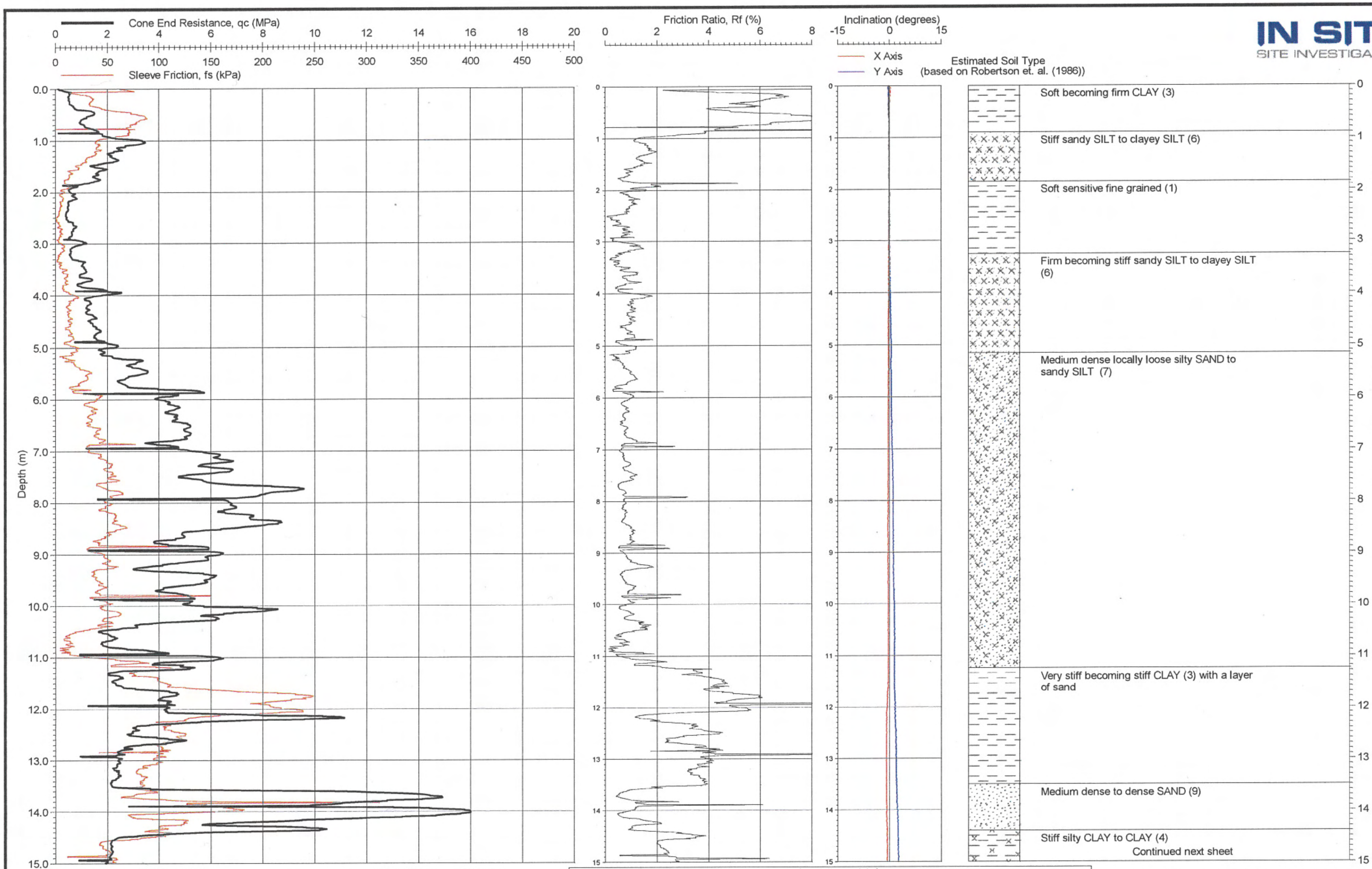
insitusi.com

Form: CPT0001

IN SITU
SITE INVESTIGATION

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 12
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

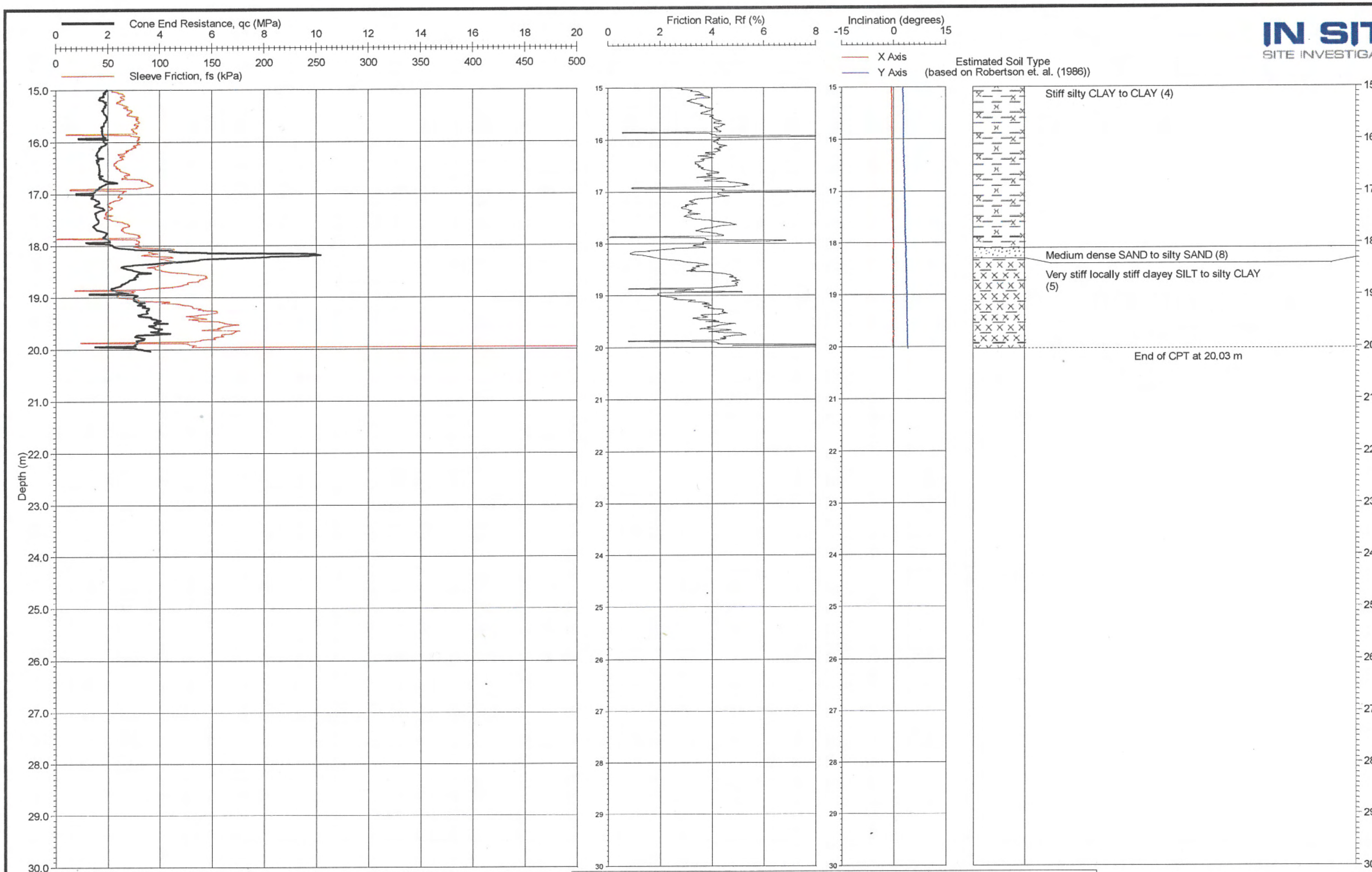
PIEZO CONE PENETRATION TEST

CPT 12

insitusi.com

Form: CPT0001

Client: DELTA SIMONS
Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 12
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

PCPT Zero Values

Tip Zero Pre:	0.2281 mV	Tip Zero Post:	0.2278 mV	Tip Zero Difference:	-2.8000 %
Sleeve Zero Pre:	0.2945 mV	Sleeve Zero Post:	0.2944 mV	Sleeve Zero Difference:	0.0409 %
Pore Pressure Zero Pre:	0.3208 mV	Pore Pressure Zero Post:	0.3179 mV	Pore Pressure Difference:	0.9028 %
X Inclinometer Zero Pre:	1.2221 mV	X Inclinometer Zero Post:	1.2269 mV	X Inclinometer Difference:	-0.3894 %
Y Inclinometer Zero Pre:	1.2357 mV	Y Inclinometer Zero Post:	1.2359 mV	Y Inclinometer Difference:	-0.0162 %

PIEZO CONE PENETRATION TEST

CPT 12

insitusi.com

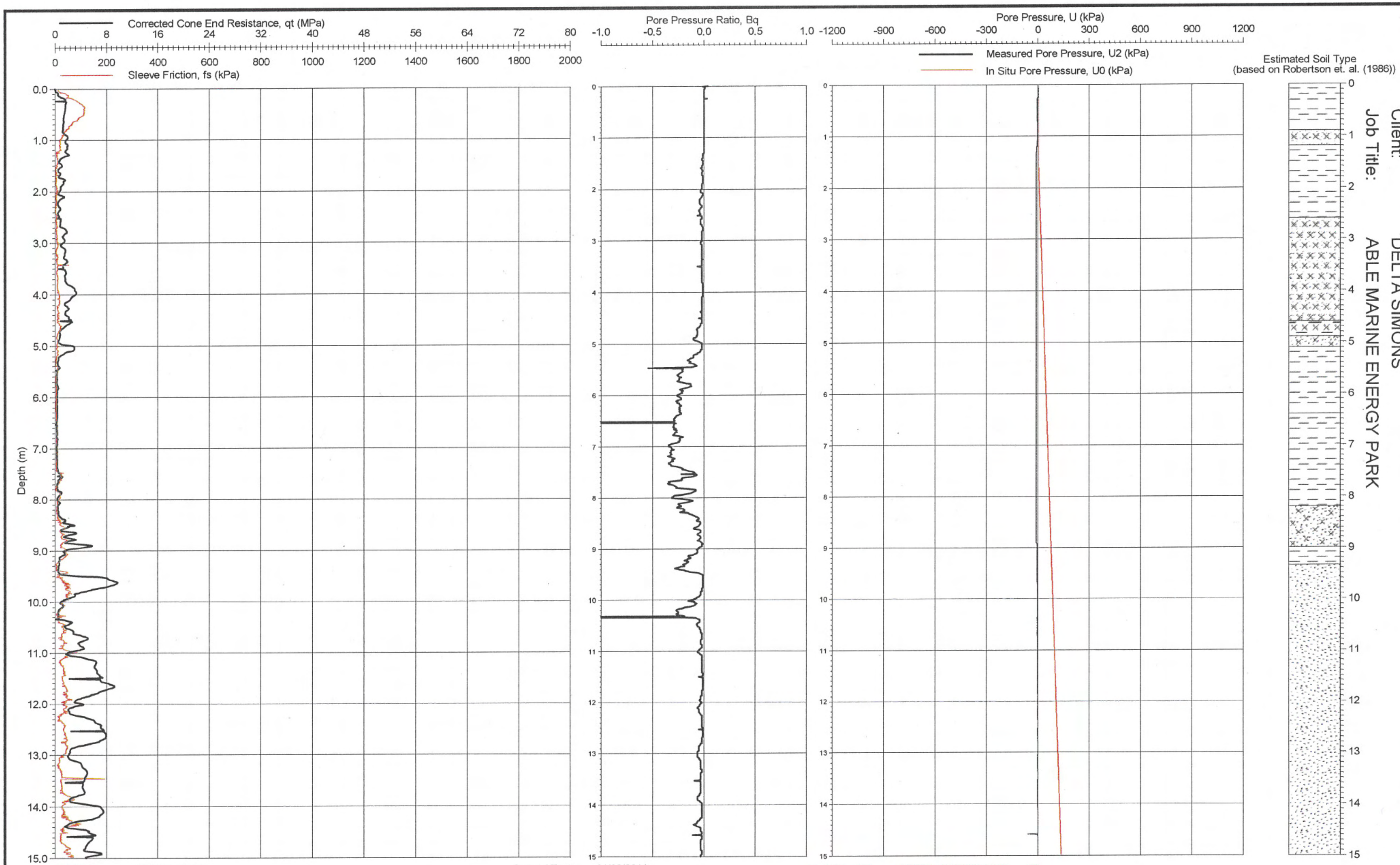
Form: CPT0001

Annex F: CPT Results in Graphical Format

- Corrected Cone End Resistance, qt (MPa)
- Sleeve Friction, fs (kPa)
- Pore Pressure Ratio, Bq
- Pore Pressure, U (kPA)

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.C86 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 01/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 01

Checked By:

IN SITU SITE INVESTIGATION

nsitusi.com

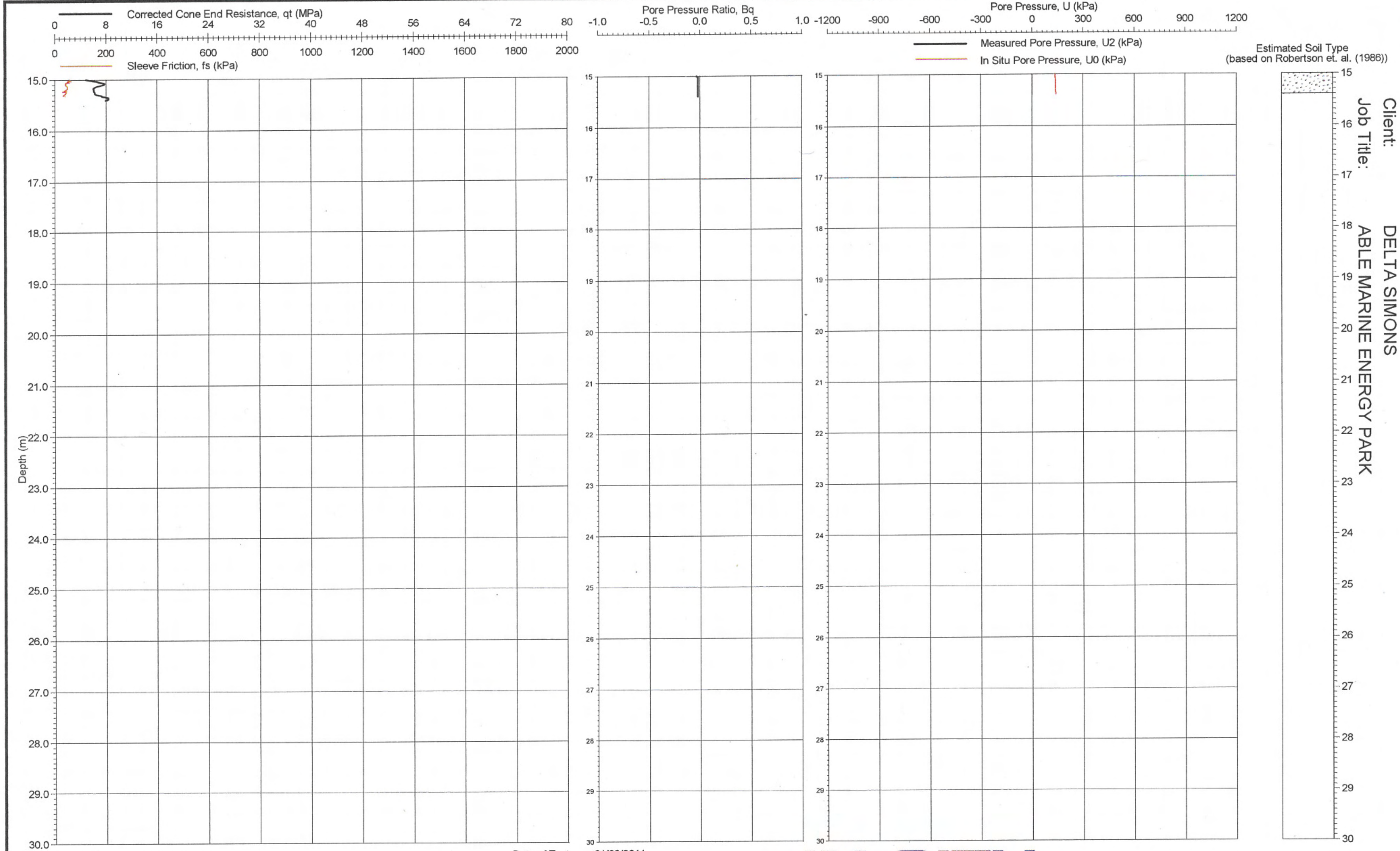
PIEZO CONE PENETRATION TEST

CPT 01

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 01
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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nsitusi.com

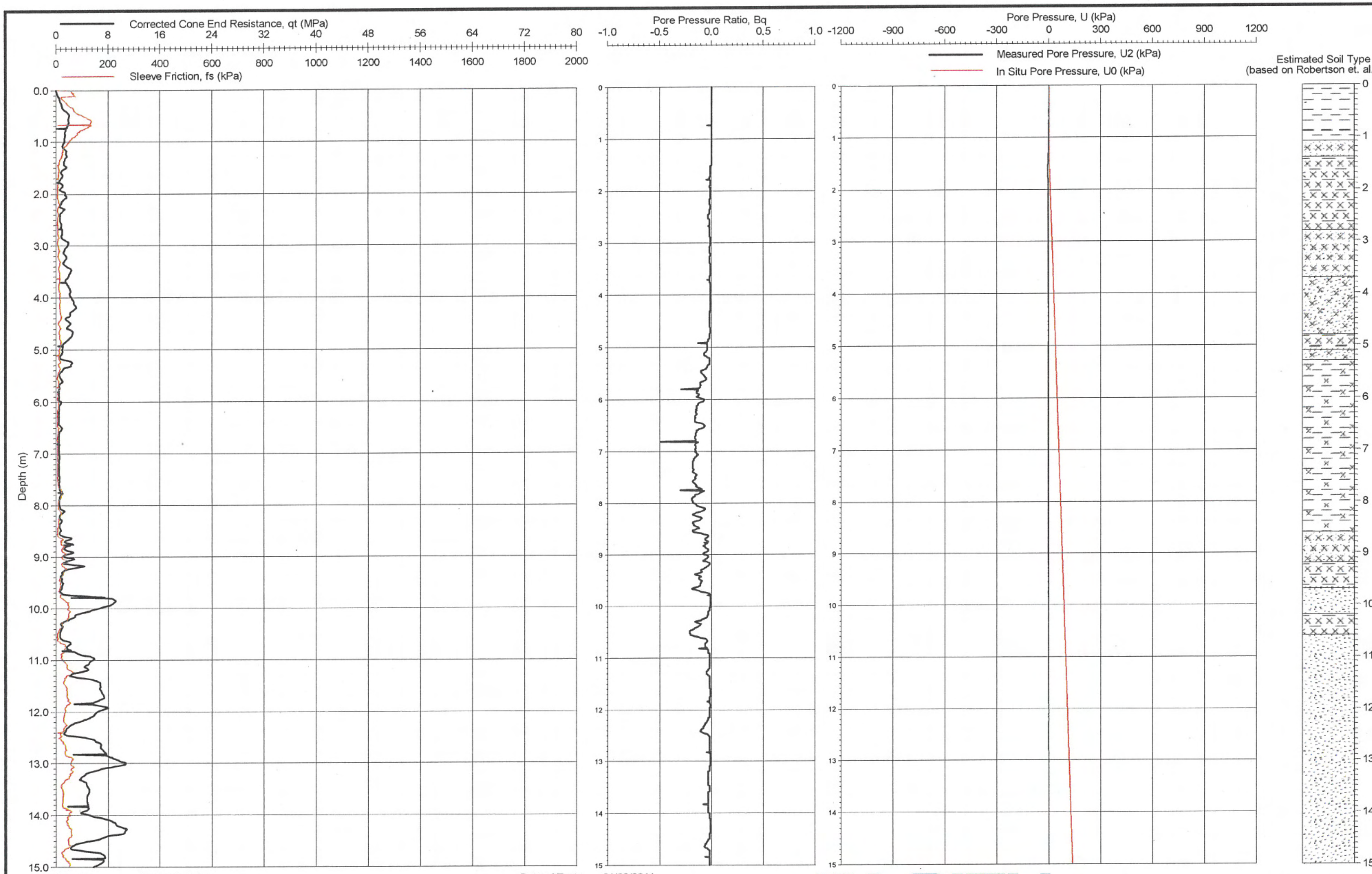
PIEZO CONE PENETRATION TEST

CPT 01

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 01A
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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PIEZO CONE PENETRATION TEST

CPT 01A

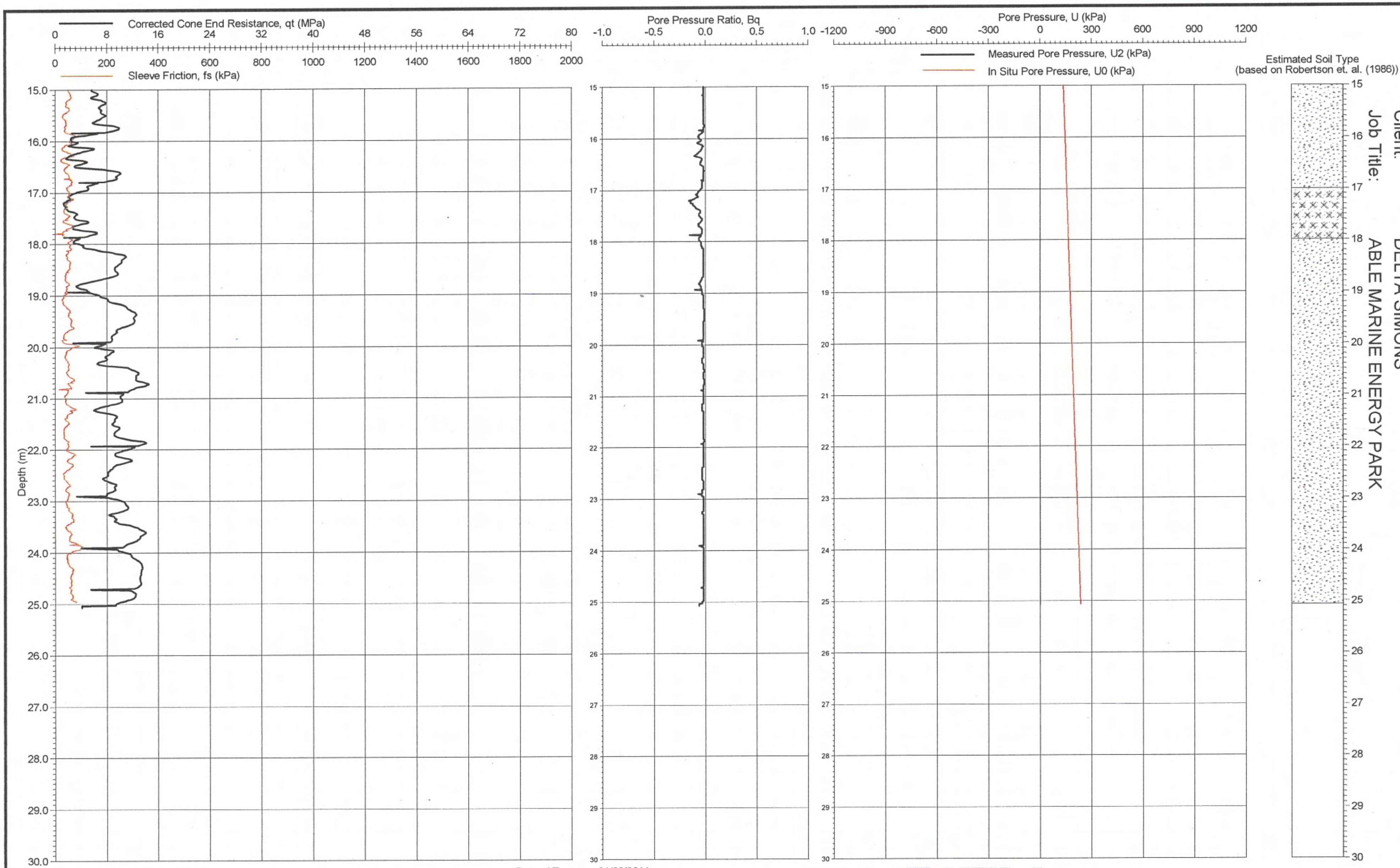
Form: CPT0002

PIEZO CONE PENETRATION TEST

CPT 01A

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.C86 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 01/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 01A

Checked By:

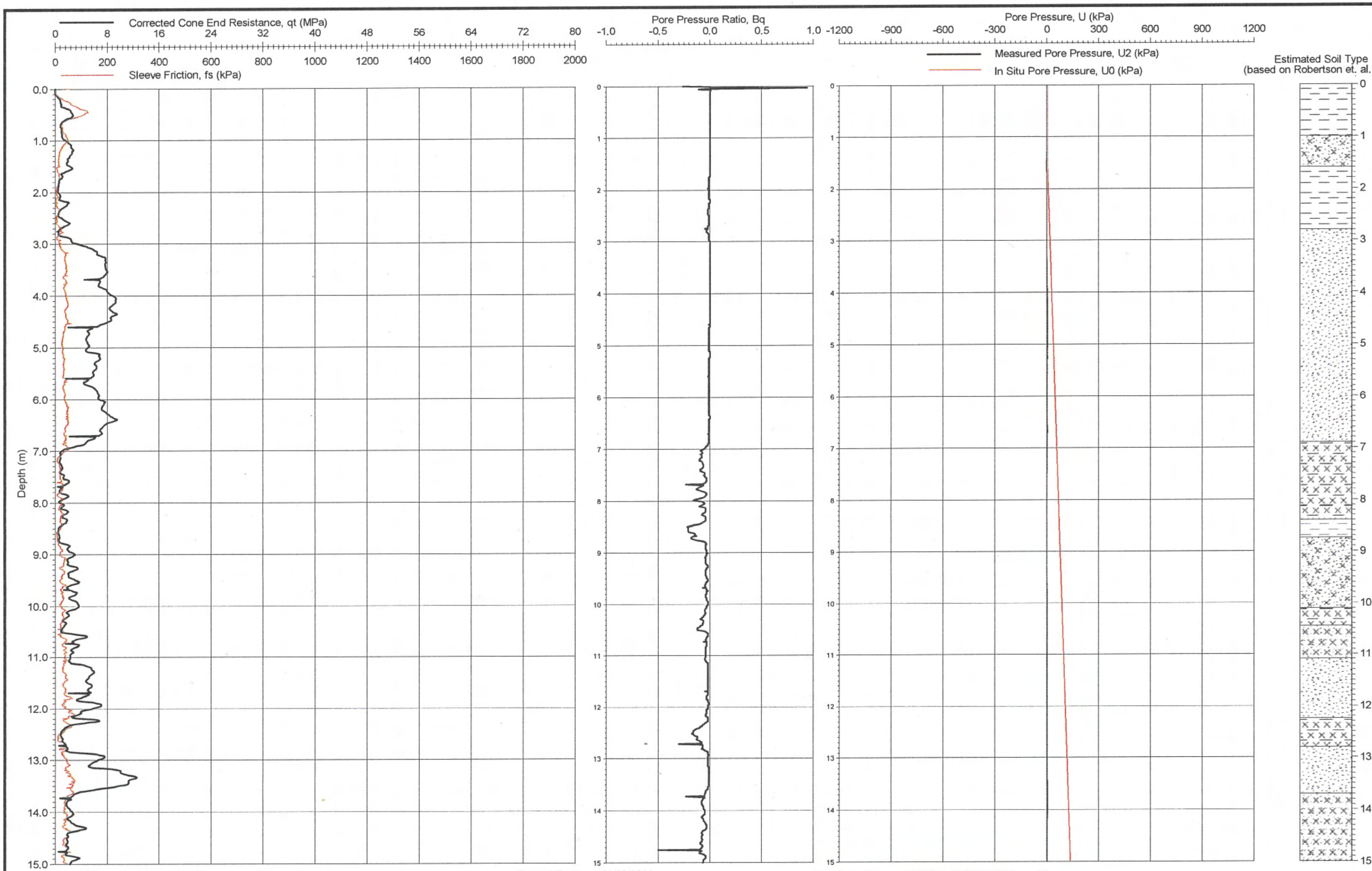
IN SITU SITE INVESTIGATION

nsitusi.com

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.C86 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 01/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 02

Checked By:

IN SITU SITE INVESTIGATION

nsitusi.com

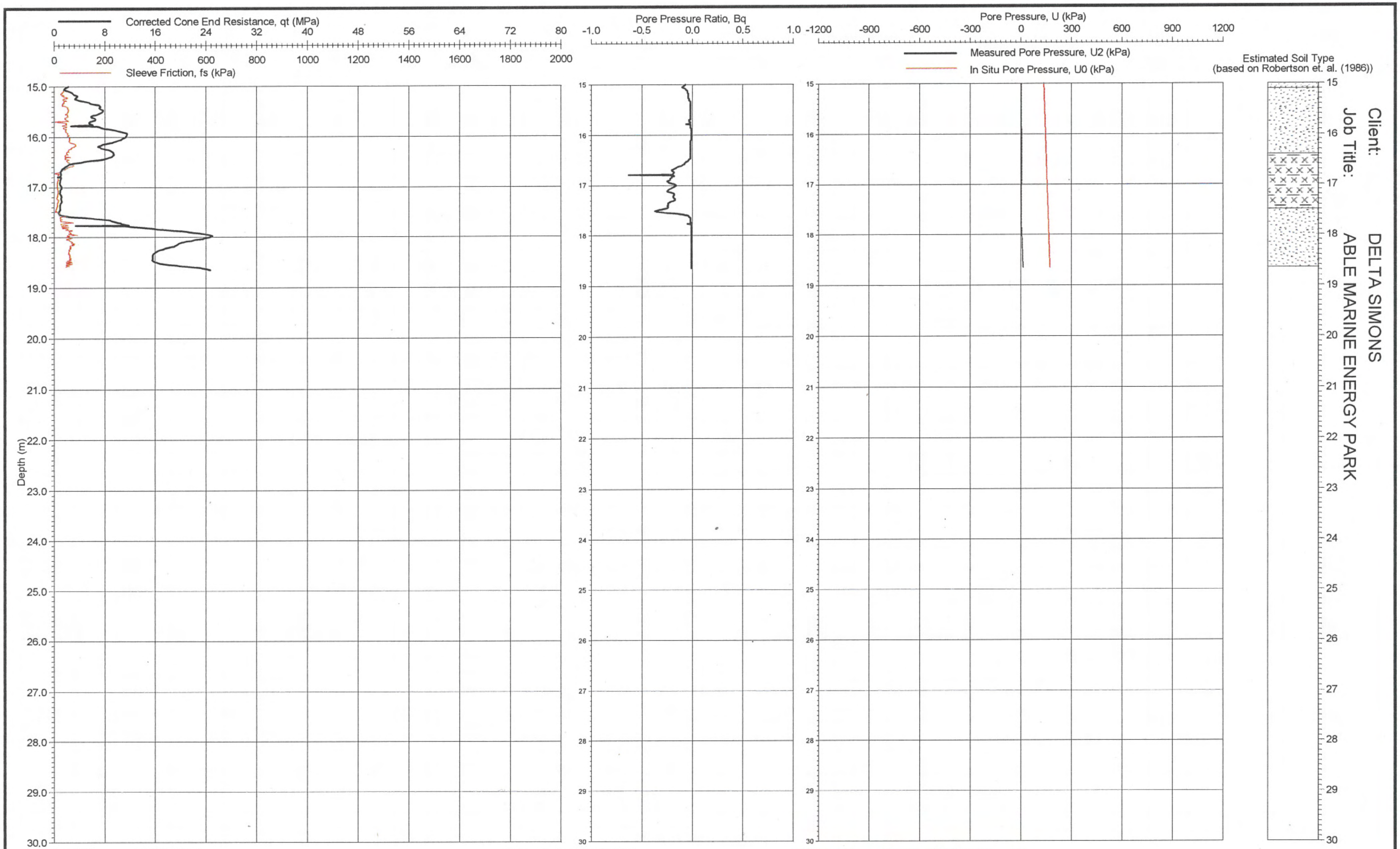
PIEZO CONE PENETRATION TEST

CPT 02

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 02
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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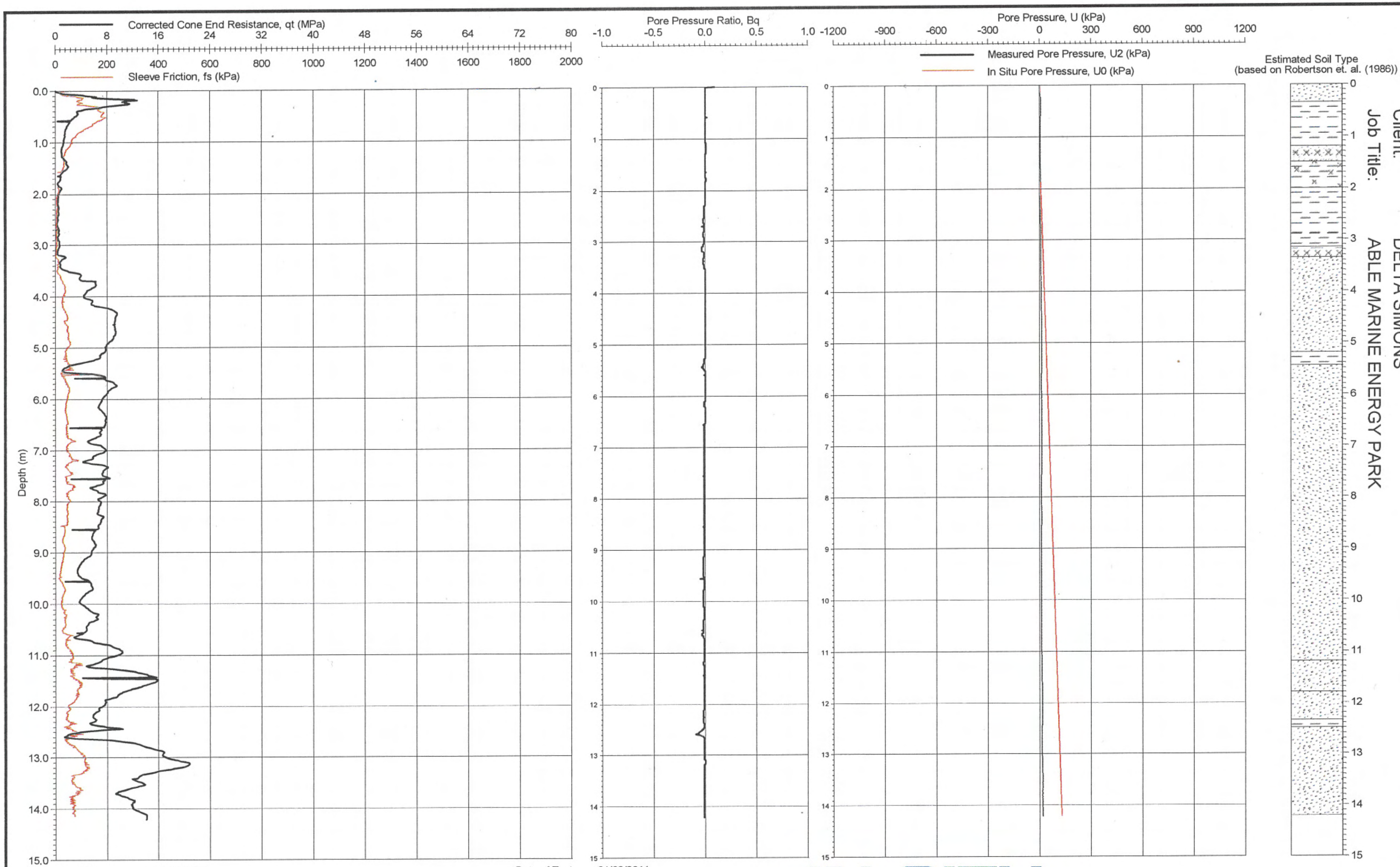
PIEZO CONE PENETRATION TEST

CPT 02

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.C86 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 01/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 03

Checked By:

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nsitusi.com

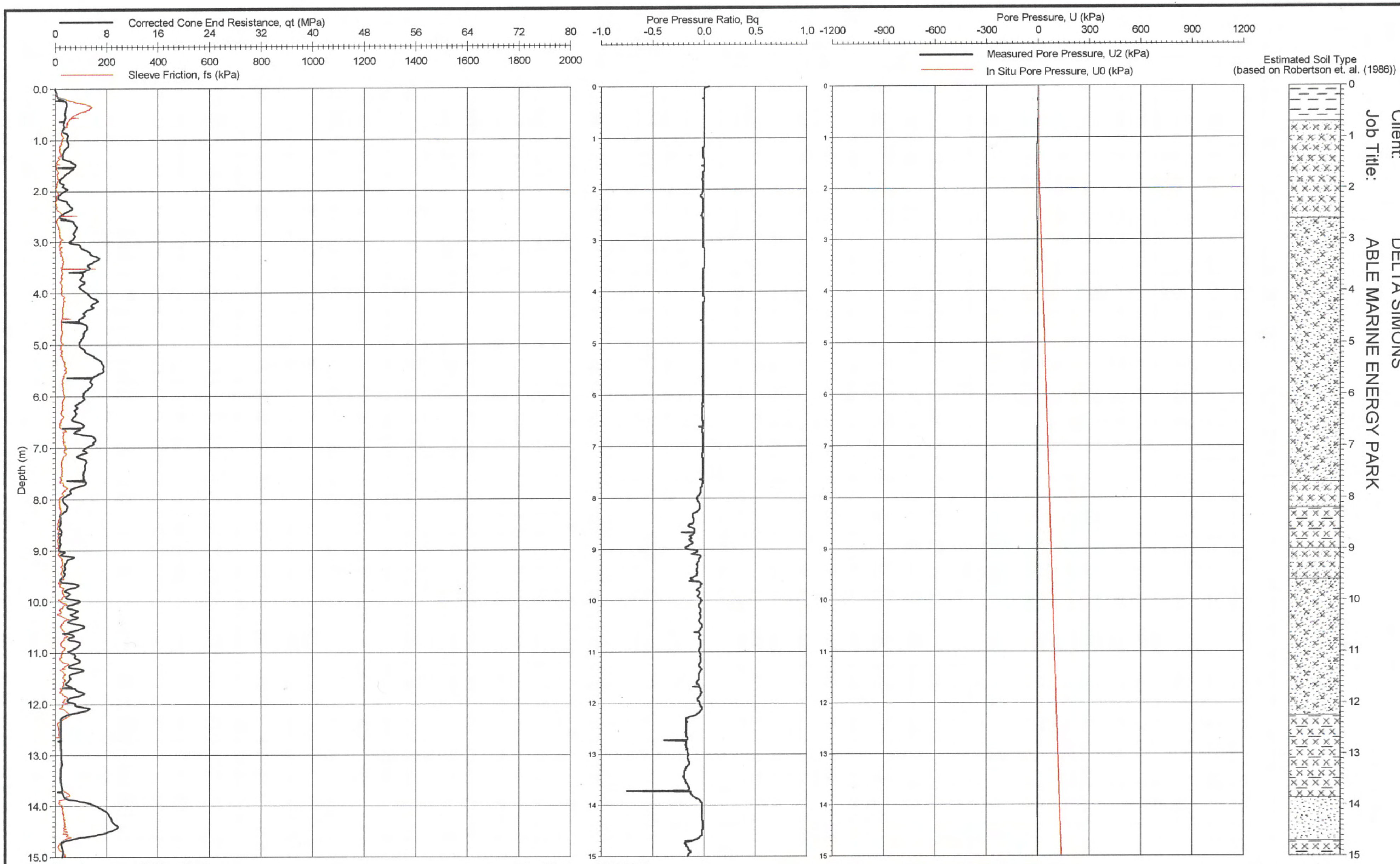
PIEZO CONE PENETRATION TEST

CPT 03

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 04
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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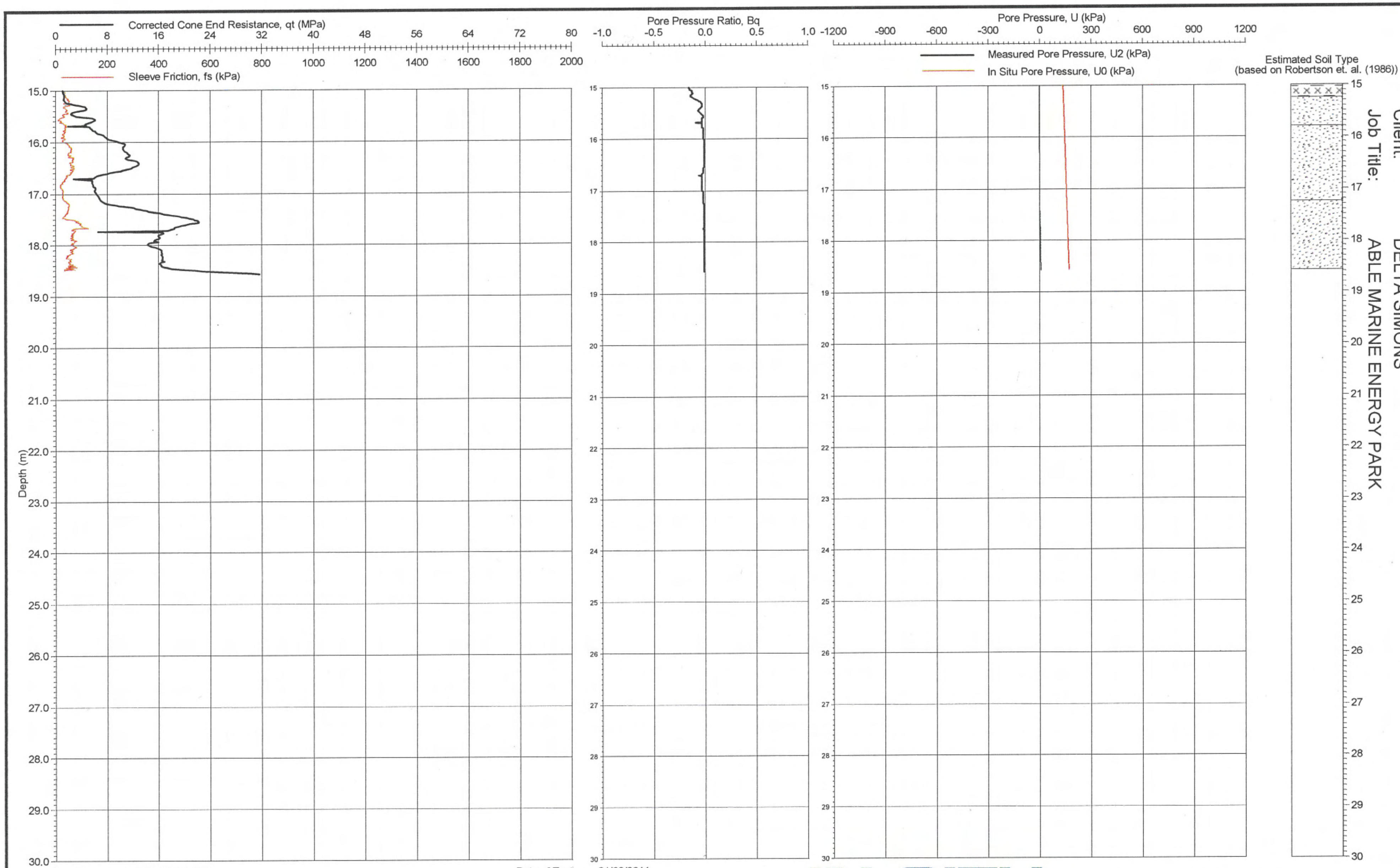
PIEZO CONE PENETRATION TEST

CPT 04

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.C86 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 01/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 04

Checked By:

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PIEZO CONE PENETRATION TEST

CPT 04

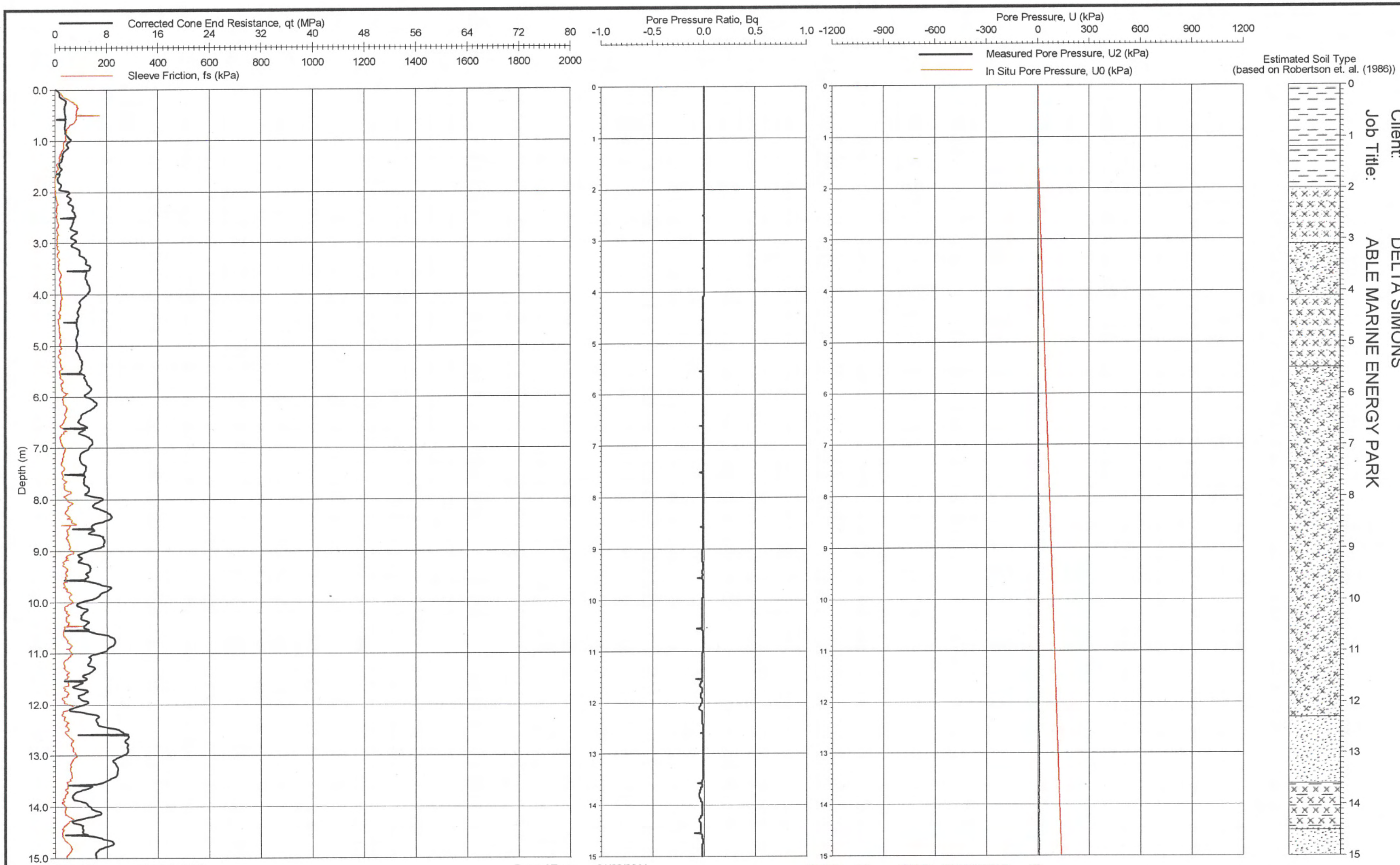
Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

PIEZO CONE PENETRATION TEST

CPT 05



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 05
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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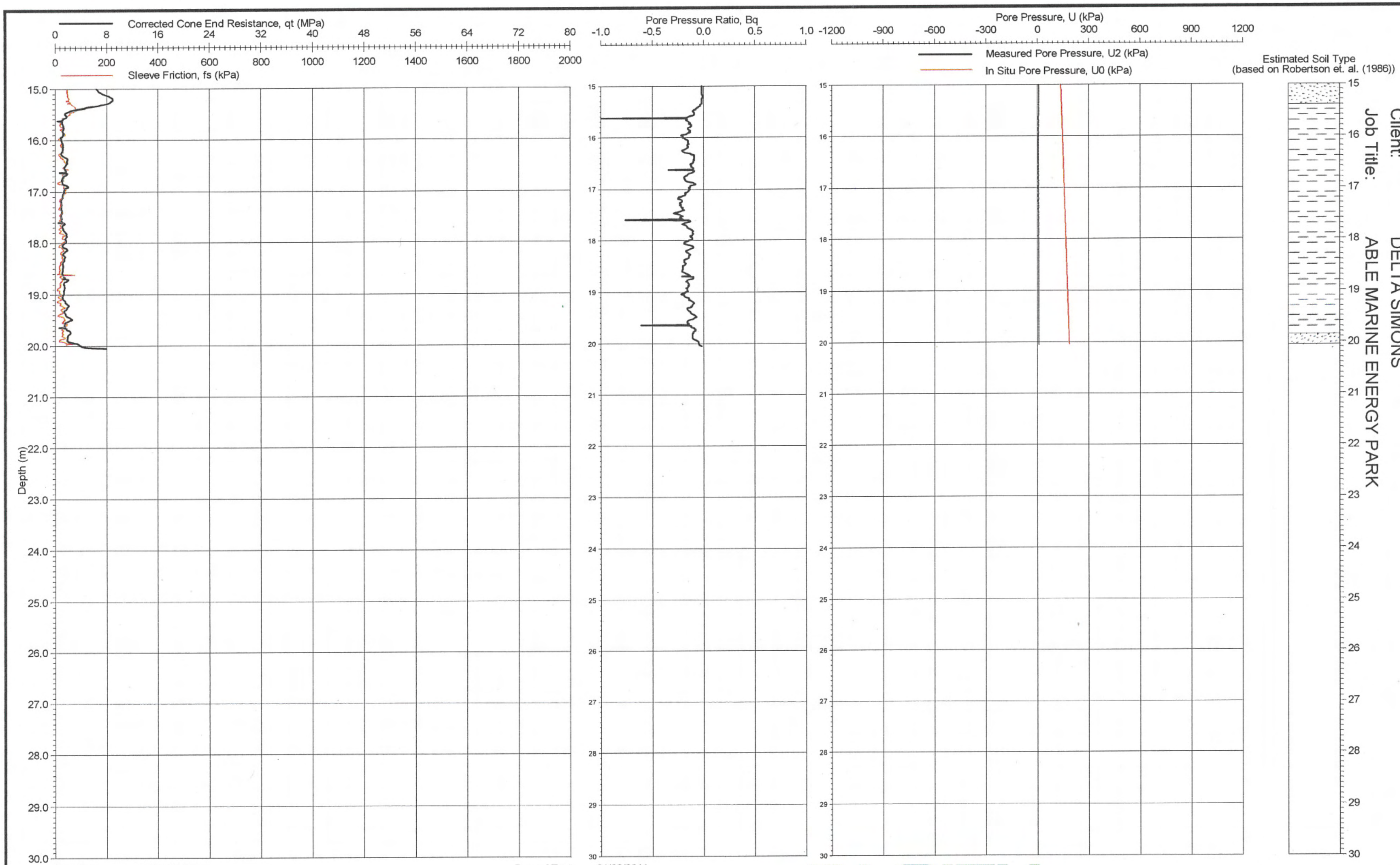
Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

PIEZO CONE PENETRATION TEST

CPT 05



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.D42 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 01/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 05

Checked By:

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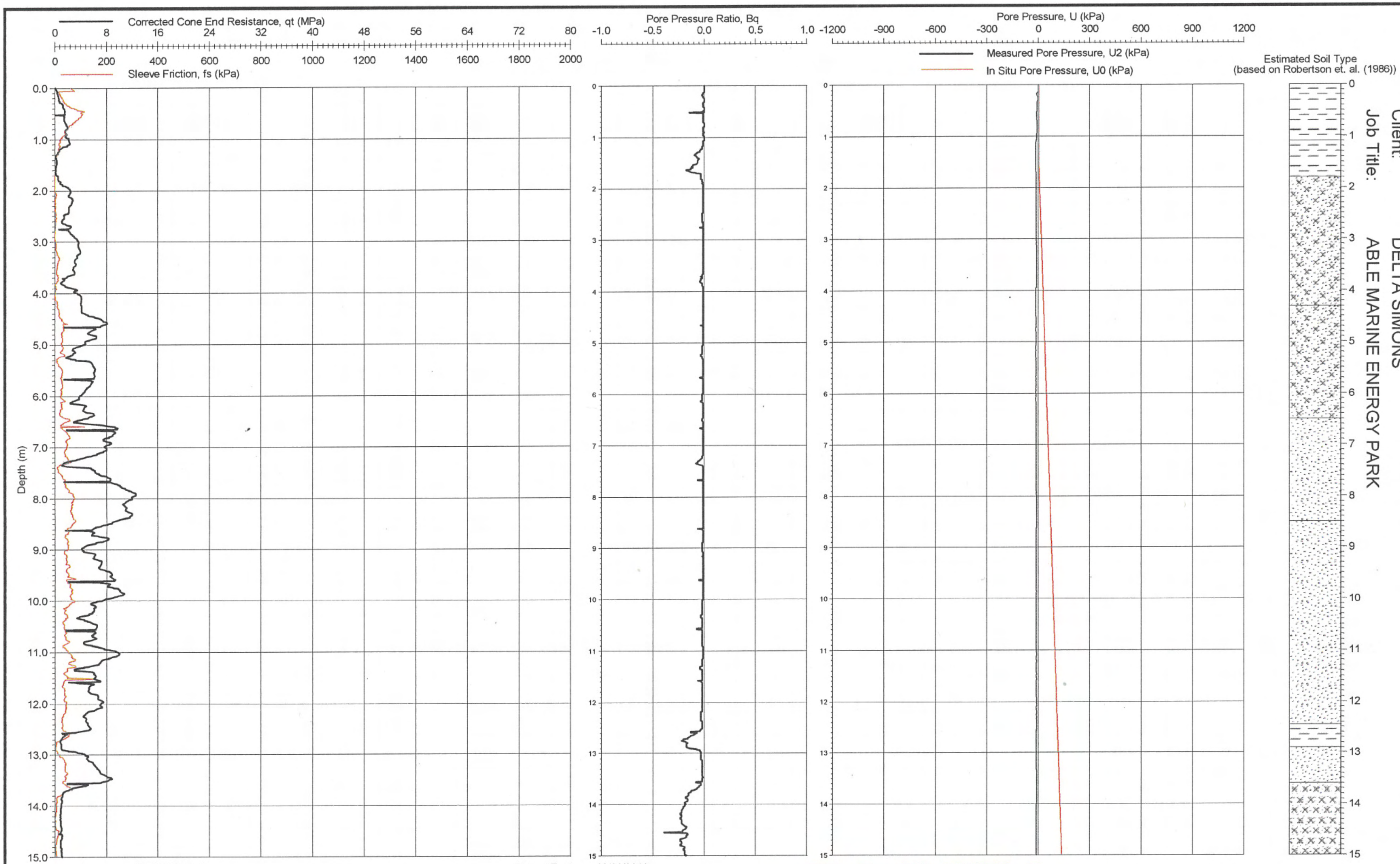
Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.D42 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 03/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 06

Checked By:

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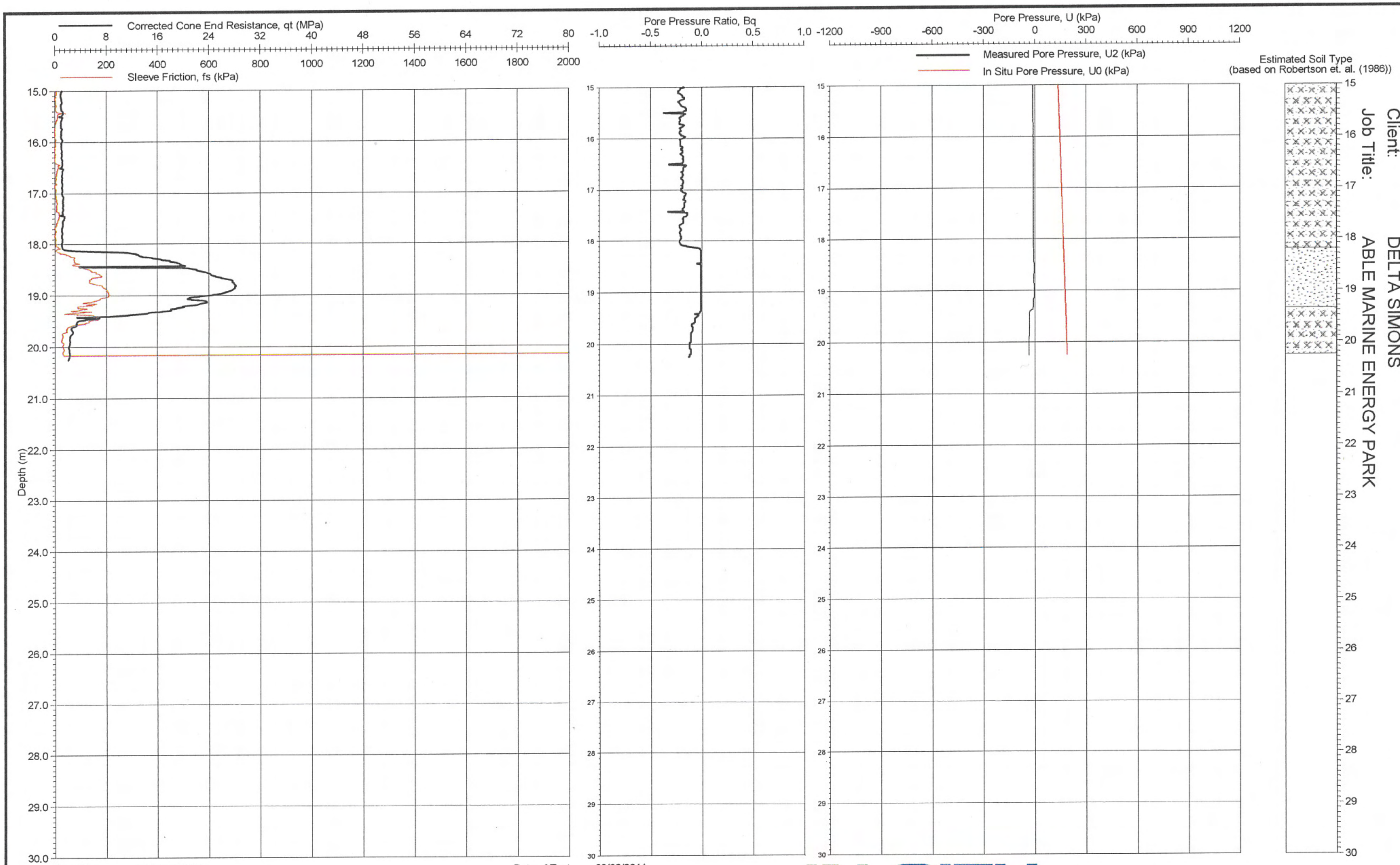
PIEZO CONE PENETRATION TEST

CPT 06

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	03/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 06
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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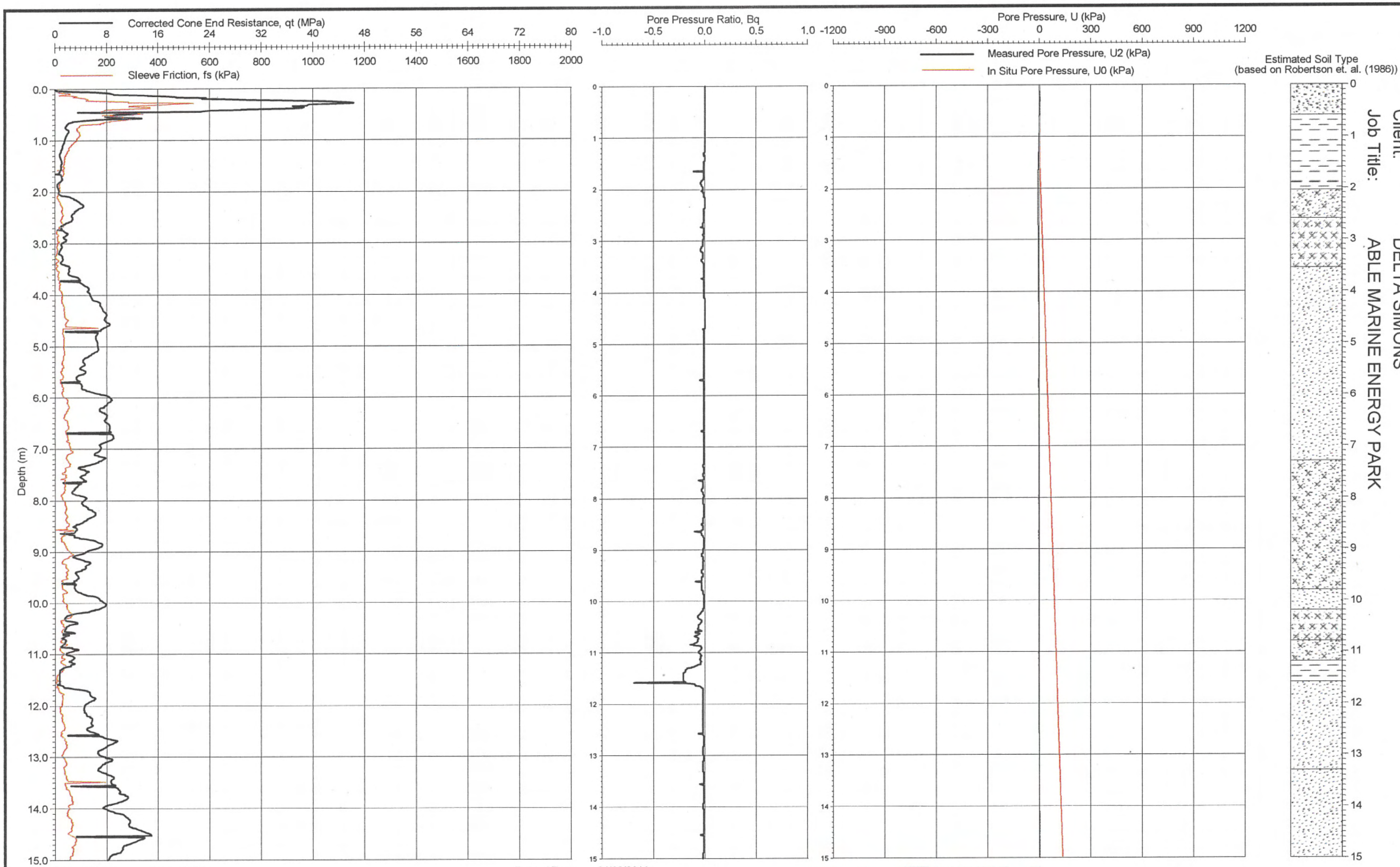
PIEZO CONE PENETRATION TEST
CPT 06

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 07
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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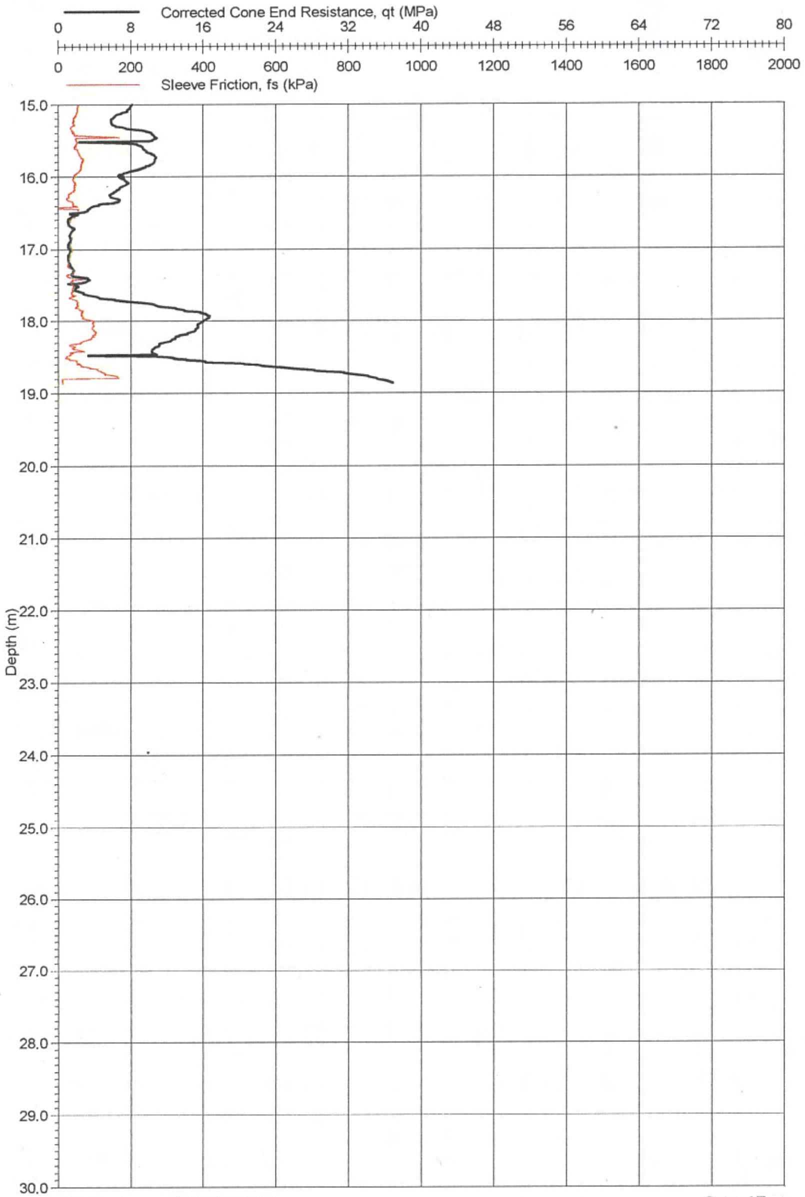
PIEZO CONE PENETRATION TEST

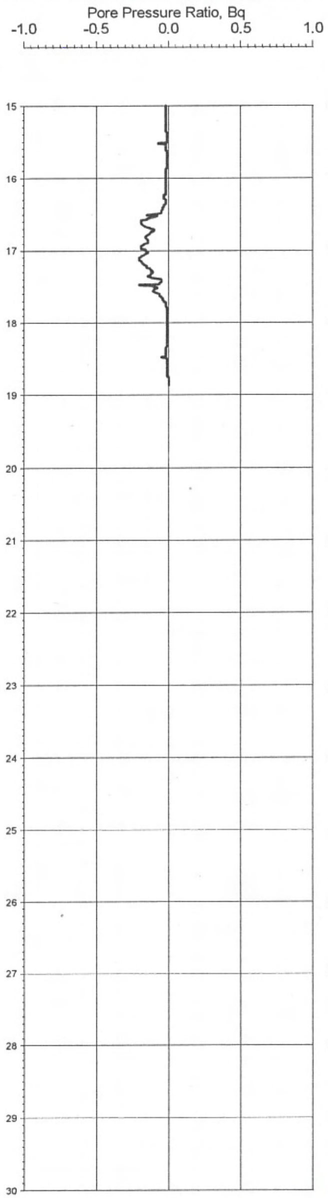
CPT 07

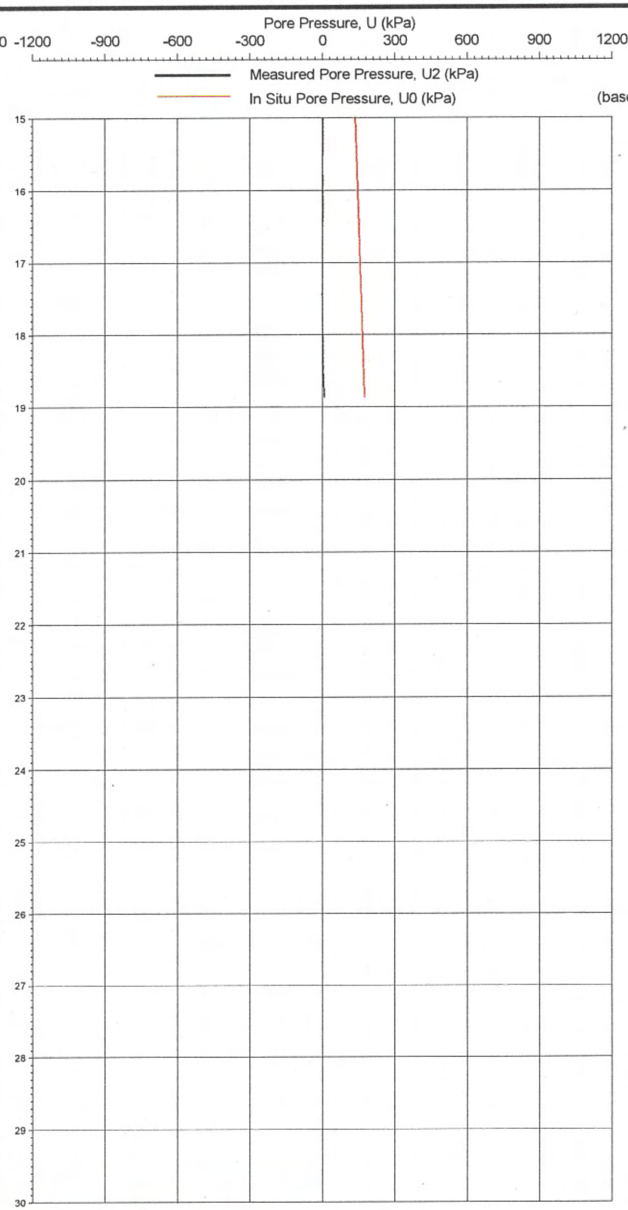
Form: CPT0002

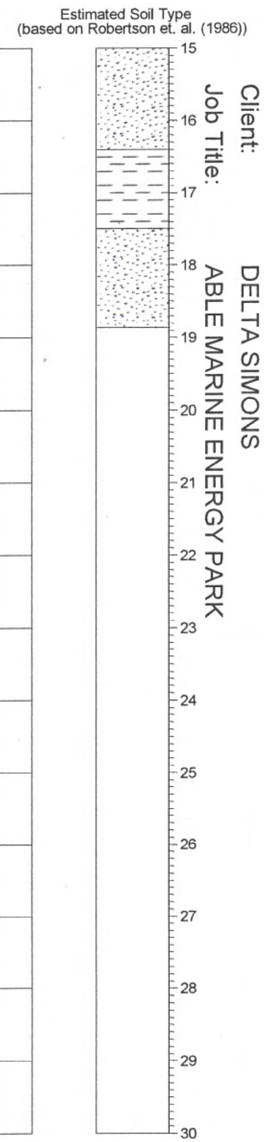
Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK









Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 07
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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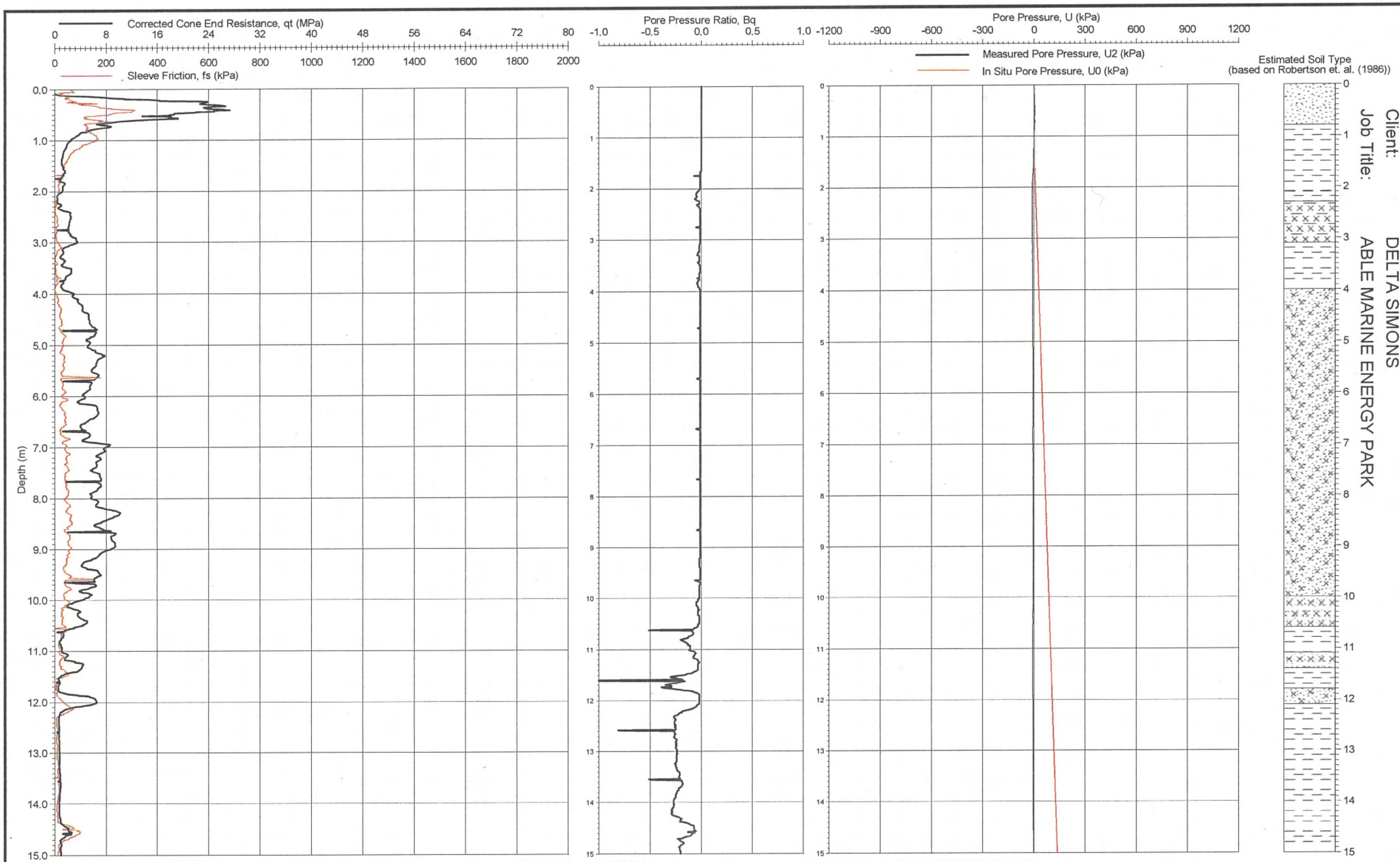
PIEZO CONE PENETRATION TEST

CPT 07

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE
Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.D42 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	04/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 08
Checked By:	

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nsitusi.com

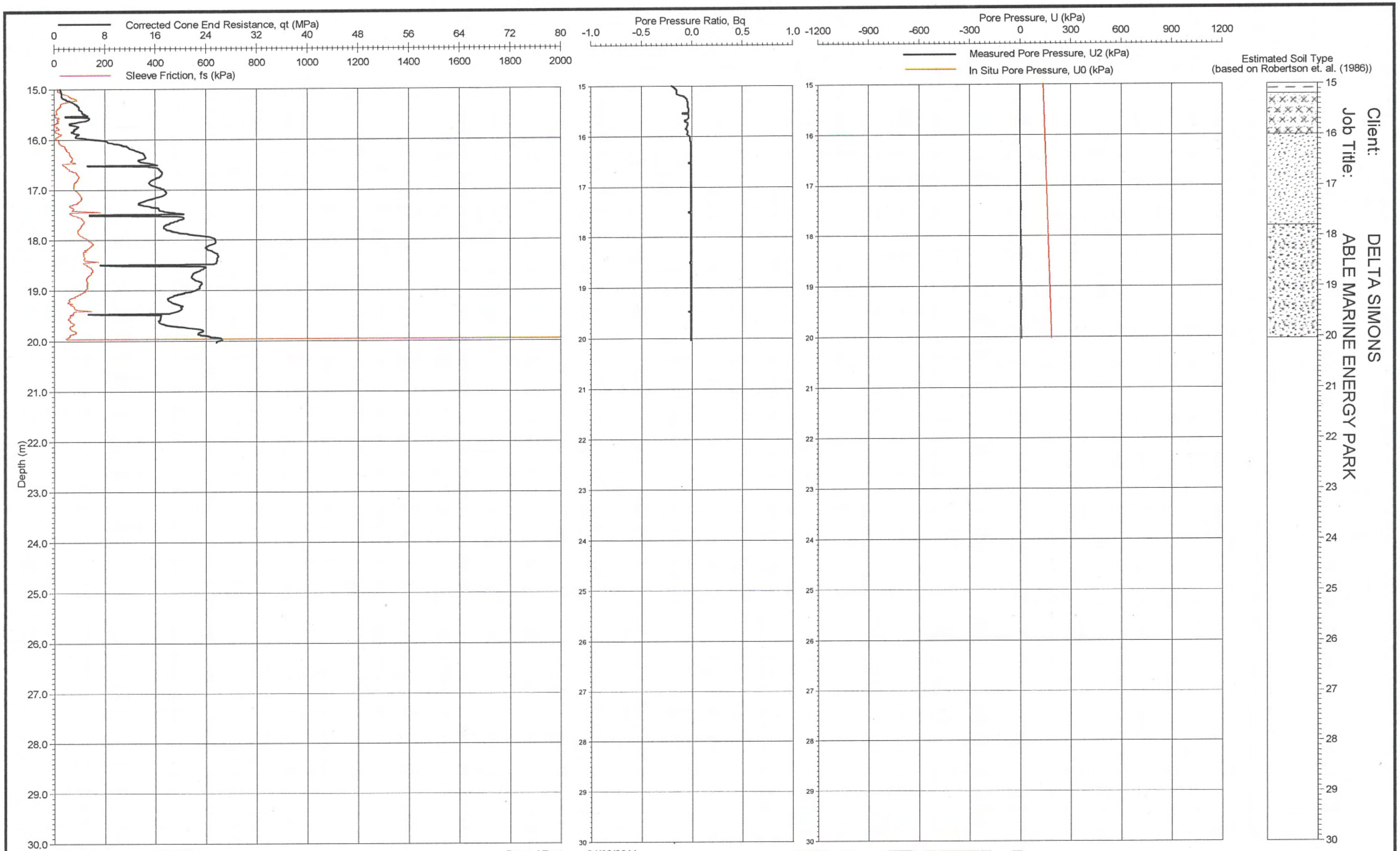
PIEZO CONE PENETRATION TEST

CPT 08

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 08
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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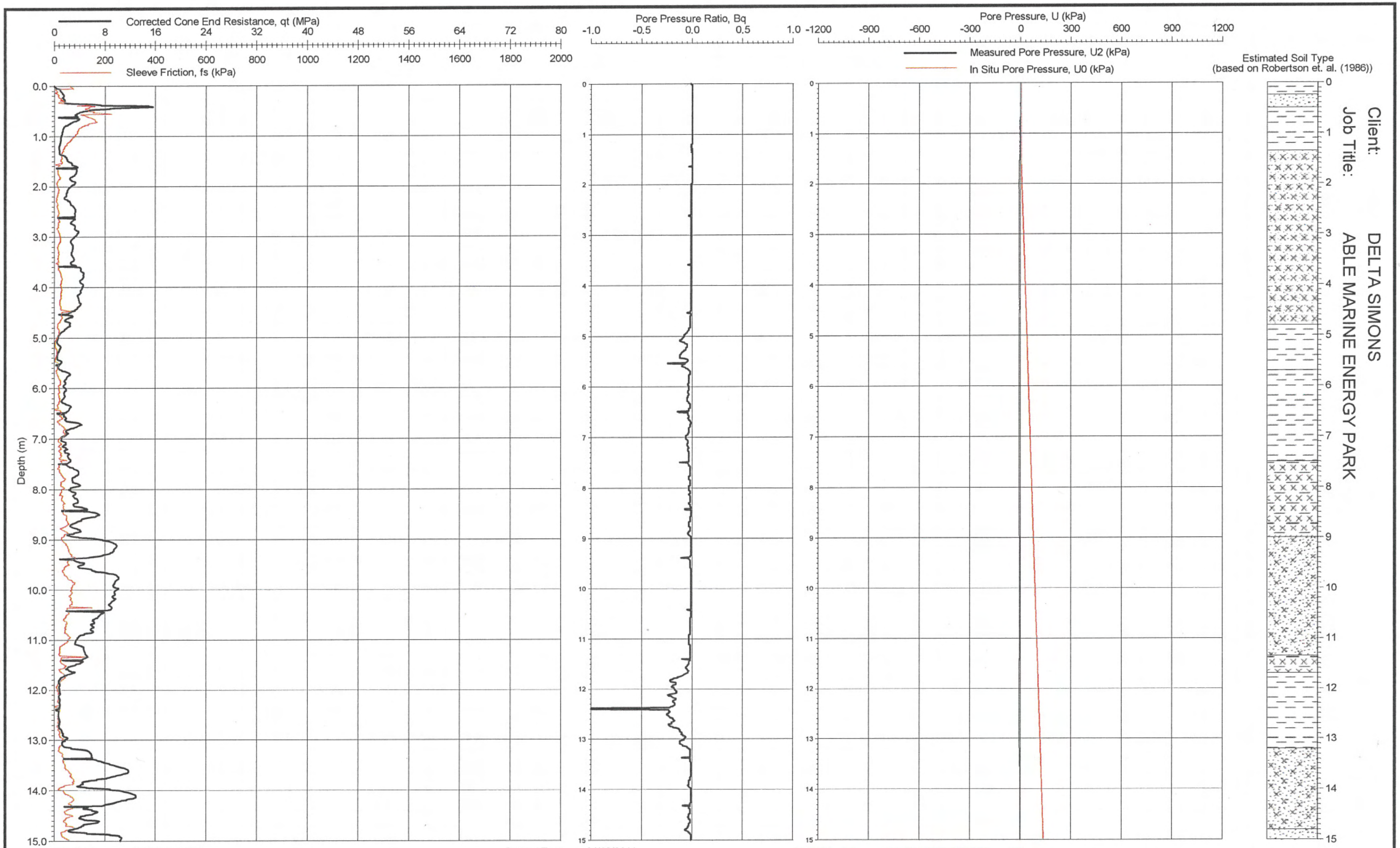
PIEZO CONE PENETRATION TEST

CPT 08

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.D42 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 04/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 09

Checked By:

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nsitusi.com

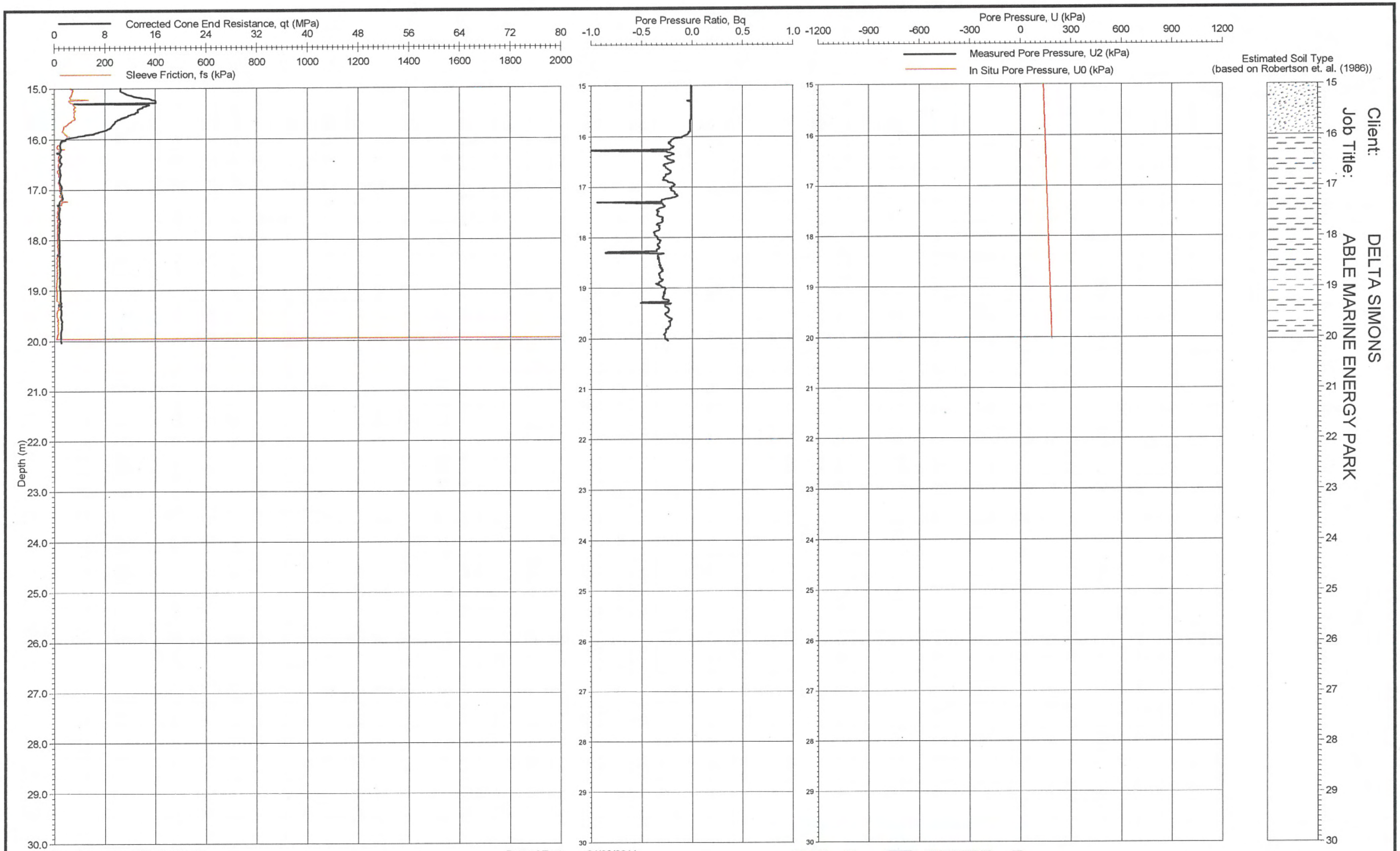
PIEZO CONE PENETRATION TEST

CPT 09

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 09
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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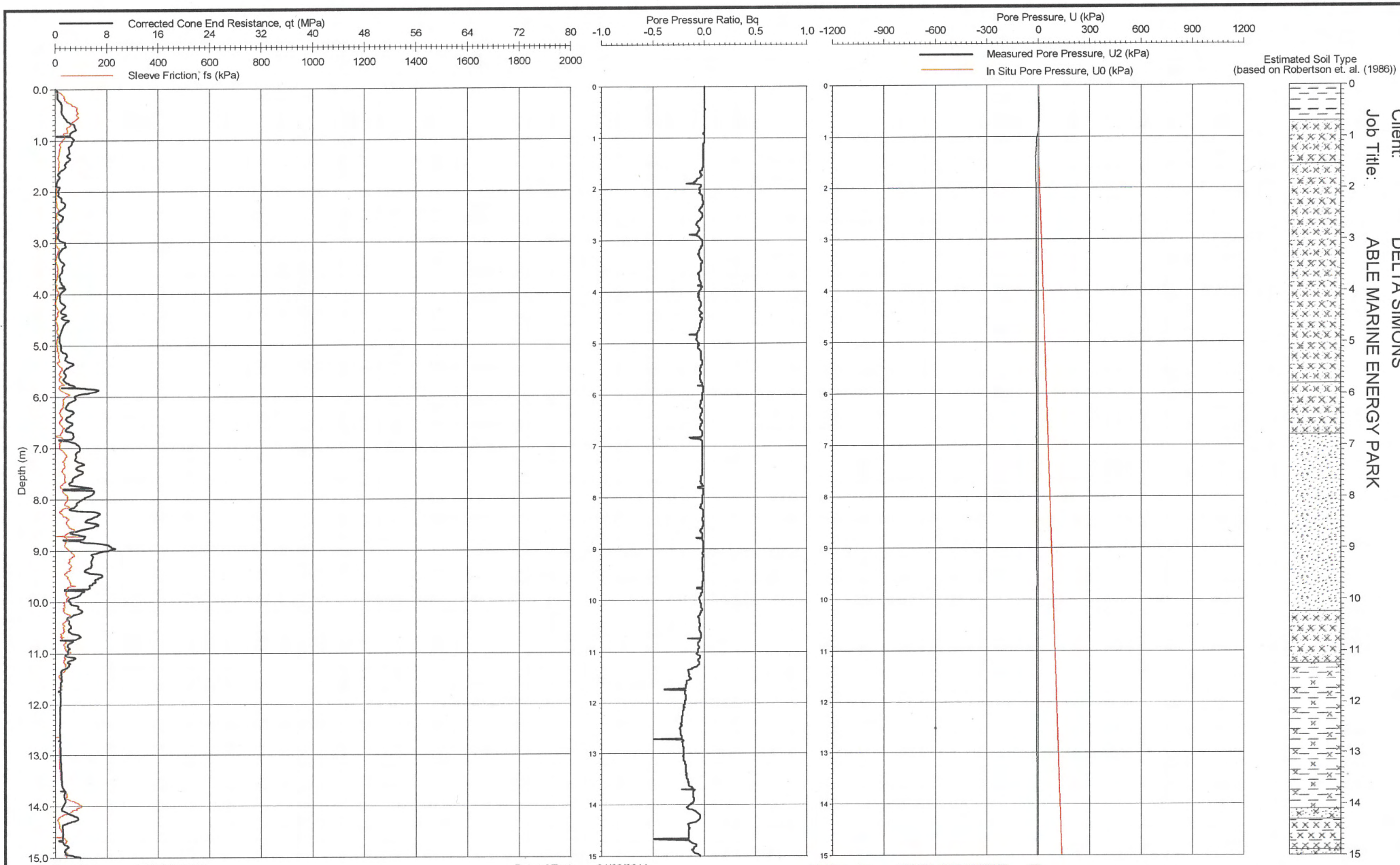
PIEZO CONE PENETRATION TEST
CPT 09

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 10
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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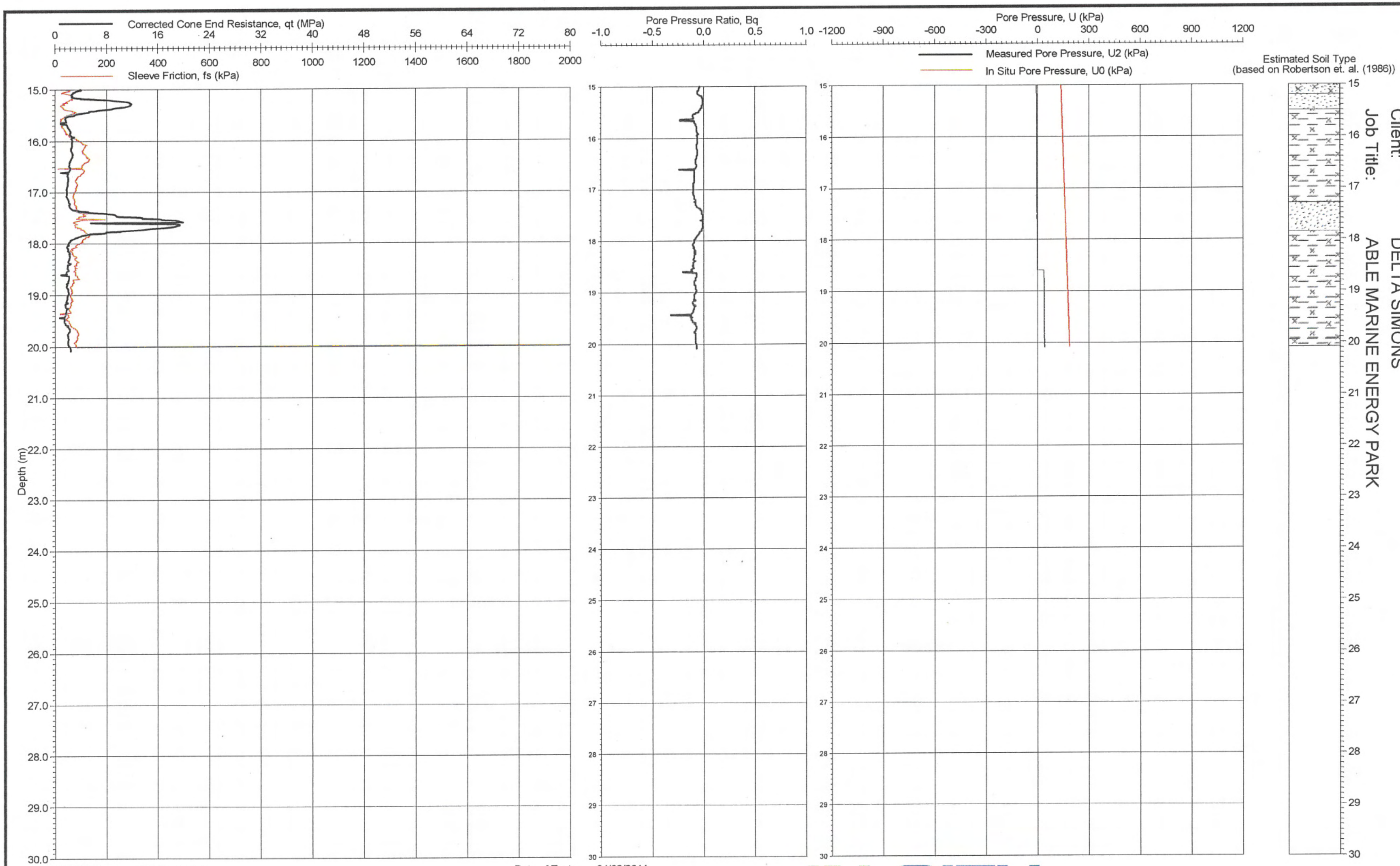
PIEZO CONE PENETRATION TEST

CPT 10

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.D42 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 04/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 10

Checked By:

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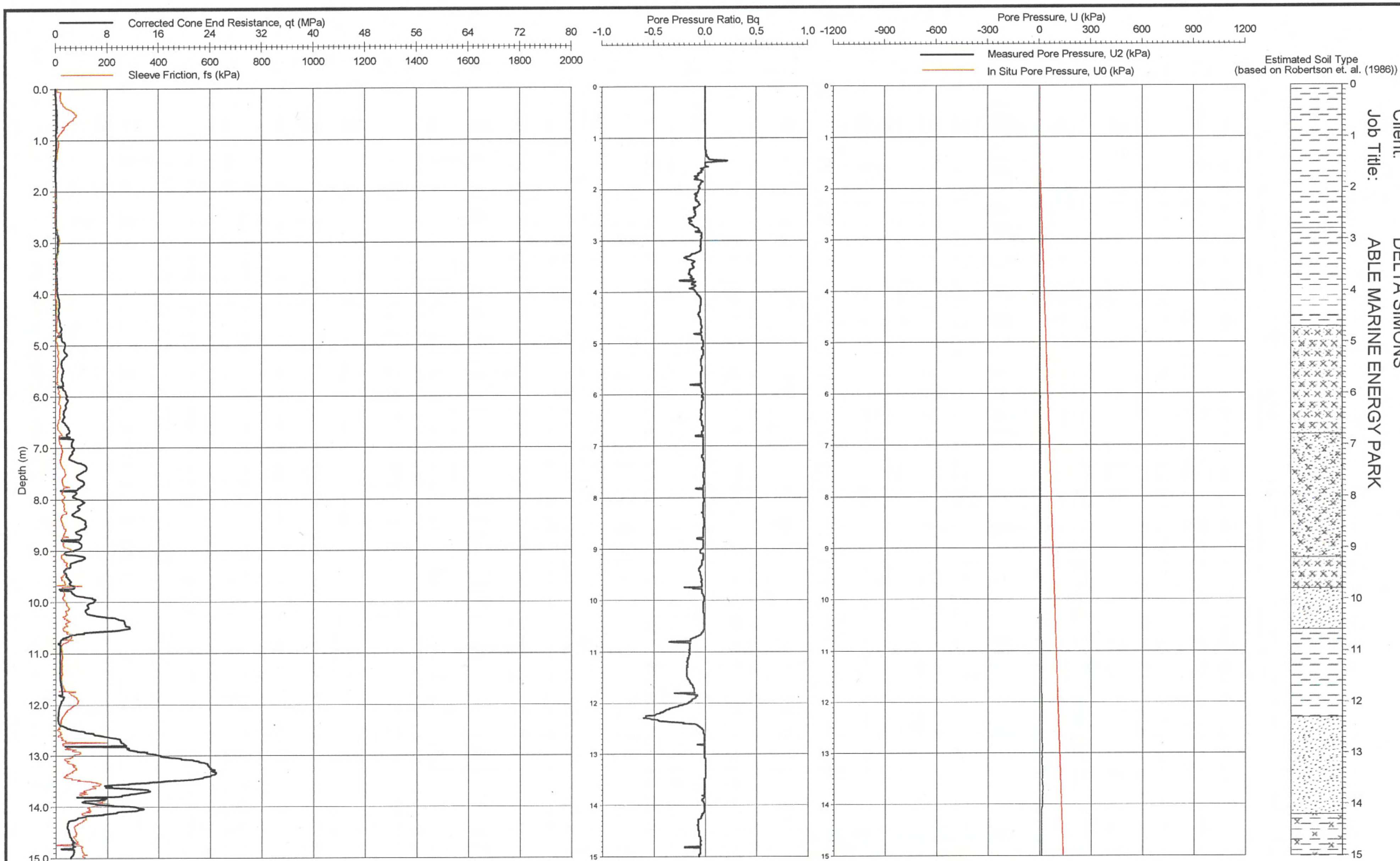
PIEZO CONE PENETRATION TEST

CPT 10

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 11
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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nsitusi.com

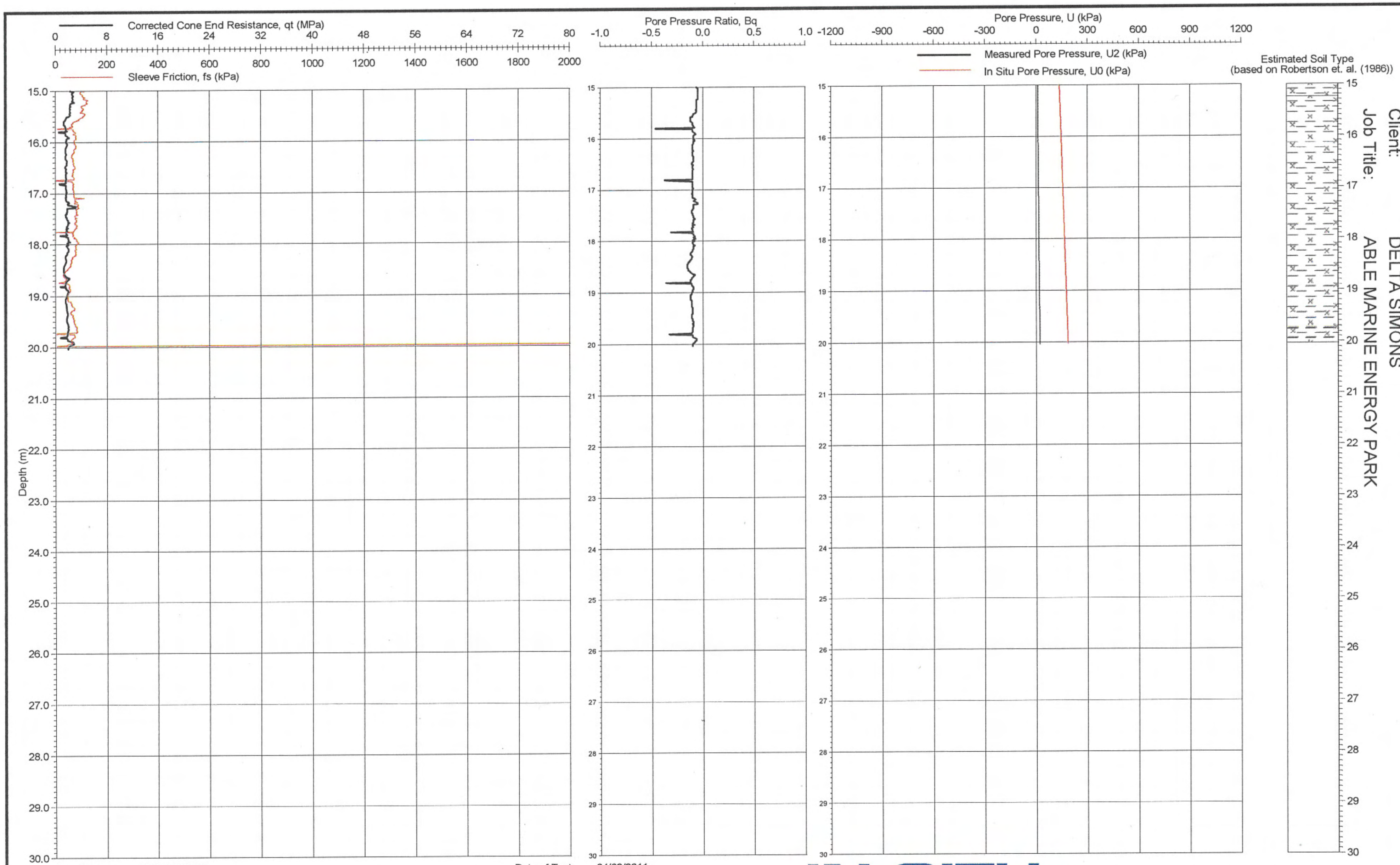
PIEZO CONE PENETRATION TEST

CPT 11

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.D42 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 04/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 11

Checked By:

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nsitusi.com

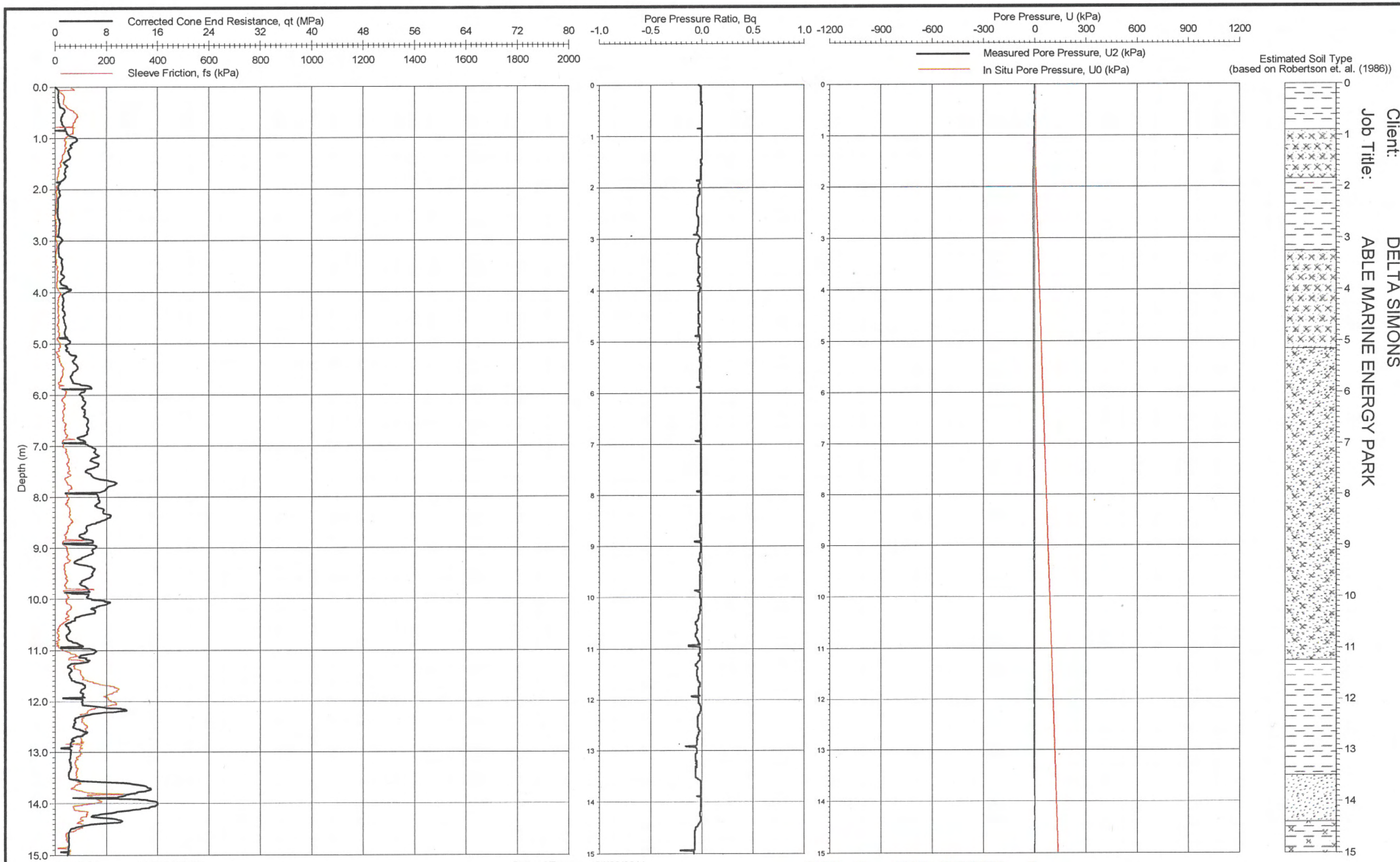
PIEZO CONE PENETRATION TEST

CPT 11

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 12
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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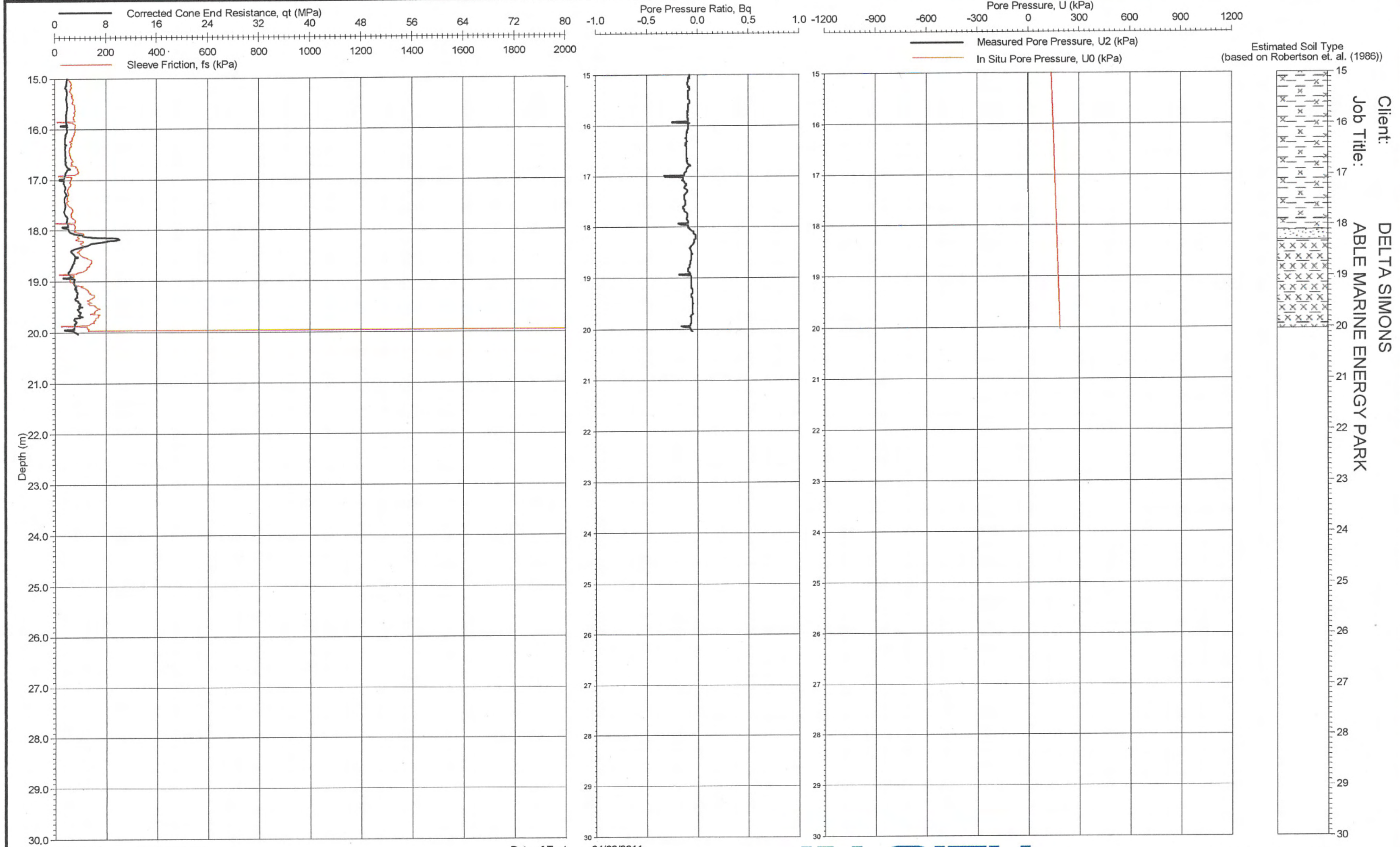
PIEZO CONE PENETRATION TEST

CPT 12

Form: CPT0002

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 12
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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PIEZO CONE PENETRATION TEST

CPT 12

Form: CPT0002

Annex G: CPT Results in Graphical Format

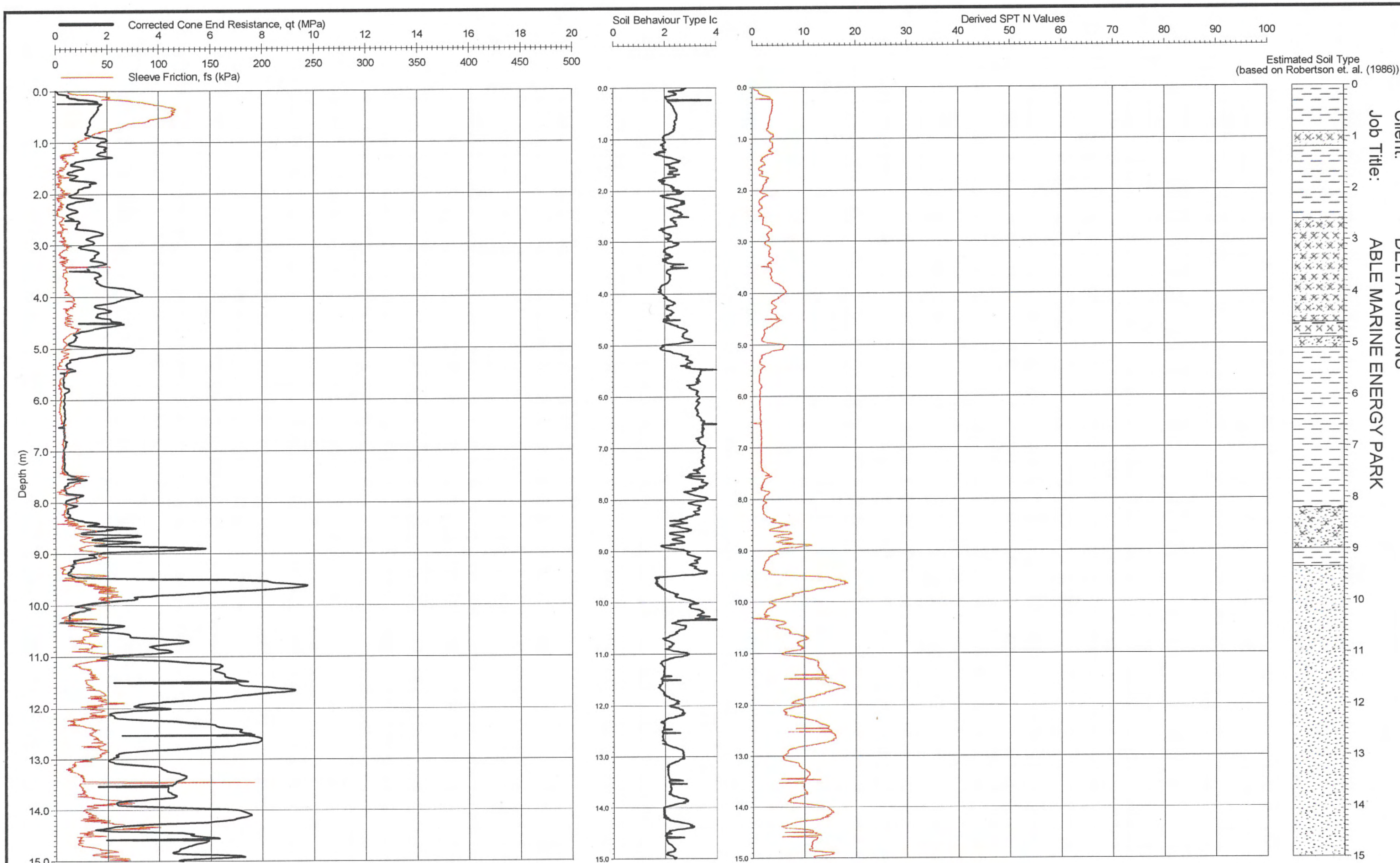
- Corrected Cone End Resistance, qt (MPa)
- Sleeve Friction, fs (kPa)
- Soil Behaviour Type, Ic
- Derived SPT N values

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

PIEZO CONE PENETRATION TEST

CPT 01



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.C86 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 01/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 01

Checked By:

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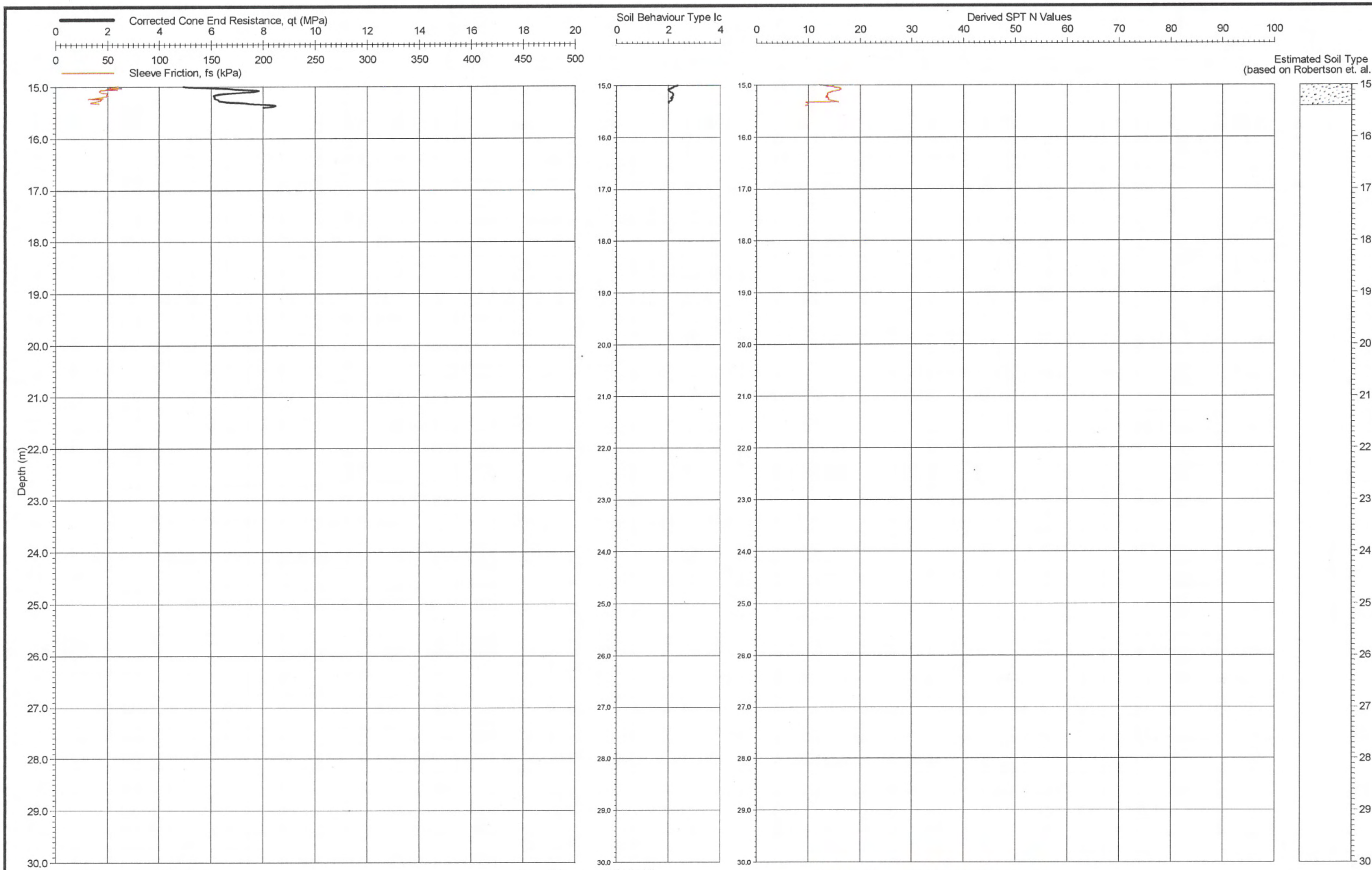
insitusi.com

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 01
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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insitusi.com

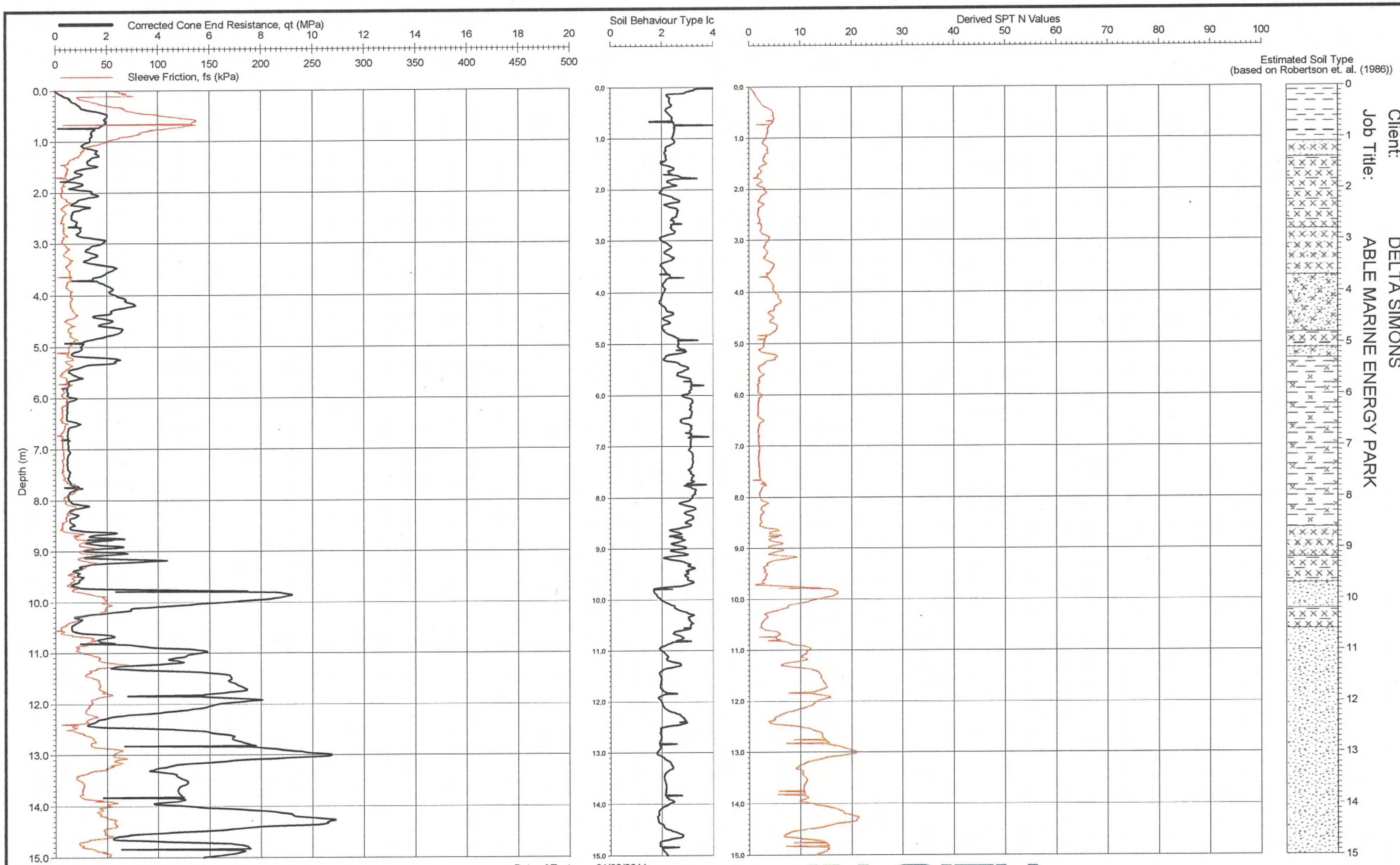
PIEZO CONE PENETRATION TEST

CPT 01

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 01A
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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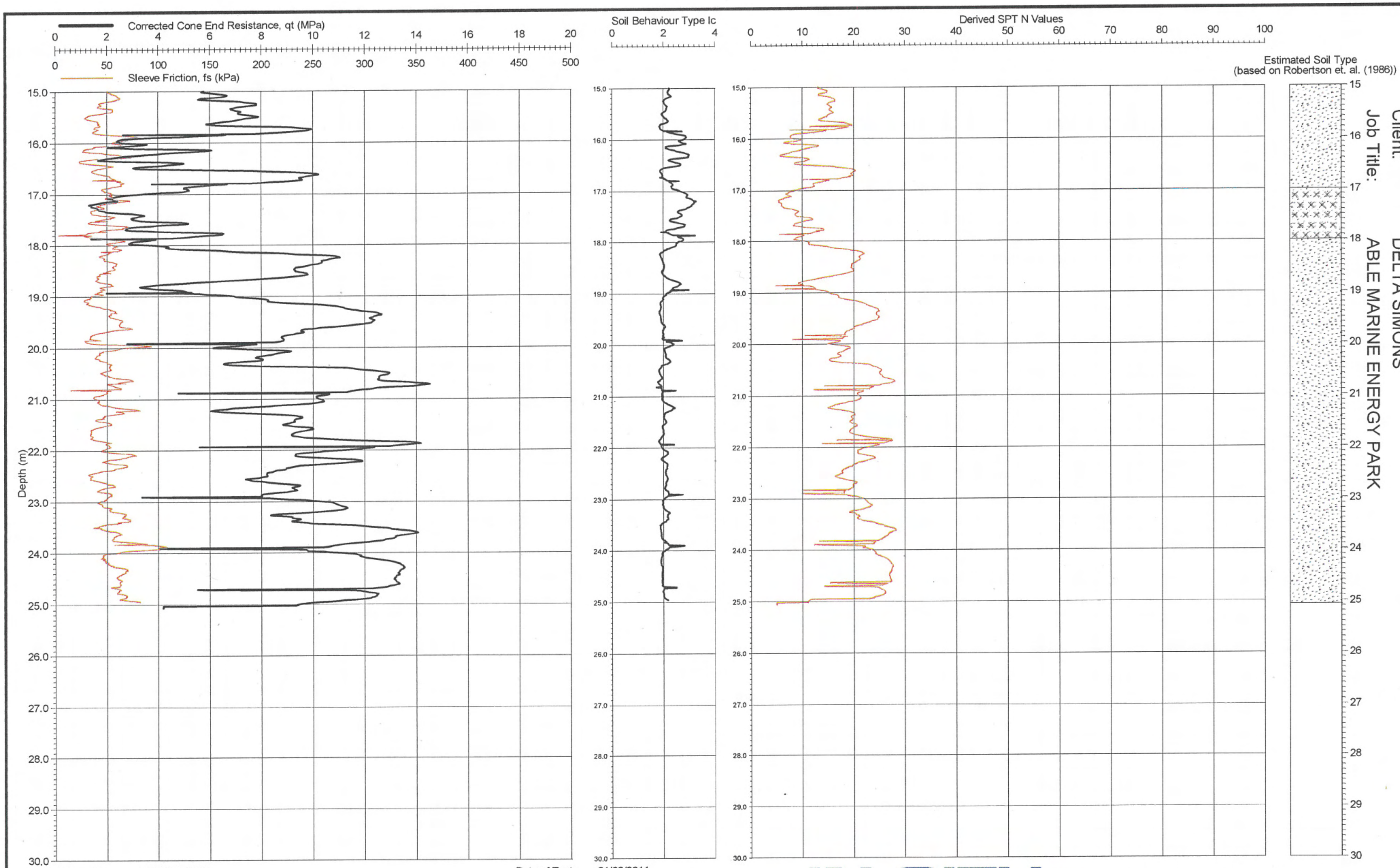
PIEZO CONE PENETRATION TEST

CPT 01A

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 01A
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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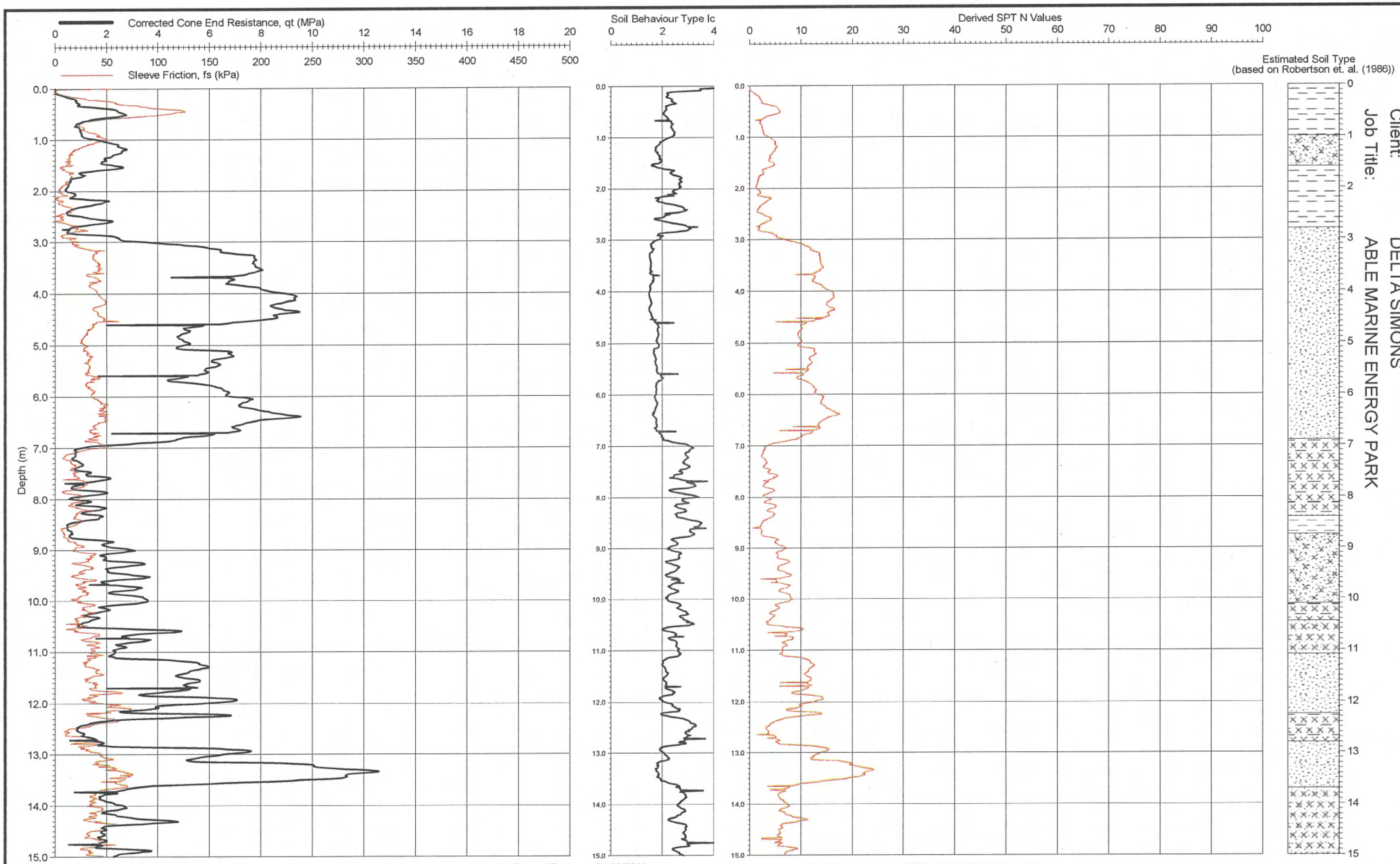
PIEZO CONE PENETRATION TEST

CPT 01A

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



PIEZO CONE PENETRATION TEST
CPT 02

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Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.C86 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 01/02/2011

Date of Plot: 14/02/2011

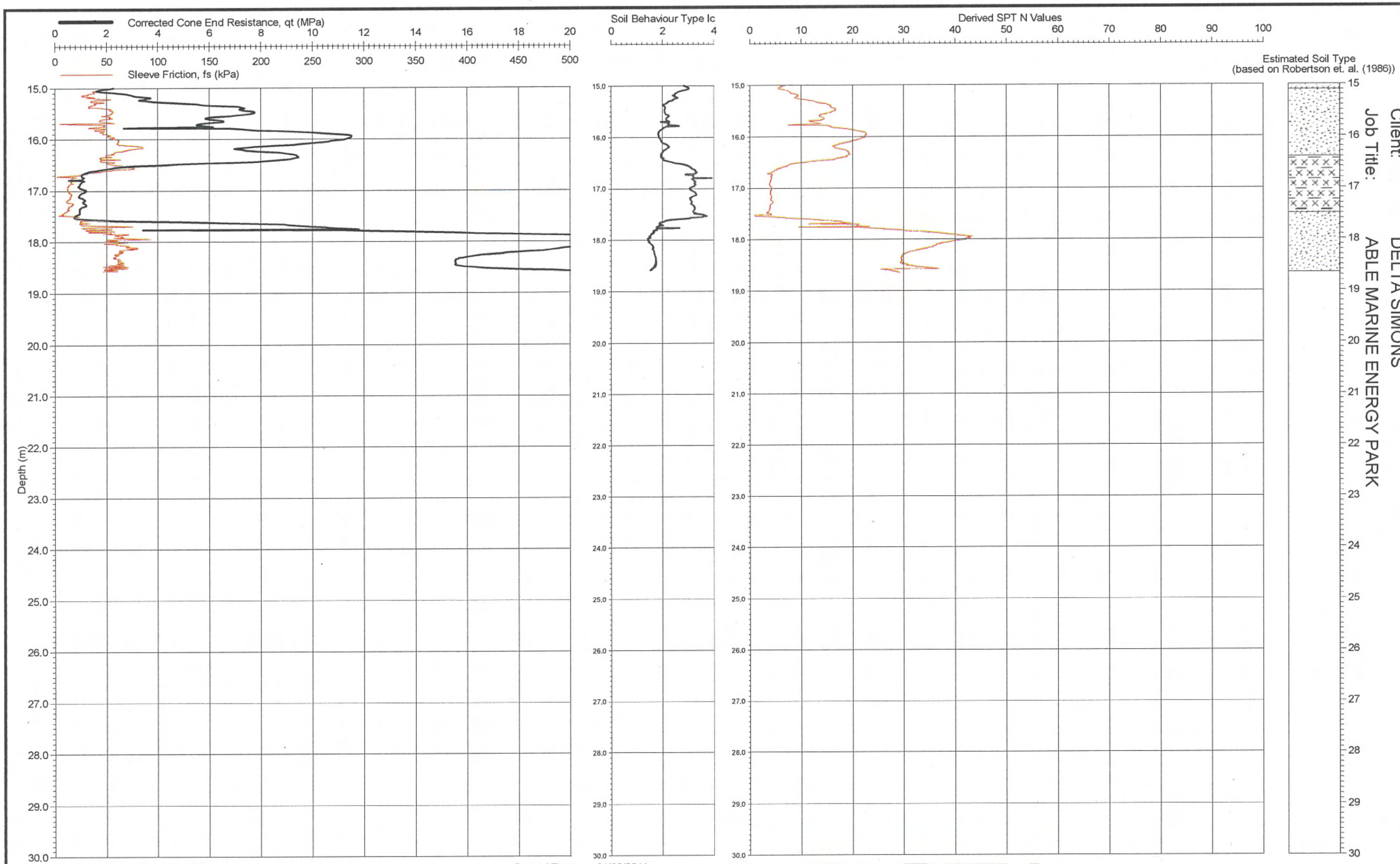
File Name: 1110107 - CPT 02

Checked By:

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 02
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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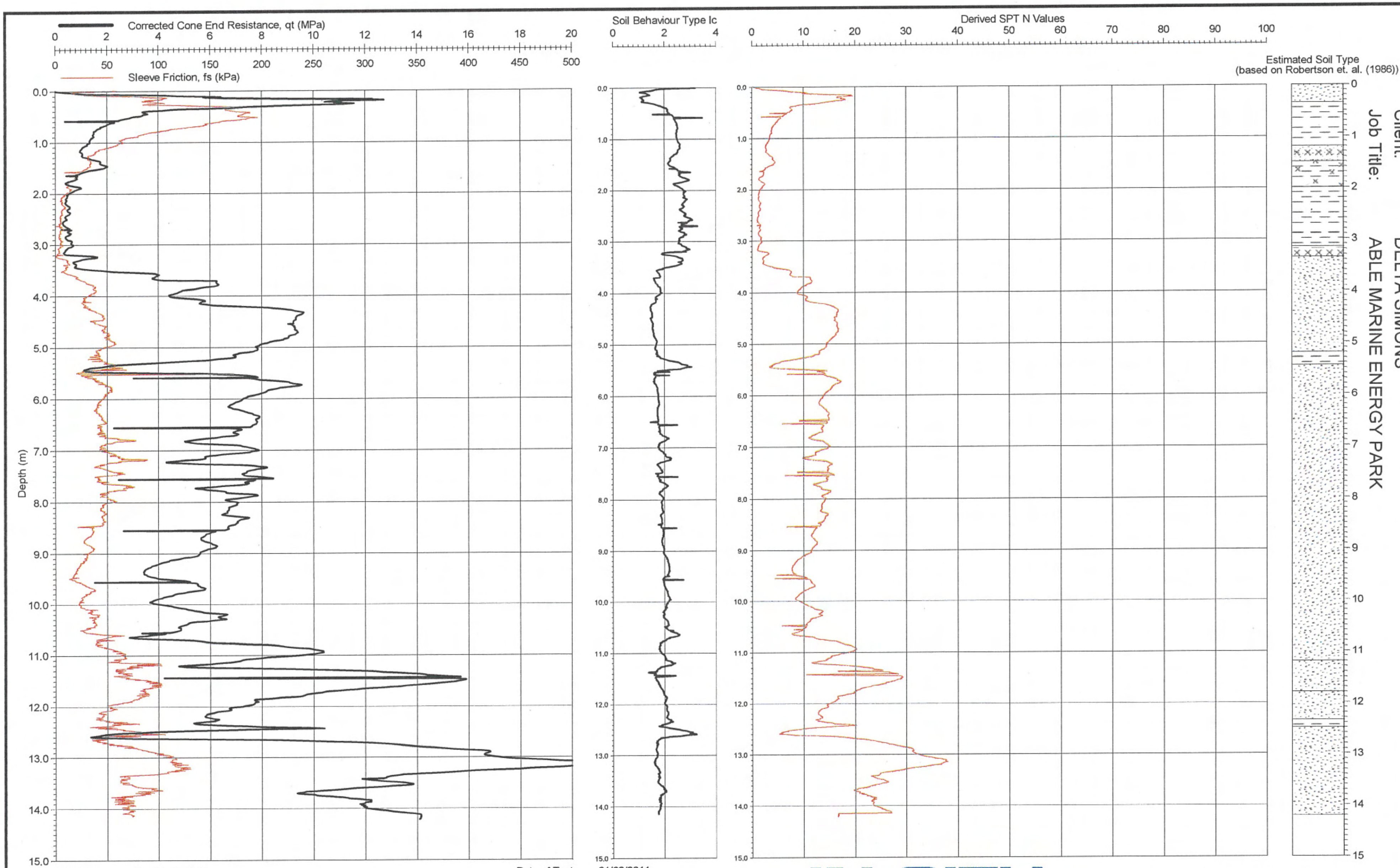
PIEZO CONE PENETRATION TEST
CPT 02

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE
Coordinates:	-
Ground Level:	-
Cone & Rig Used:	S15CFIIP.C86 - CPT 04
Remarks:	Test refused on total pressure.

Date of Test:	01/02/2011
Date of Plot:	14/02/2011
File Name:	1110107 - CPT 03
Checked By:	

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insitusi.com

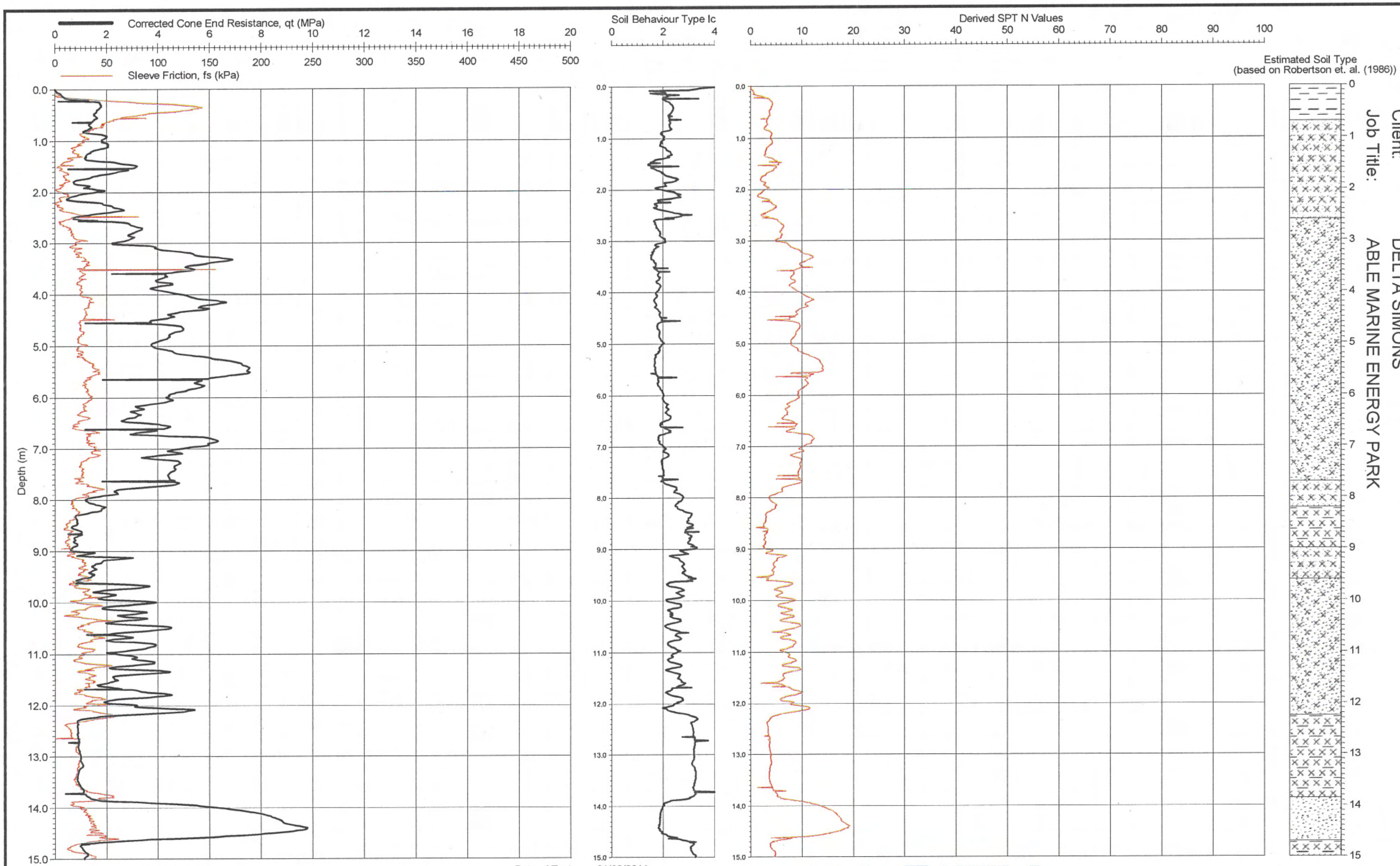
PIEZO CONE PENETRATION TEST

CPT 03

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 04
Cone & Rig Used:	S15CFIIP.C86 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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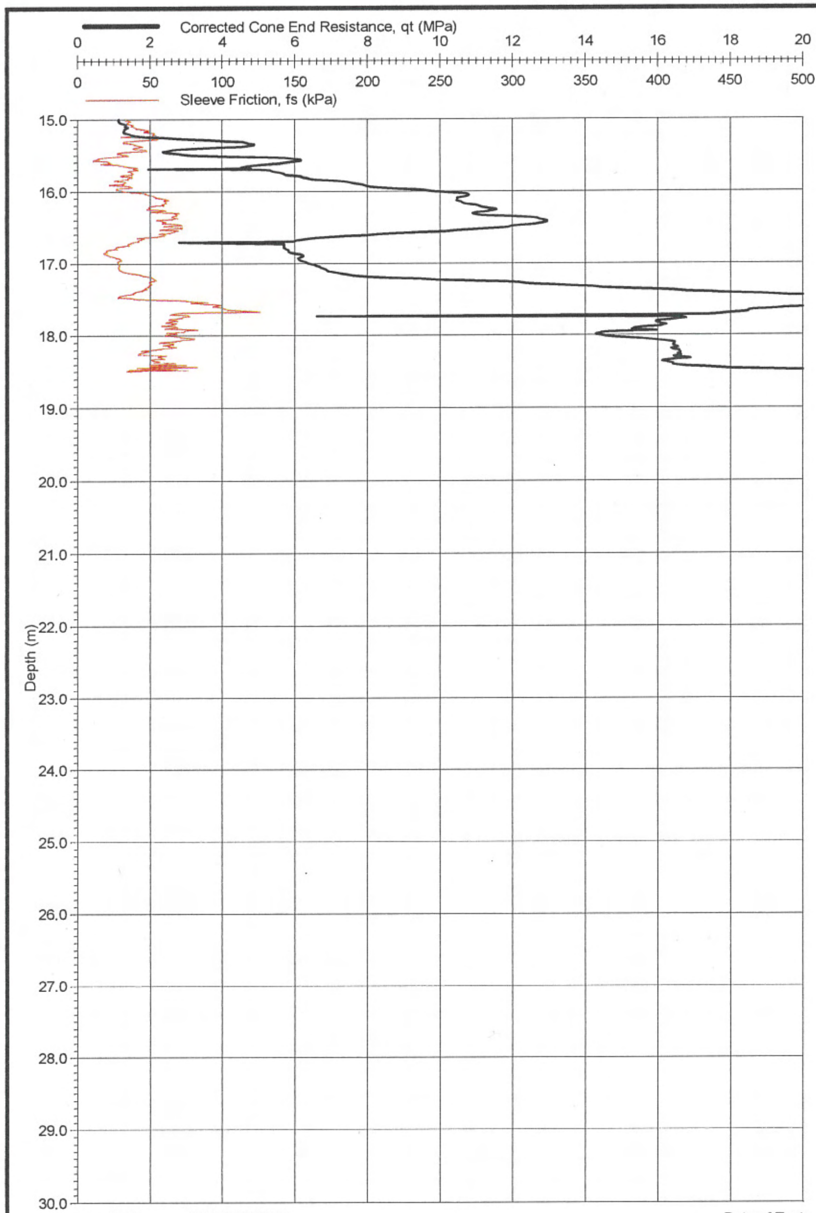
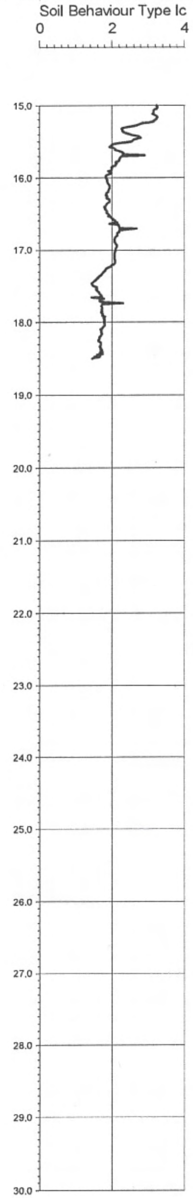
PIEZO CONE PENETRATION TEST
CPT 04

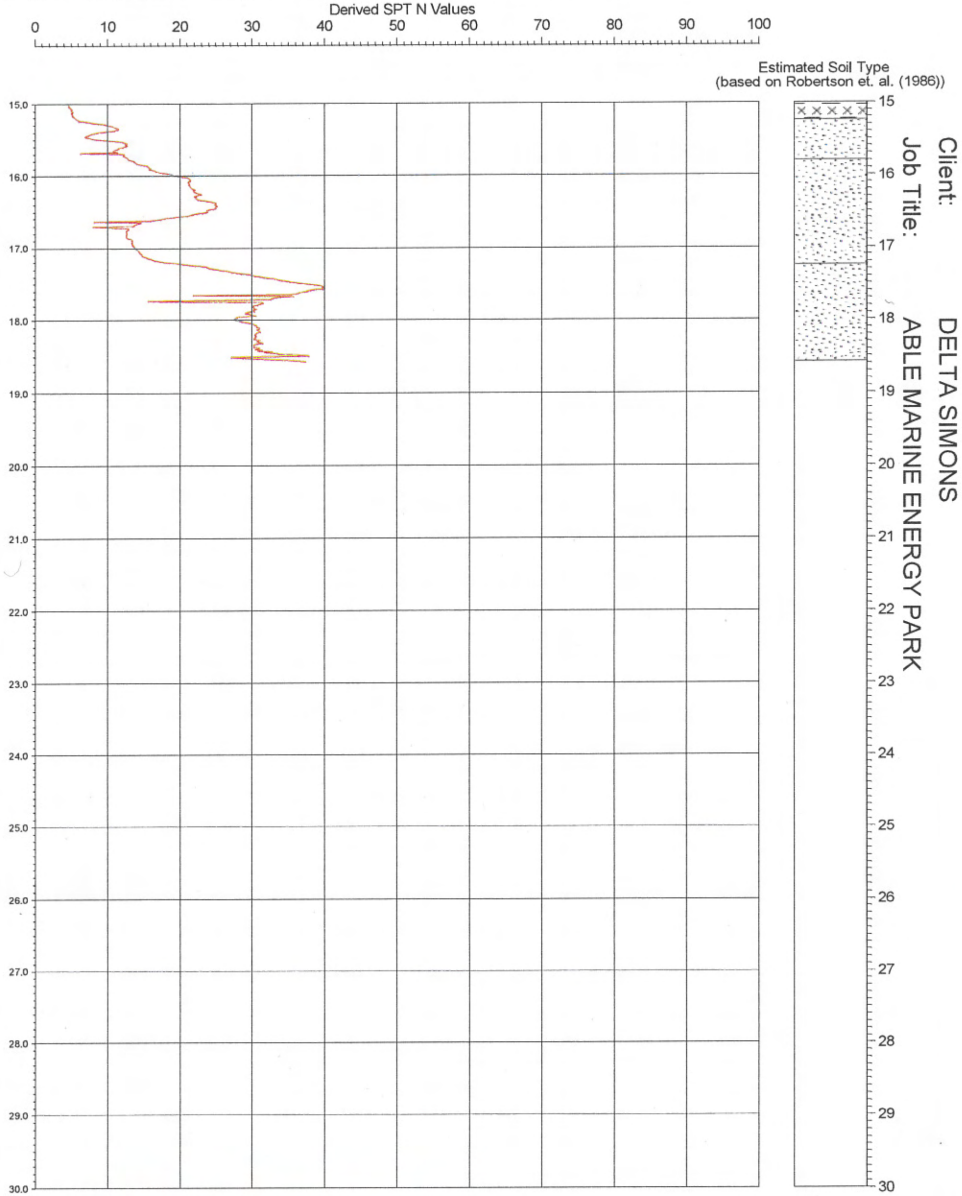
Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK







Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.C86 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 01/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 04

Checked By:

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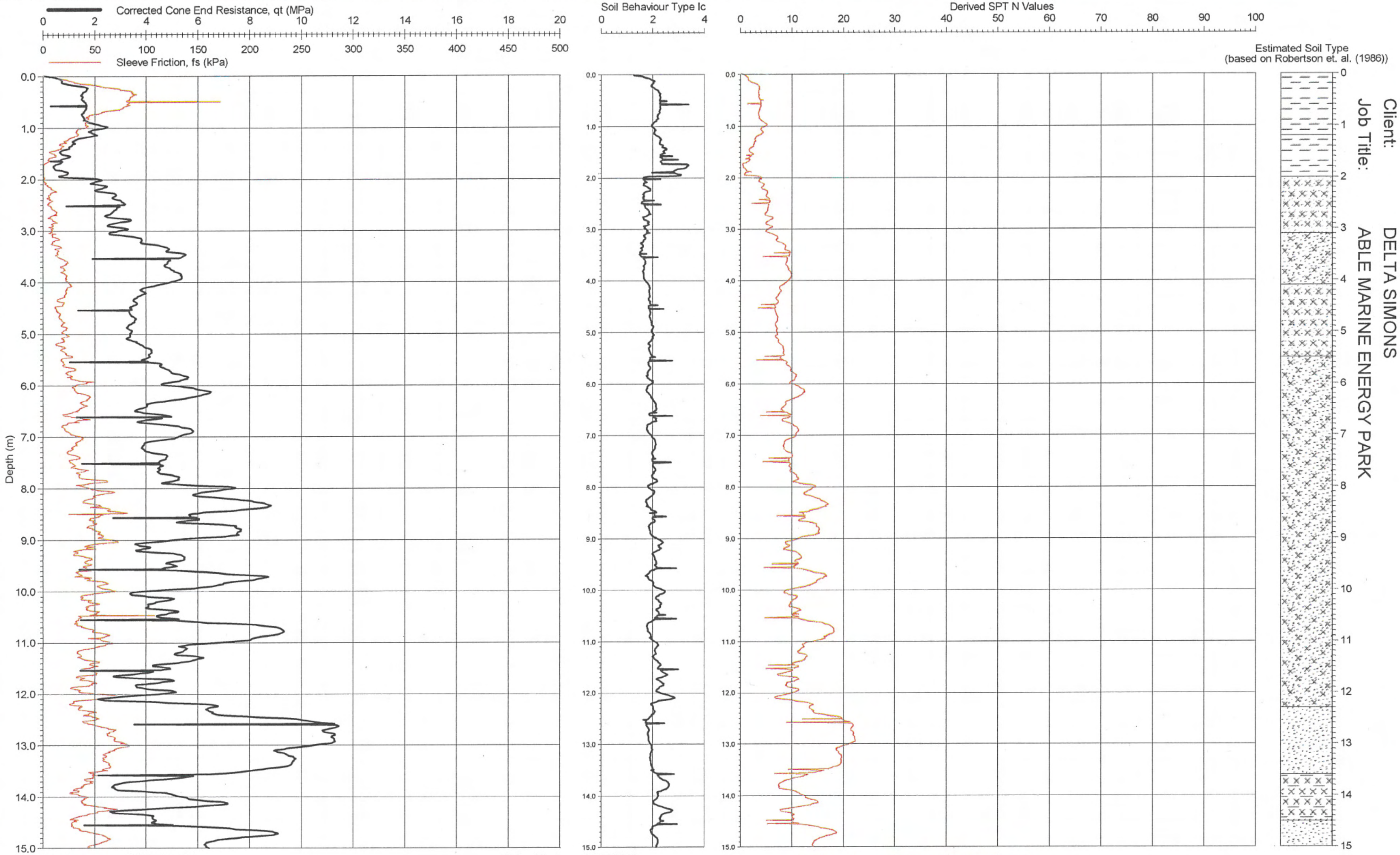
PIEZO CONE PENETRATION TEST

CPT 04

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 05
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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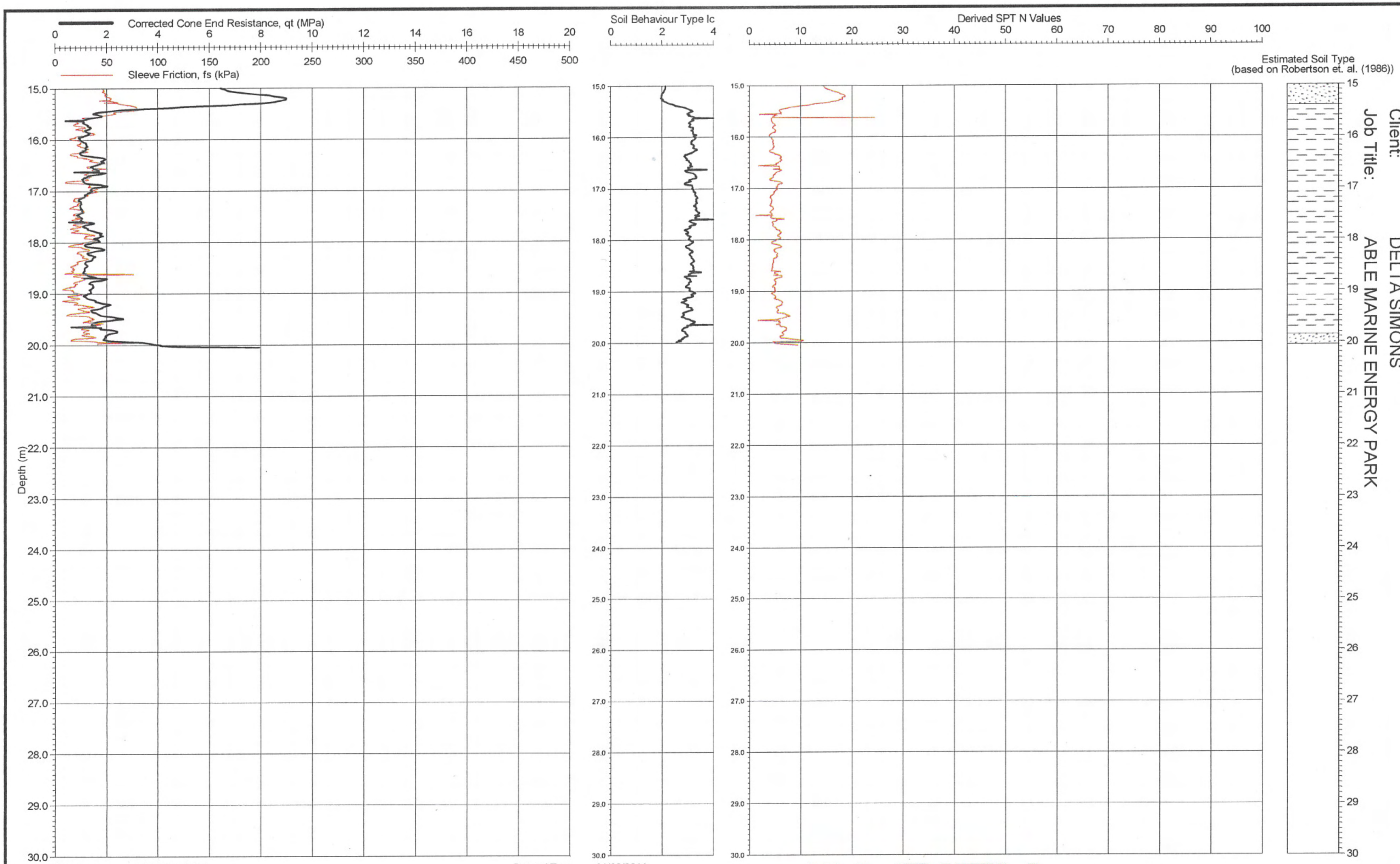
PIEZO CONE PENETRATION TEST
CPT 05

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 05
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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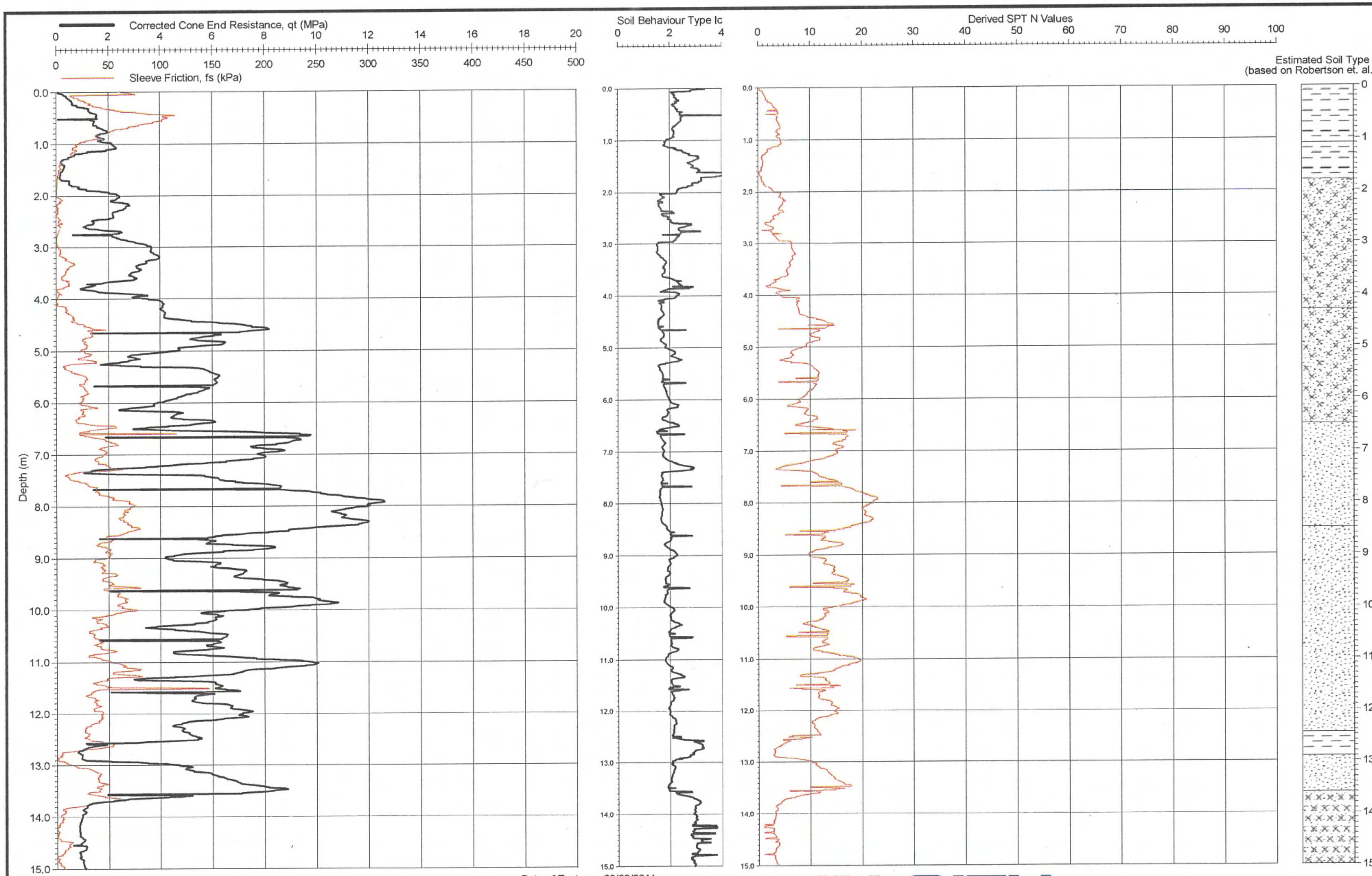
PIEZO CONE PENETRATION TEST
CPT 05

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.D42 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 03/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 06

Checked By:

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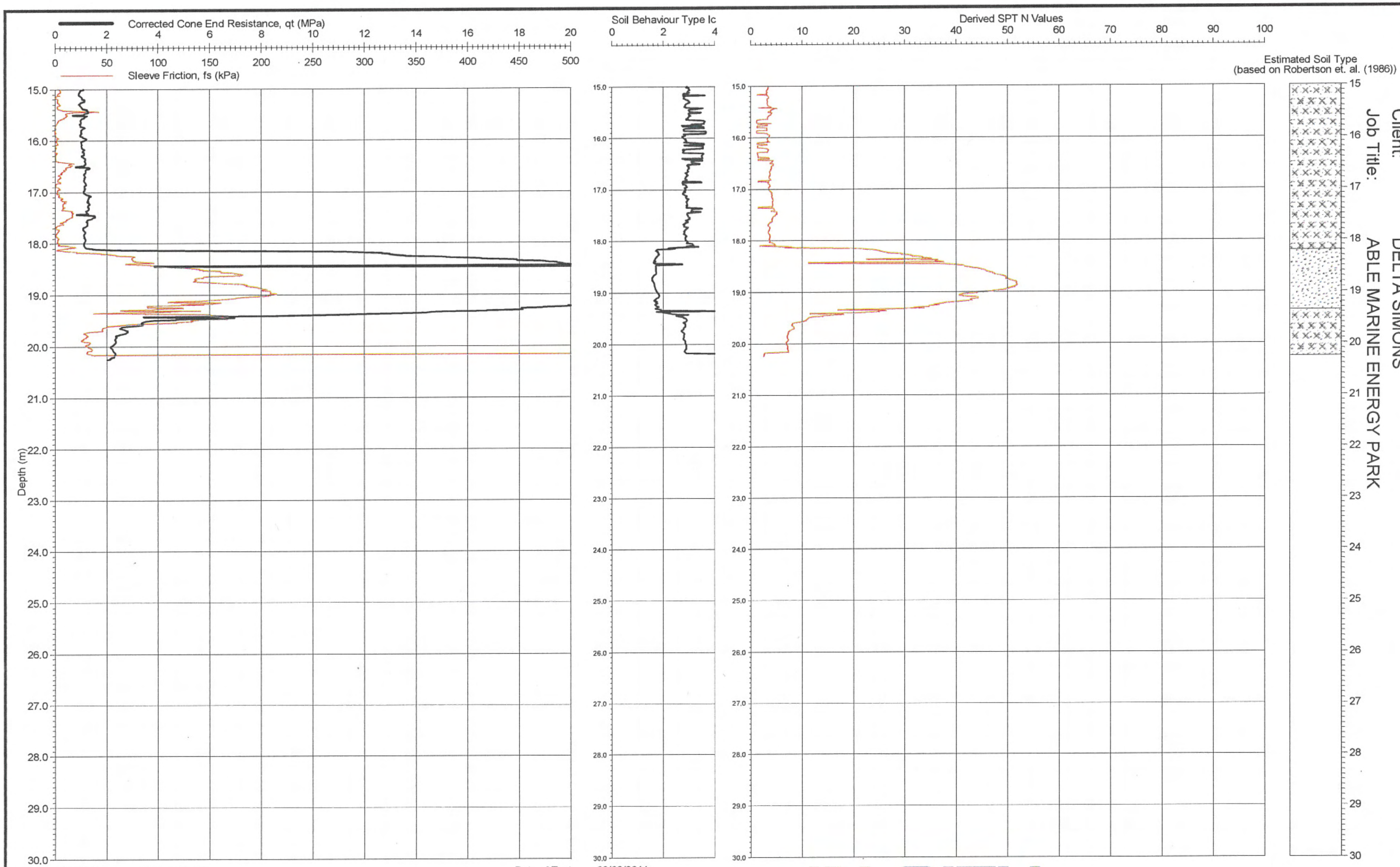
PIEZO CONE PENETRATION TEST

CPT 06

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	03/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 06
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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PIEZO CONE PENETRATION TEST

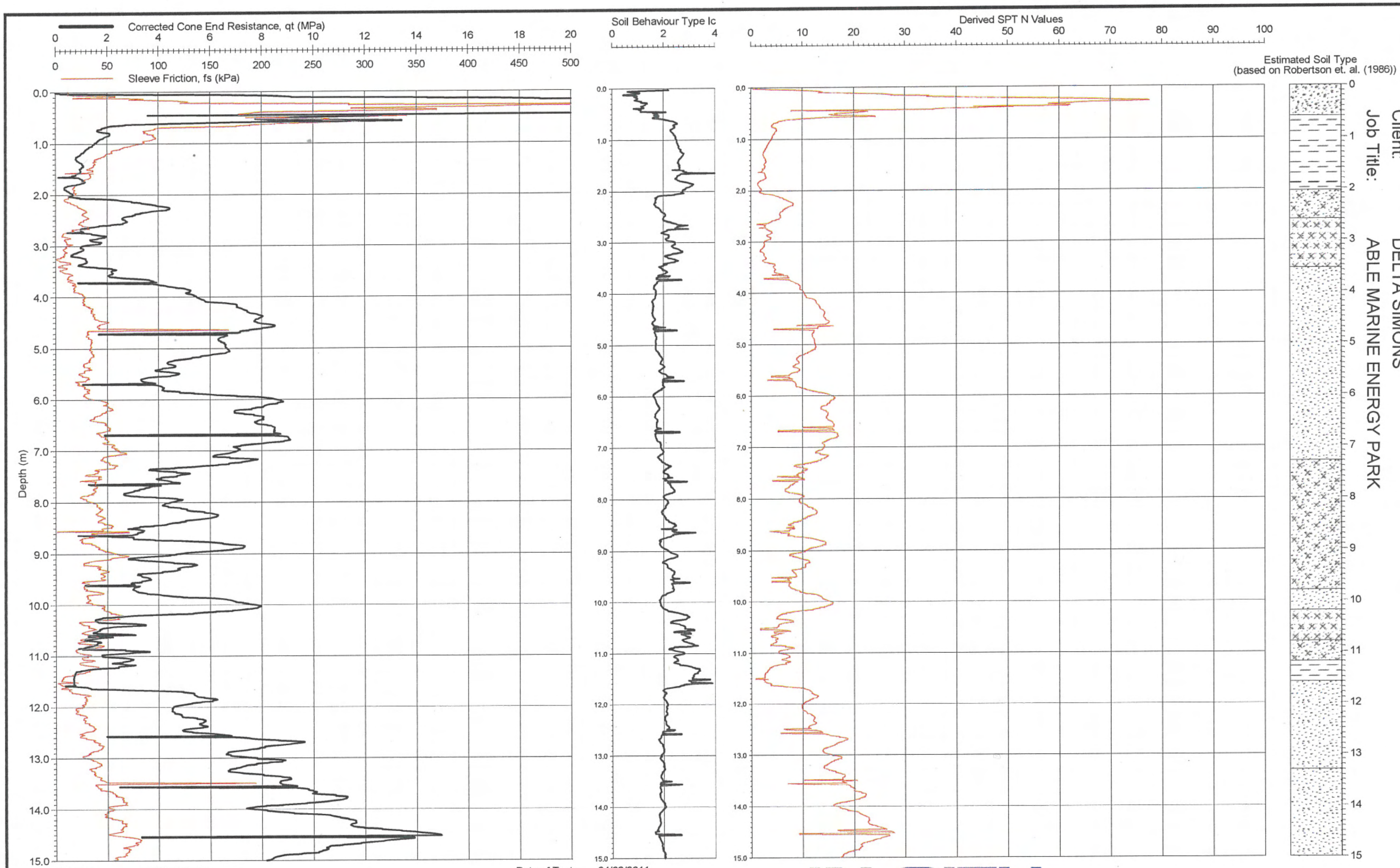
CPT 06

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

PIEZO CONE PENETRATION TEST
CPT 07



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 07
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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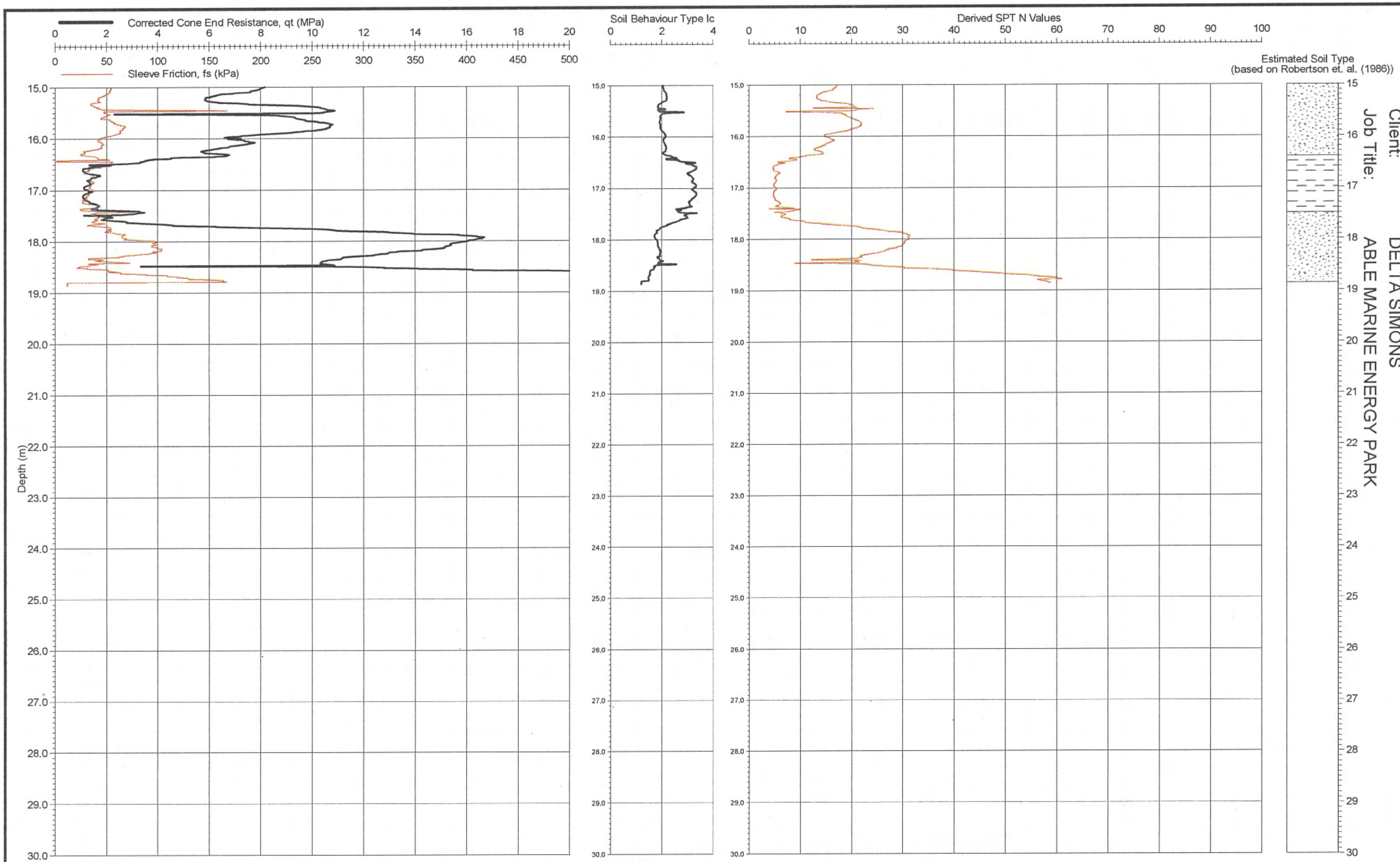
Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

PIEZO CONE PENETRATION TEST

CPT 07



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 07
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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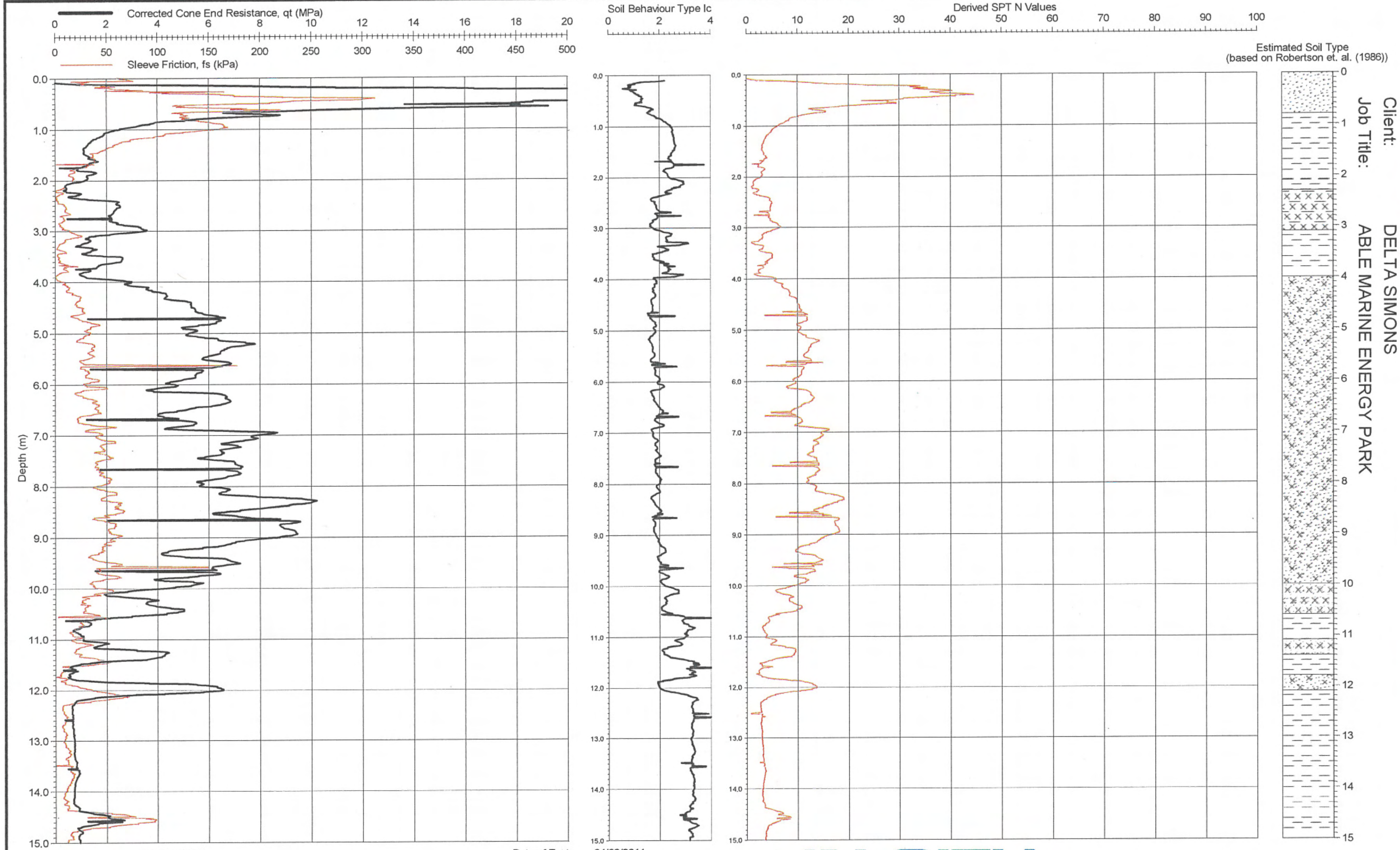
Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 08
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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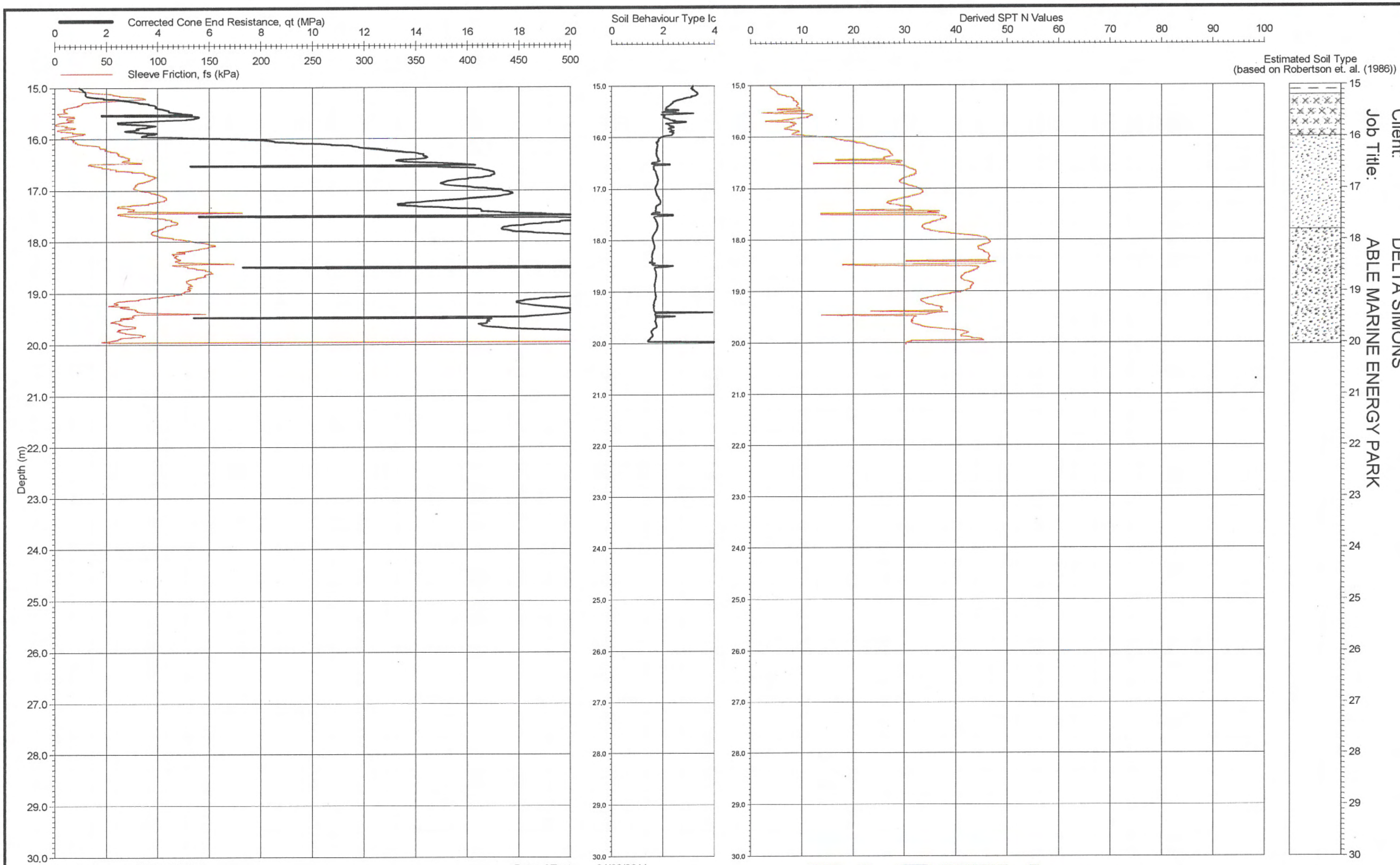
PIEZO CONE PENETRATION TEST

CPT 08

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.D42 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 04/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 08

Checked By:

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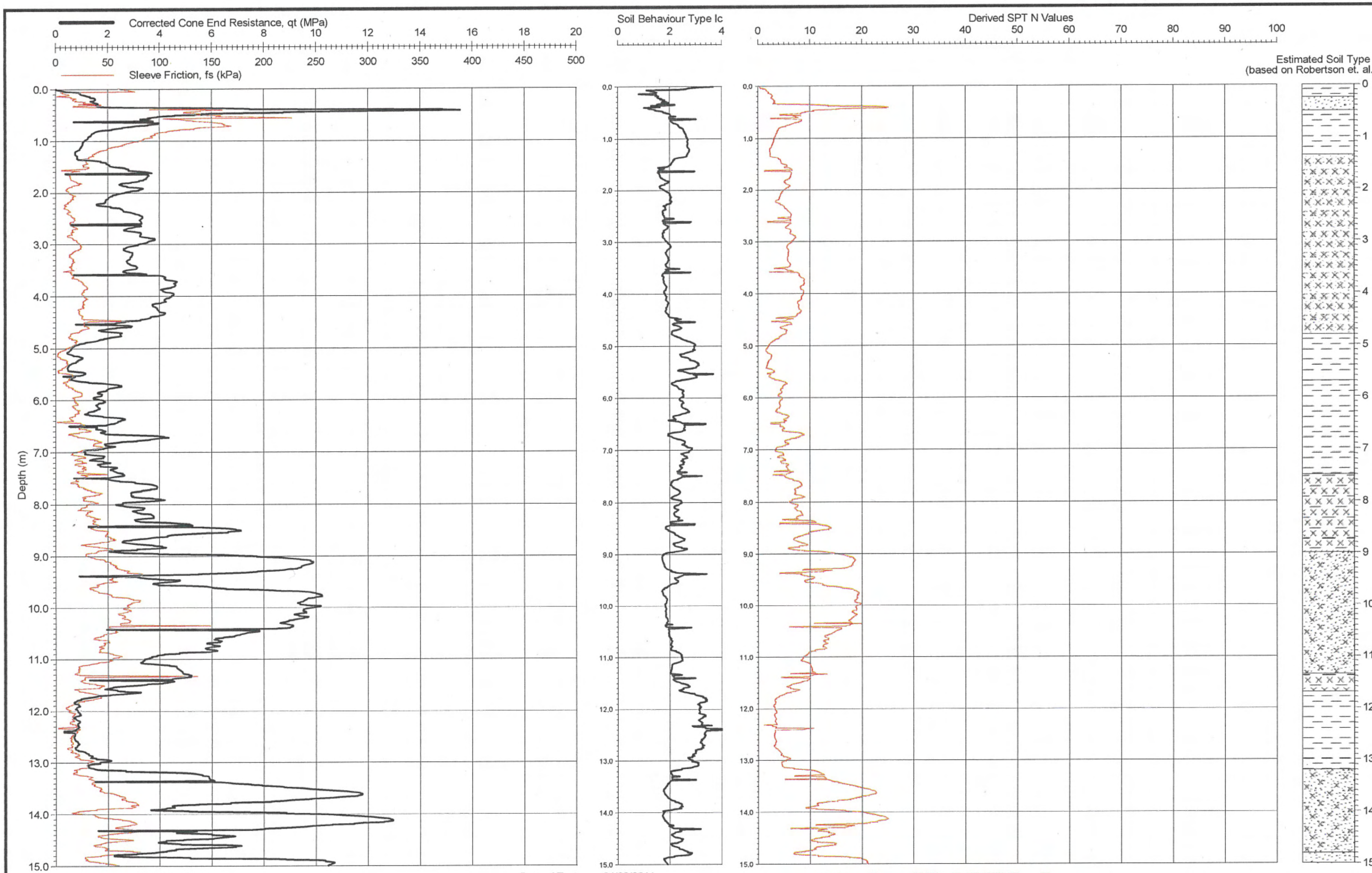
PIEZO CONE PENETRATION TEST

CPT 08

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 09
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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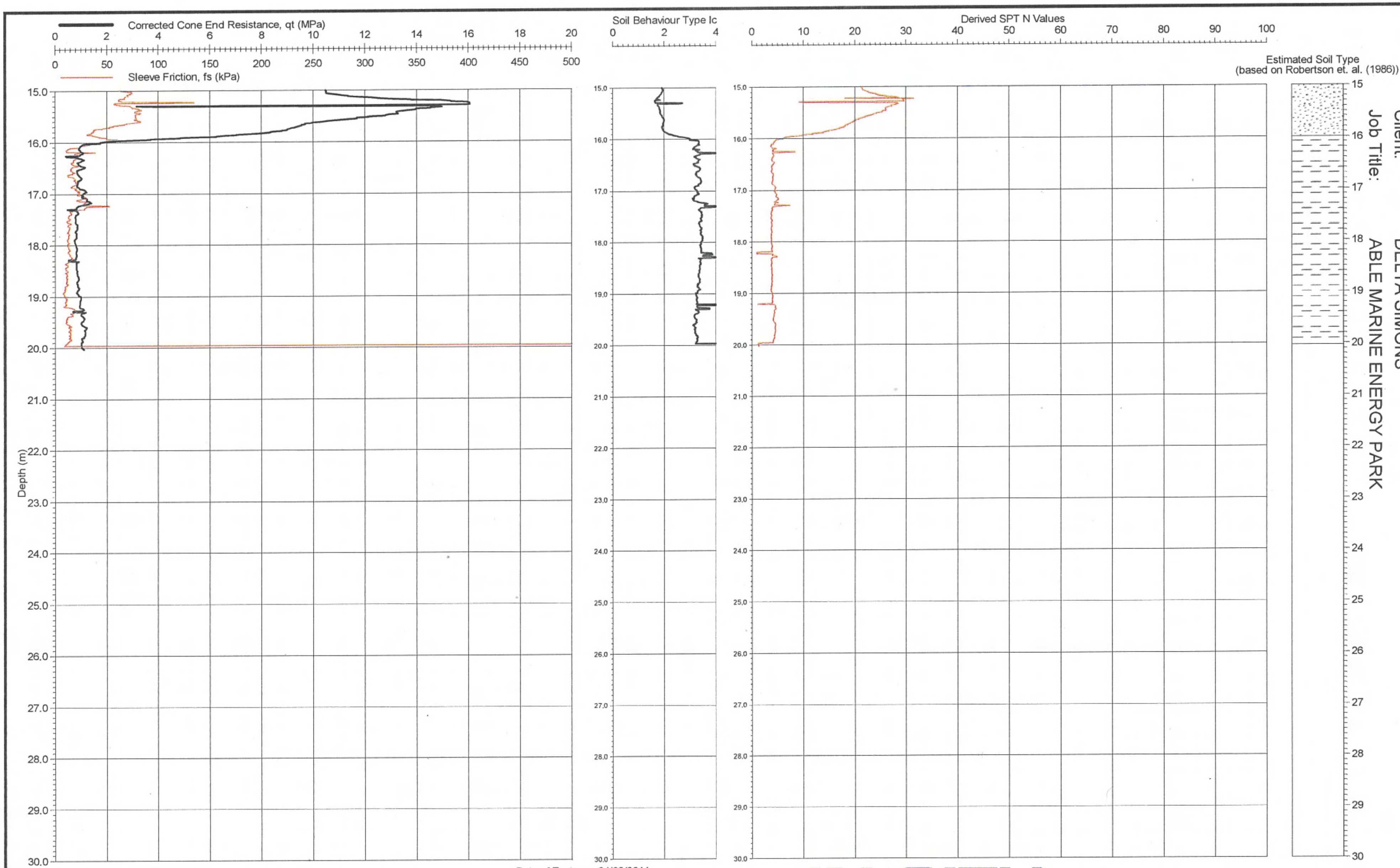
PIEZO CONE PENETRATION TEST
CPT 09

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.D42 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 04/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 09

Checked By:

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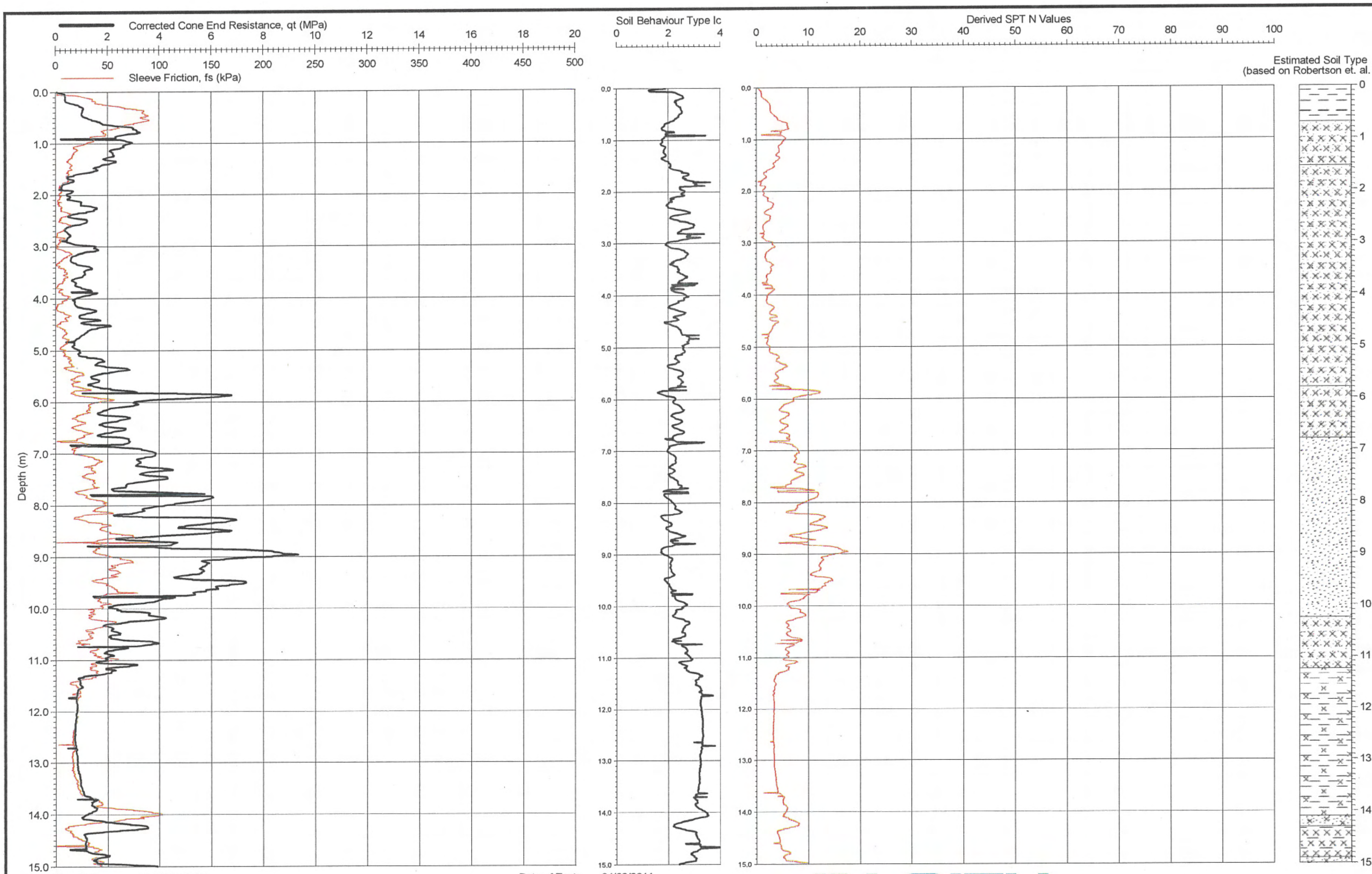
PIEZO CONE PENETRATION TEST
CPT 09

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 10
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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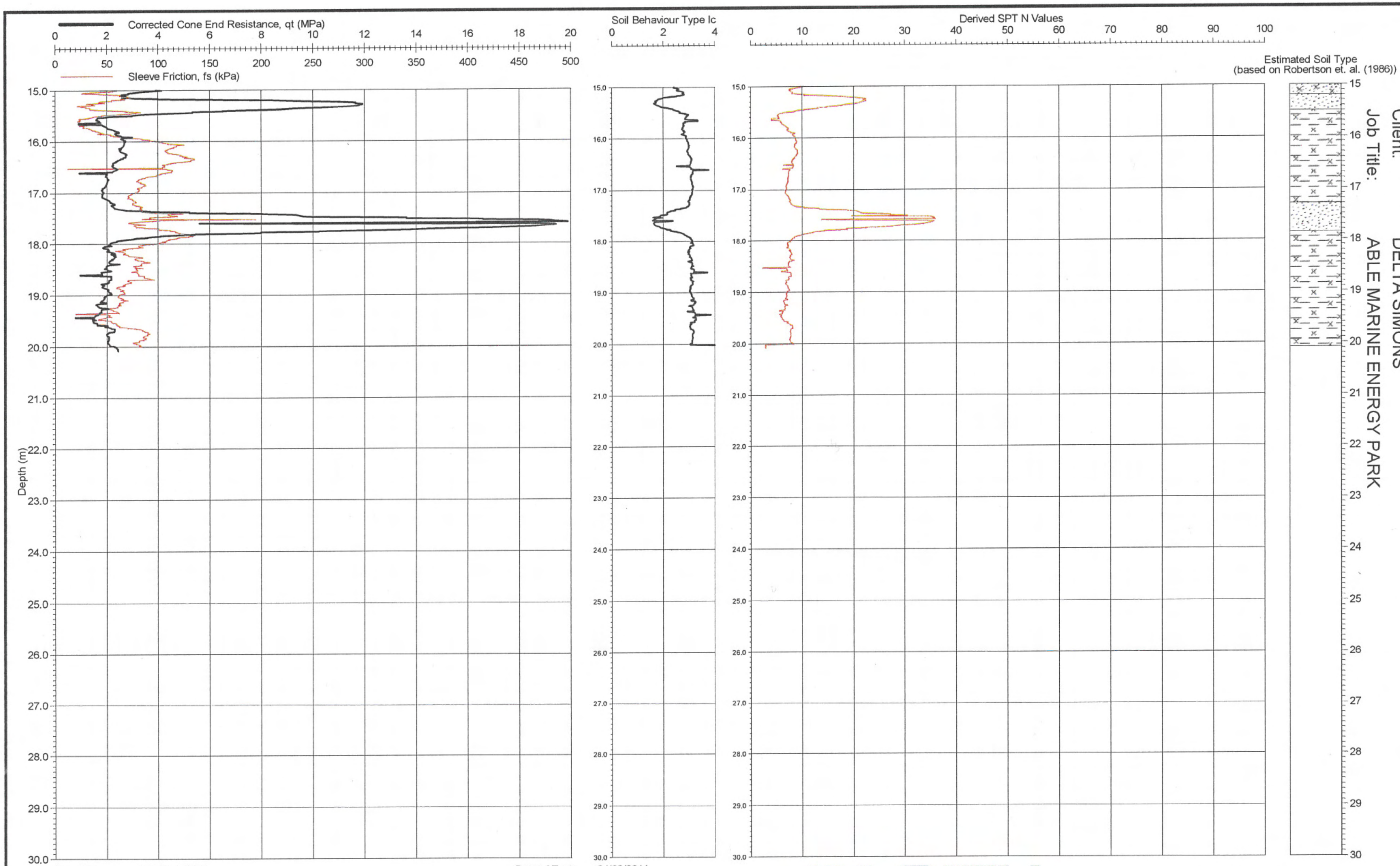
PIEZO CONE PENETRATION TEST

CPT 10

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.D42 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 04/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 10

Checked By:

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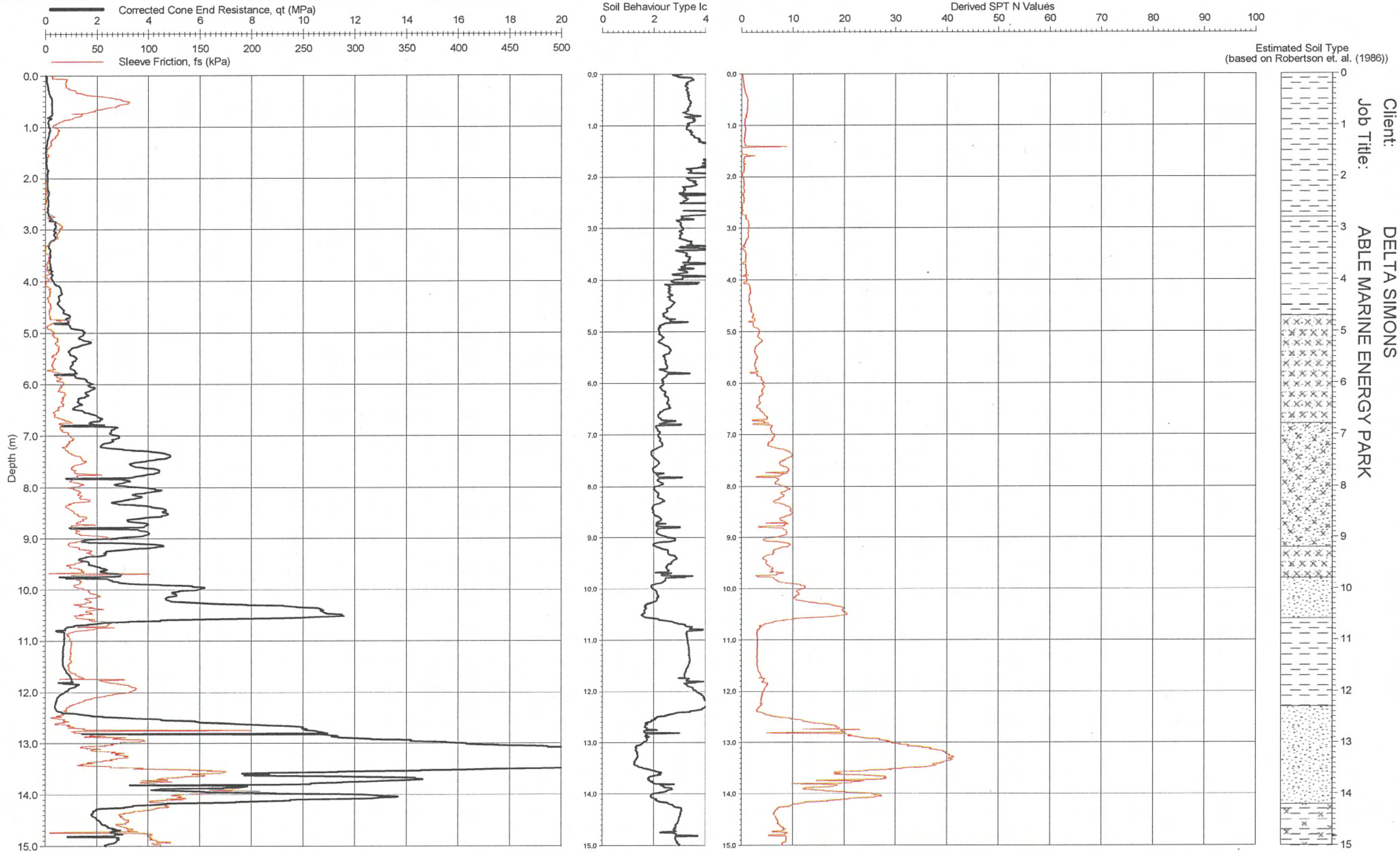
PIEZO CONE PENETRATION TEST

CPT 10

Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 11
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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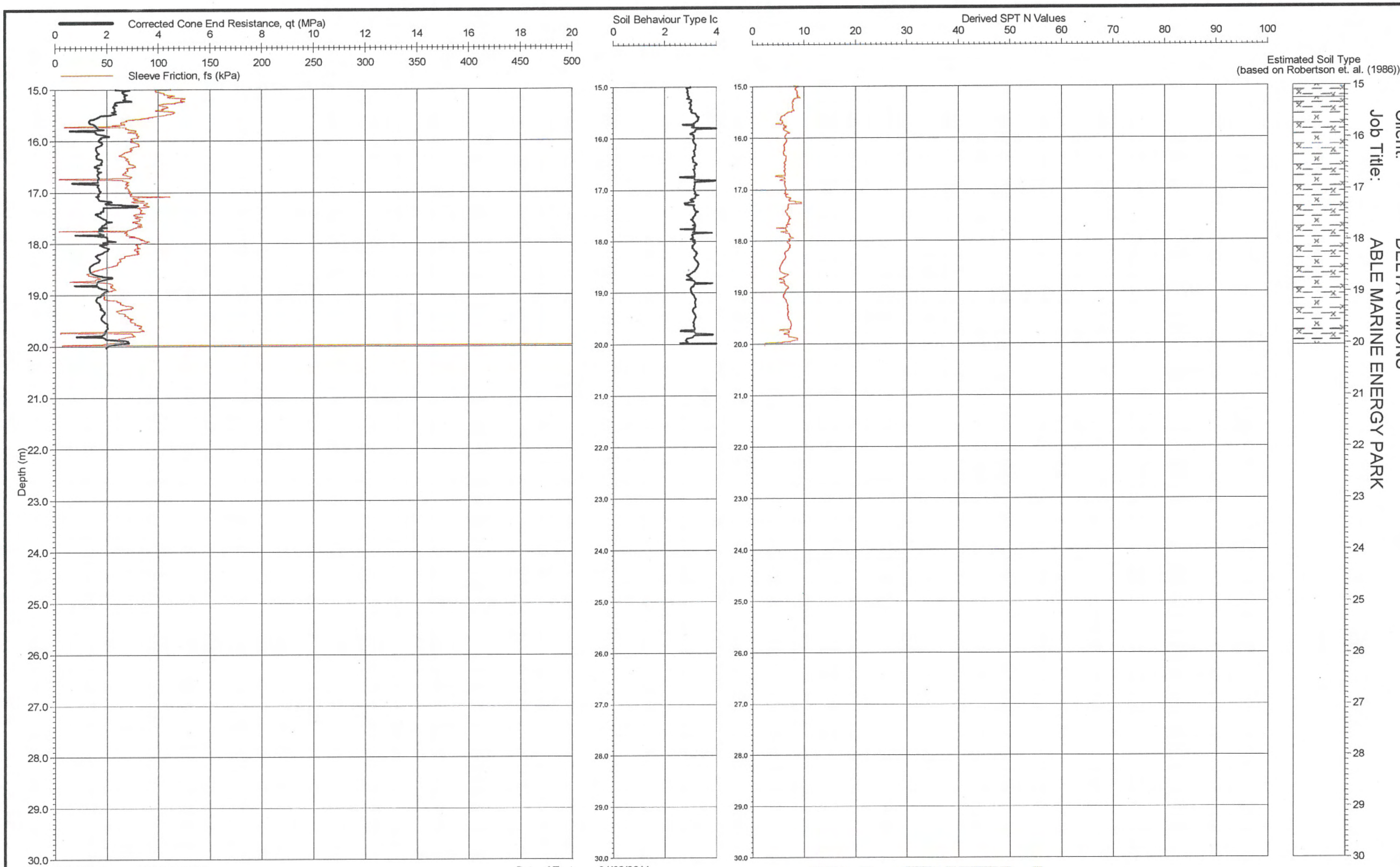
PIEZO CONE PENETRATION TEST

CPT 11

Form: CPT0003

PIEZO CONE PENETRATION TEST
CPT 11

Client: DELTA SIMONS
Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE
Coordinates: -
Ground Level: -
Cone & Rig Used: S15CFIIP.D42 - CPT 04
Remarks: Test refused on total pressure.

Date of Test: 04/02/2011
Date of Plot: 14/02/2011
File Name: 1110107 - CPT 11
Checked By:

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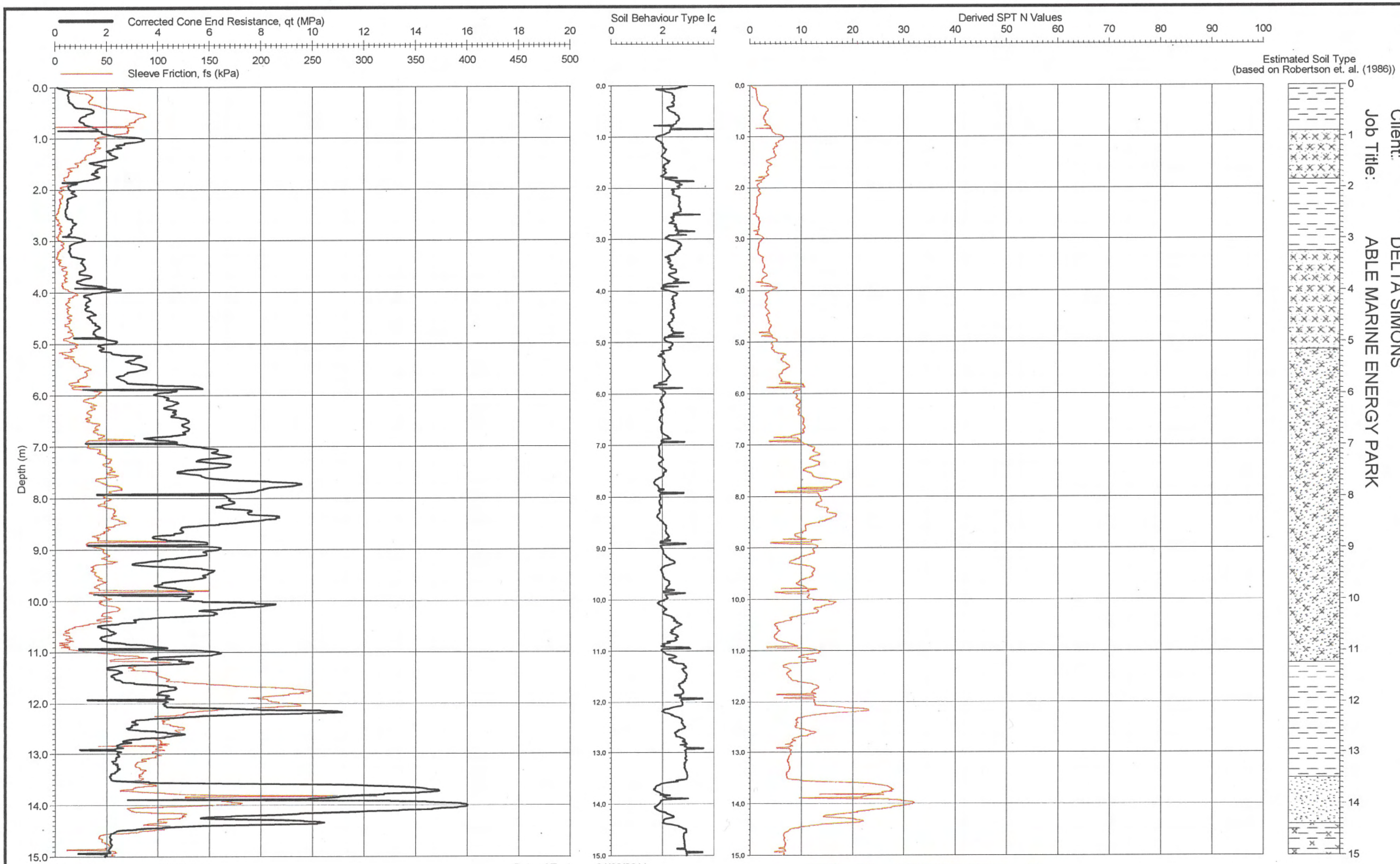
Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: S15CFIIP.D42 - CPT 04

Remarks: Test refused on total pressure.

Date of Test: 04/02/2011

Date of Plot: 14/02/2011

File Name: 1110107 - CPT 12

Checked By:

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PIEZO CONE PENETRATION TEST

CPT 12

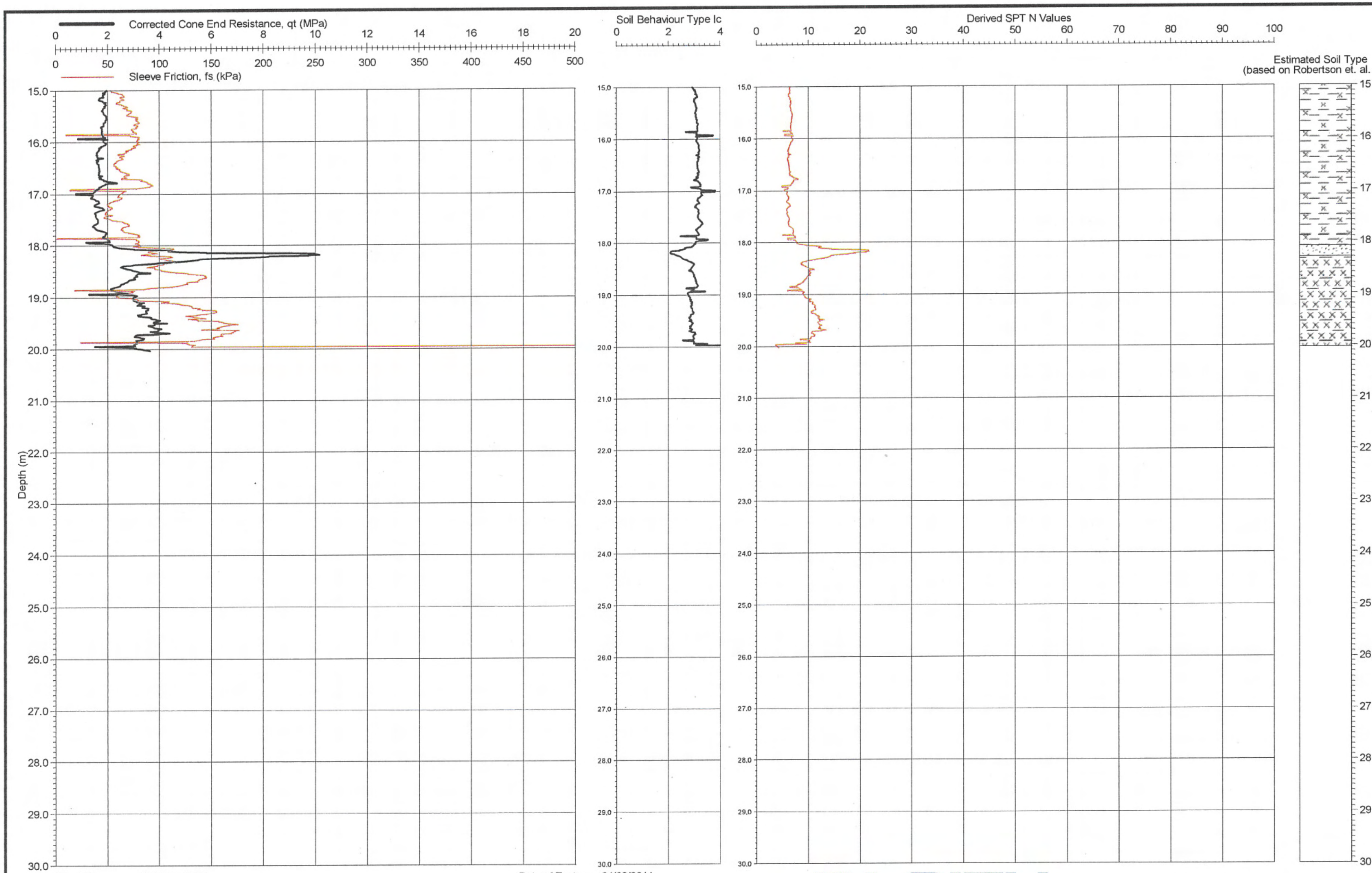
Form: CPT0003

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

PIEZO CONE PENETRATION TEST

CPT 12



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	14/02/2011
Ground Level:	-	File Name:	1110107 - CPT 12
Cone & Rig Used:	S15CFIIP.D42 - CPT 04	Checked By:	
Remarks:	Test refused on total pressure.		

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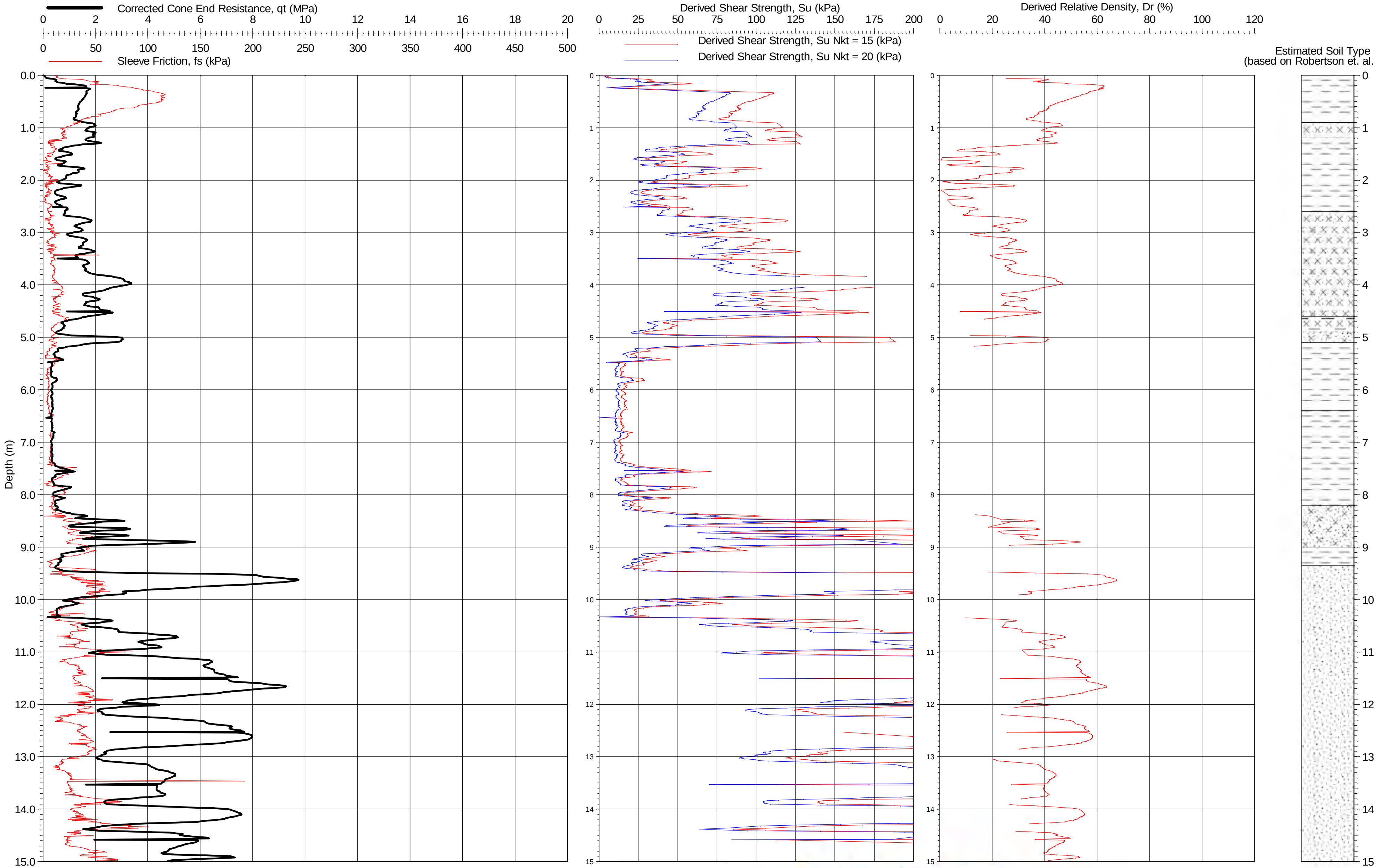
Form: CPT0003

Annex H: CPT Results in Graphical Format

- Corrected Cone End Resistance, qt (MPa)
- Sleeve Friction, fs (kPa)
- Derived Shear Strength, Su (kPa)
- Derived Relative Density, Dr (%)



Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 01
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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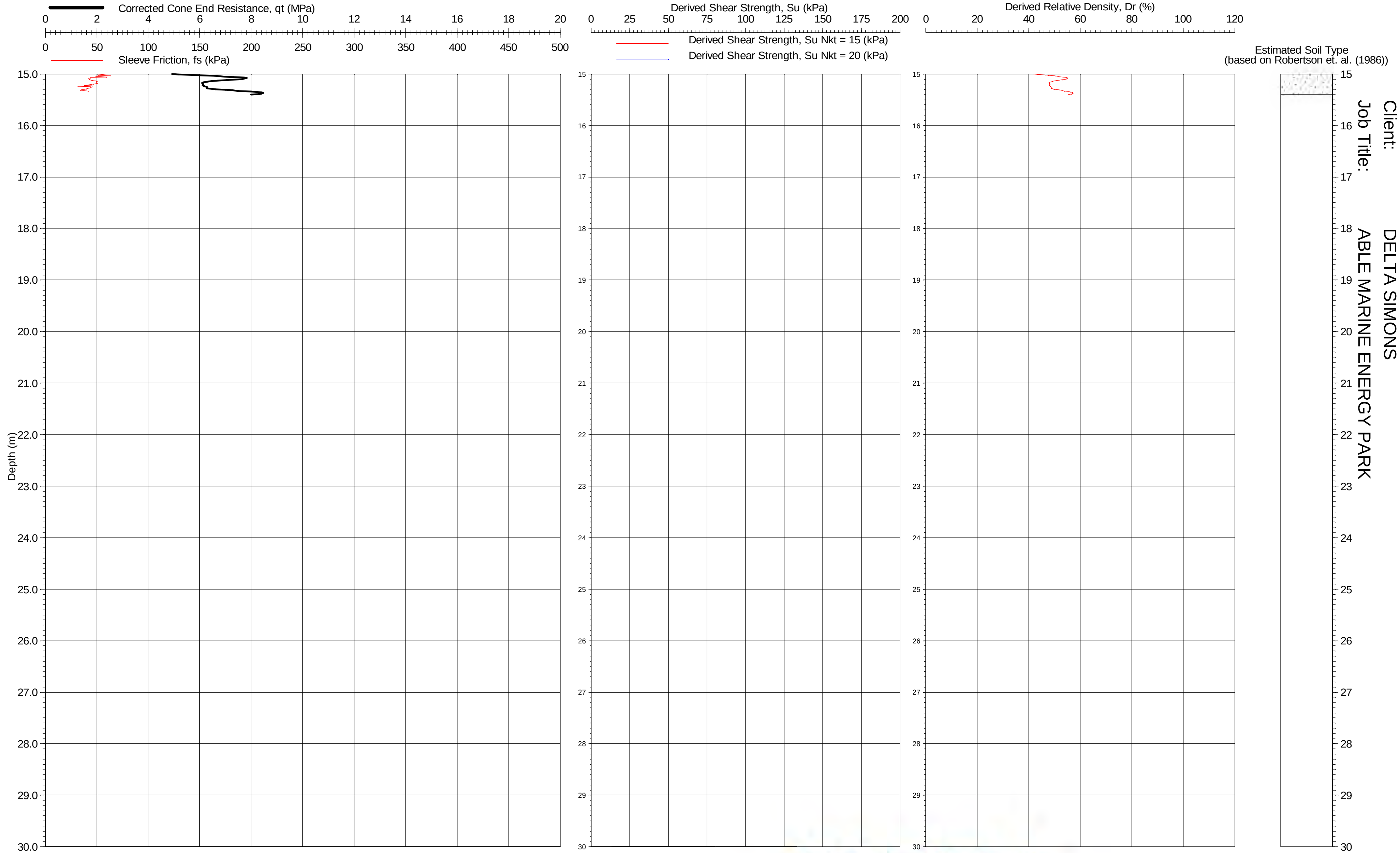
PIEZO CONE PENETRATION TEST

CPT 01

Form: CPT0004



Client: DELTA SIMONS
Job Title: ABLE MARINE ENERGY PARK

Location: HUMBERSIDE
Coordinates: -
Ground Level: -
Cone & Rig Used: 5405.104 - CPT 001
Remarks: Test refused on total pressure.

Date of Test: 01/02/2011
Date of Plot: 19/04/2011
File Name: 1110107 - CPT 01
Checked By:

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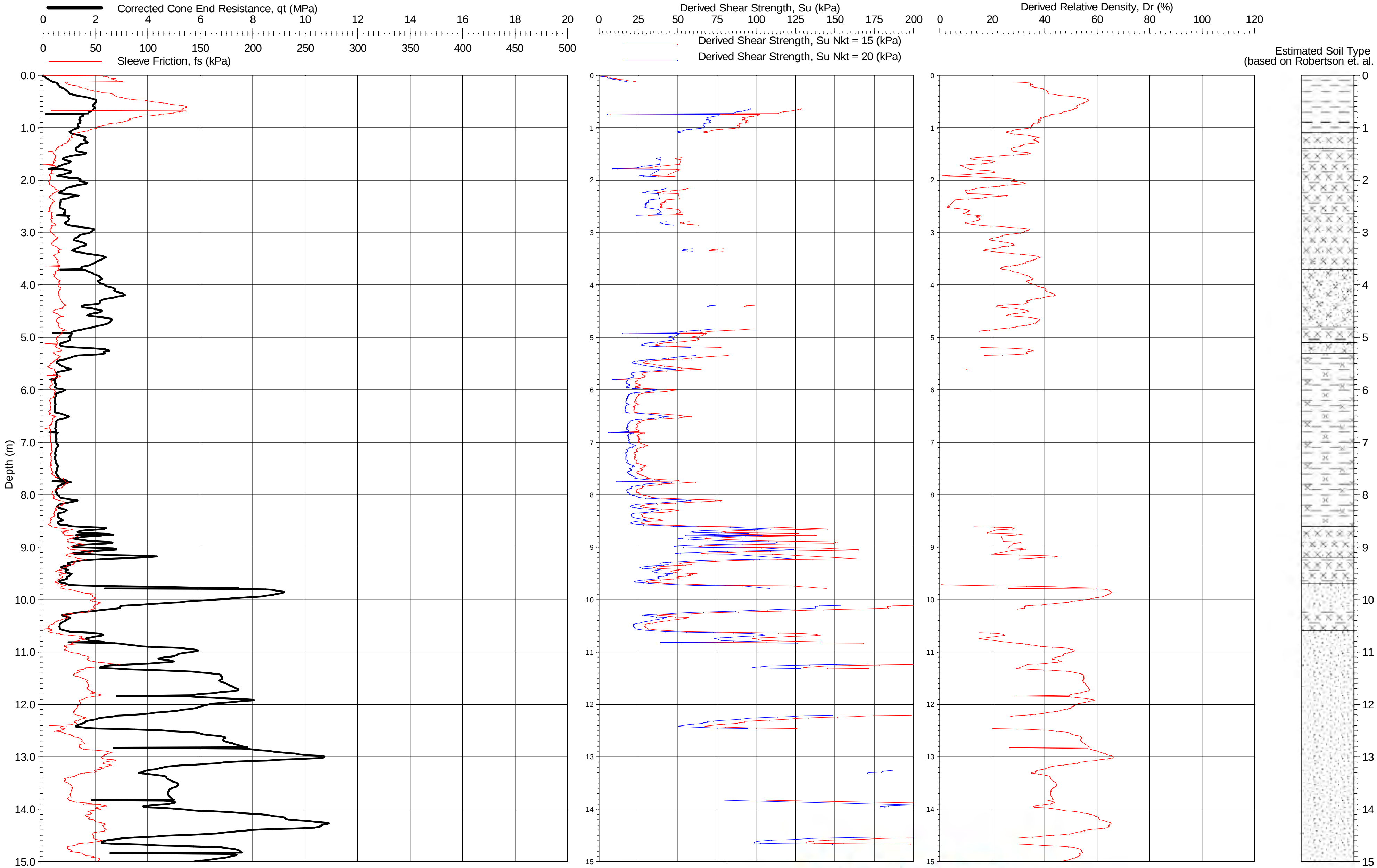
PIEZO CONE PENETRATION TEST
CPT 01

Form: CPT0004

Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 01A
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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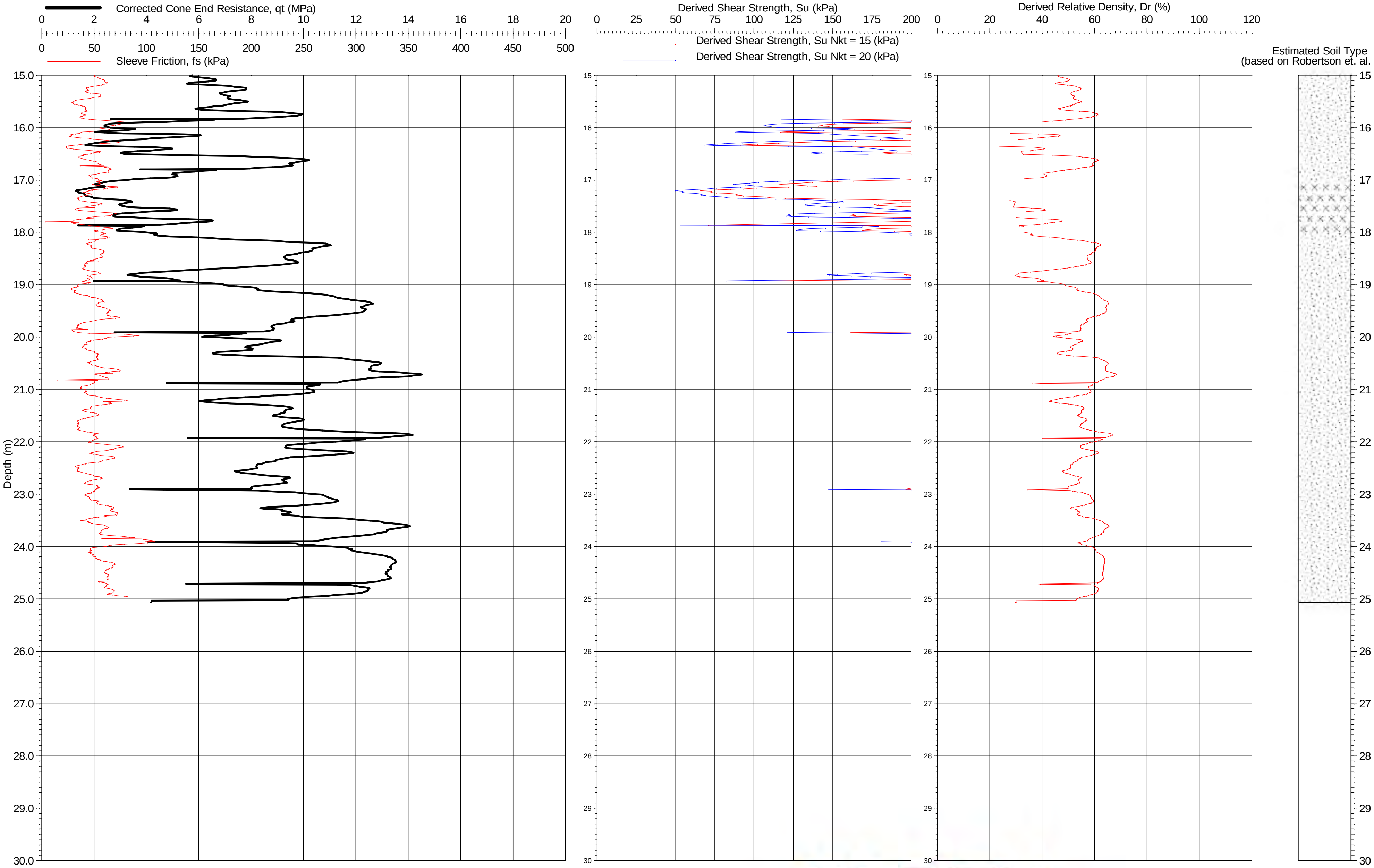
PIEZO CONE PENETRATION TEST

CPT 01A

Form: CPT0004



Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 01A
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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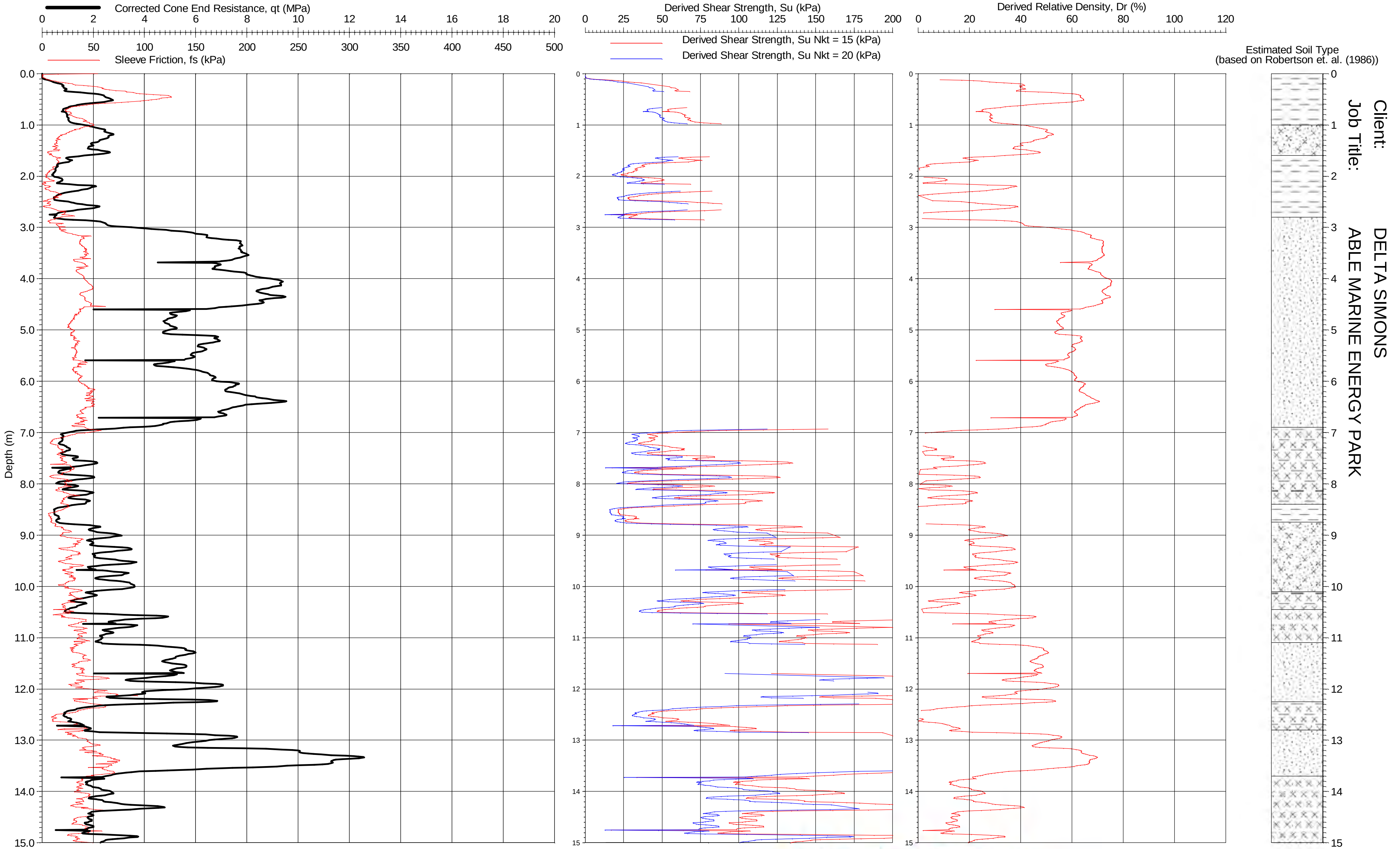
PIEZO CONE PENETRATION TEST

CPT 01A

Form: CPT0004



Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 02
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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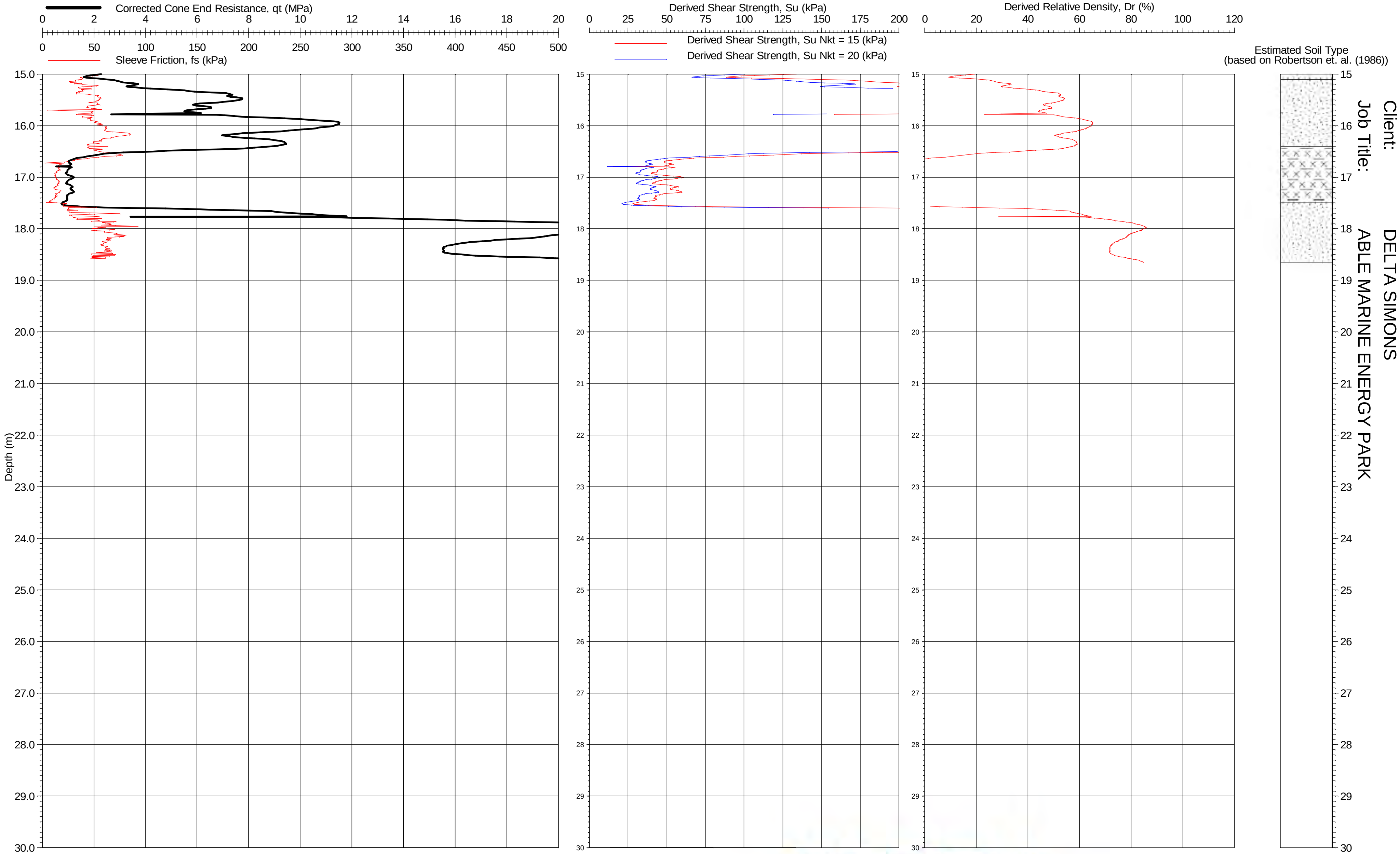
PIEZO CONE PENETRATION TEST

CPT 02

Form: CPT0004



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: 5405.104 - CPT 001

Remarks: Test refused on total pressure.

Date of Test: 01/02/2011

Date of Plot: 19/04/2011

File Name: 1110107 - CPT 02

Checked By:

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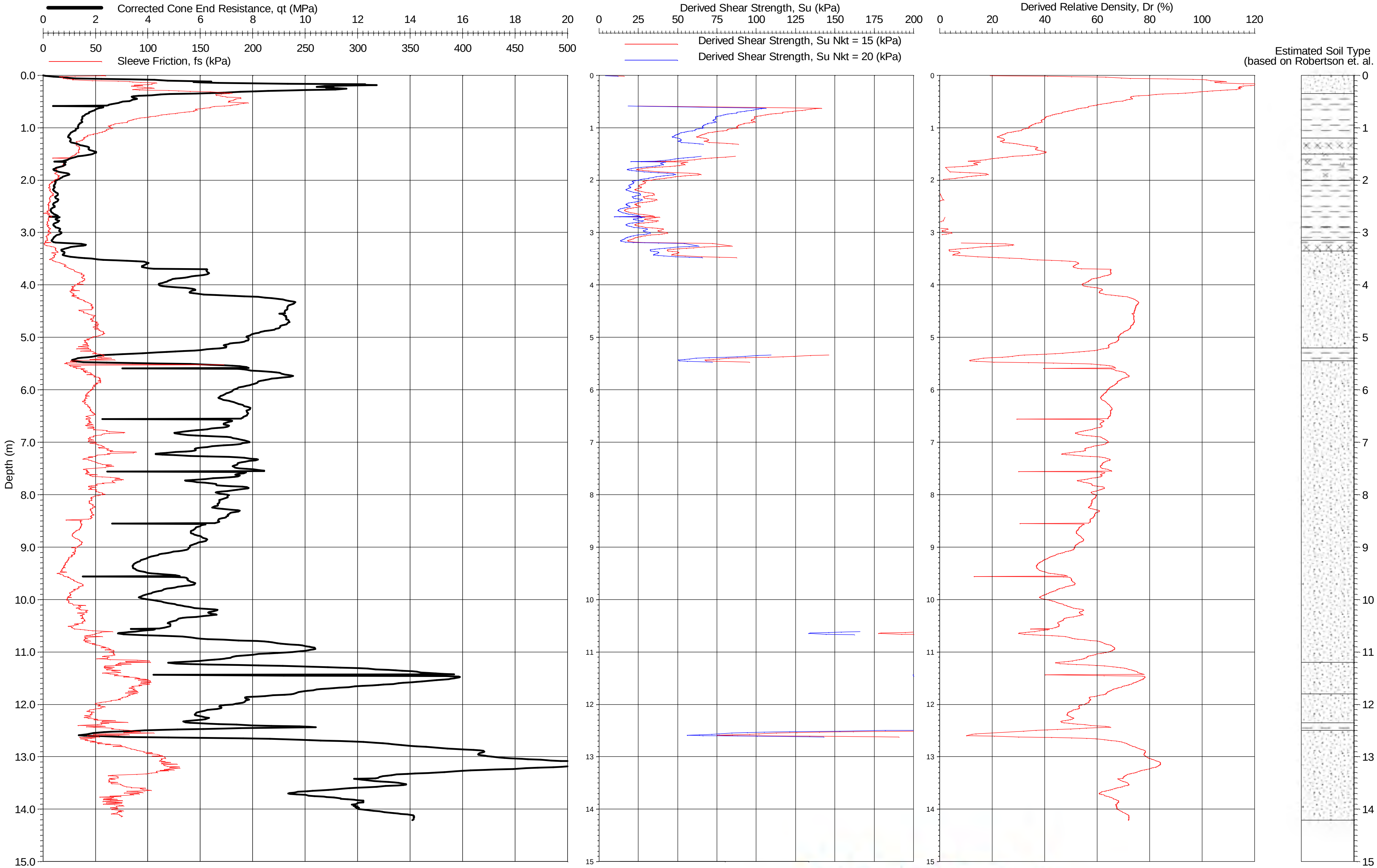
PIEZO CONE PENETRATION TEST

CPT 02

Form: CPT0004



Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 03
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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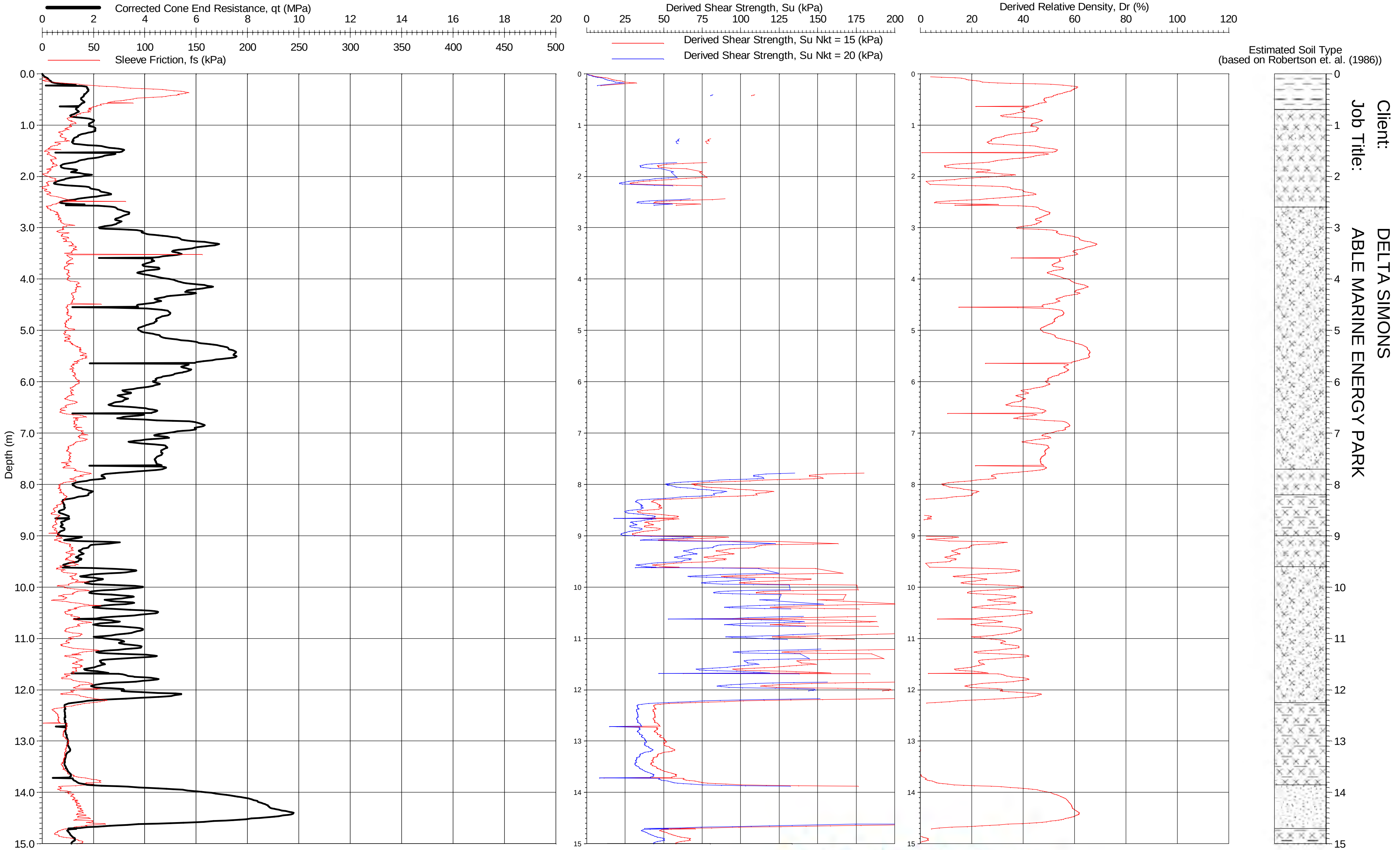
PIEZO CONE PENETRATION TEST
CPT 03

Form: CPT0004



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: 5405.104 - CPT 001

Remarks: Test refused on total pressure.

Date of Test: 01/02/2011

Date of Plot: 19/04/2011

File Name: 1110107 - CPT 04

Checked By:

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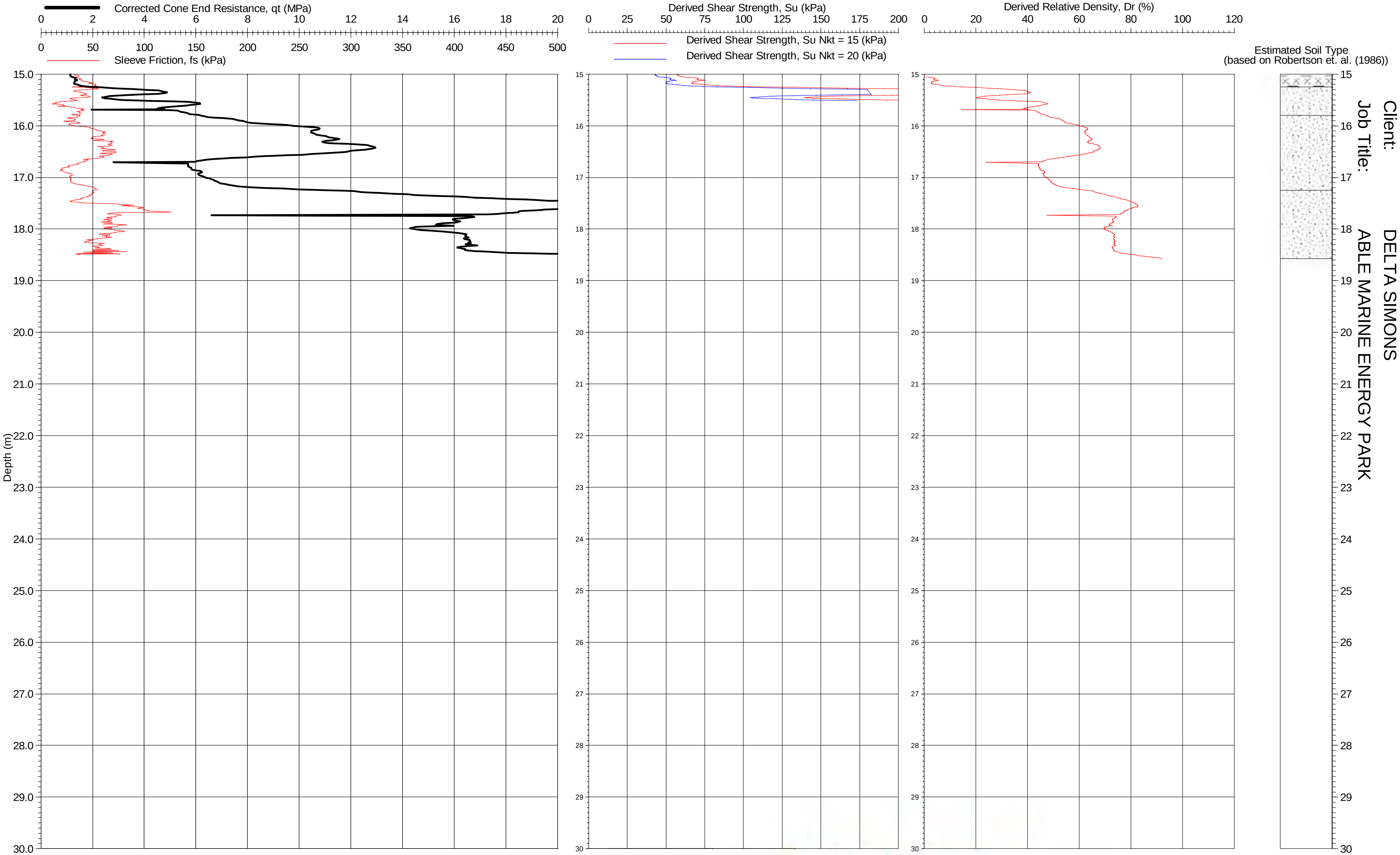
PIEZO CONE PENETRATION TEST

CPT 04

Form: CPT0004



Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 04
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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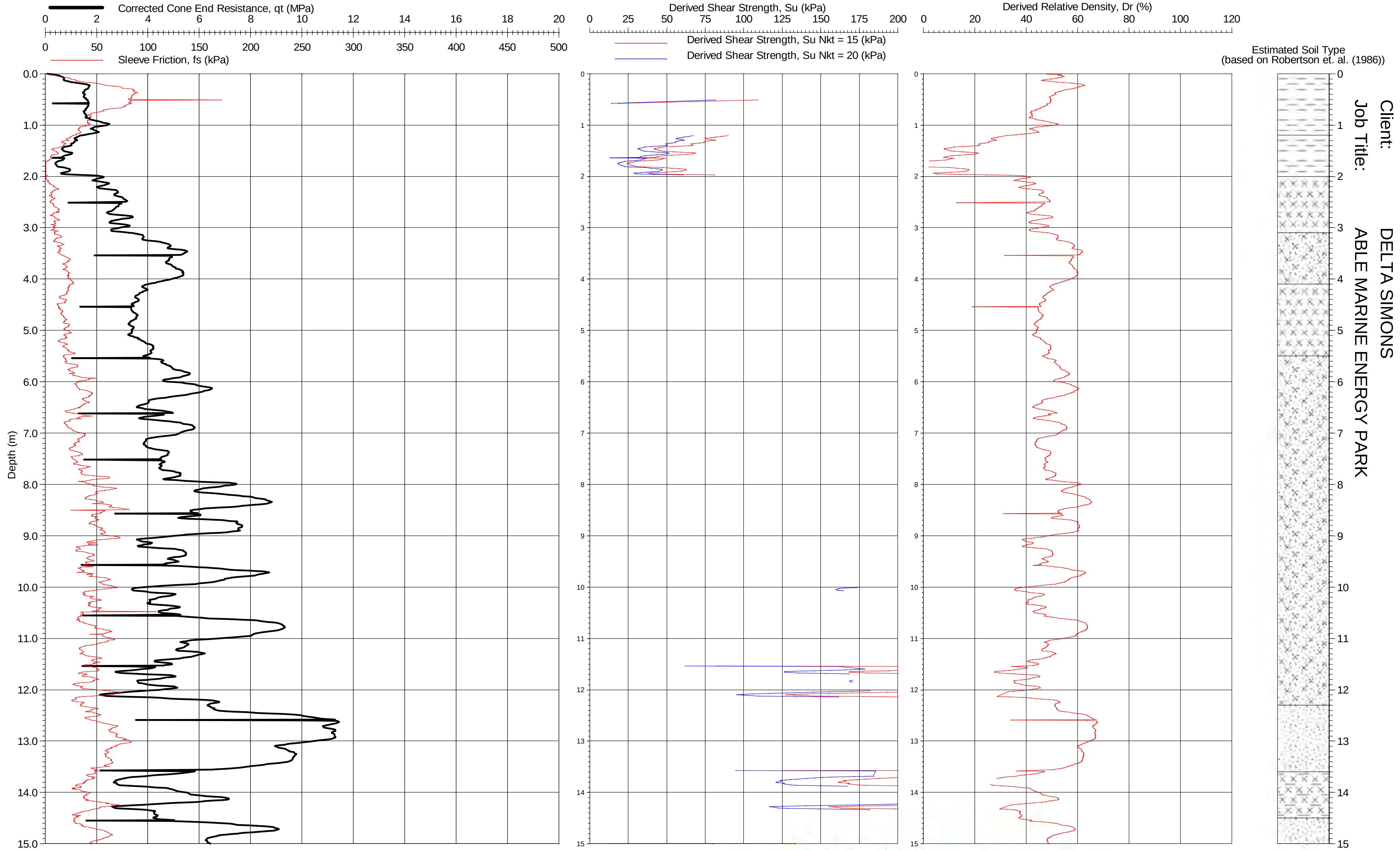
PIEZO CONE PENETRATION TEST

CPT 04

Form: CPT0004



Location:	HUMBERSIDE	Date of Test:	01/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 05
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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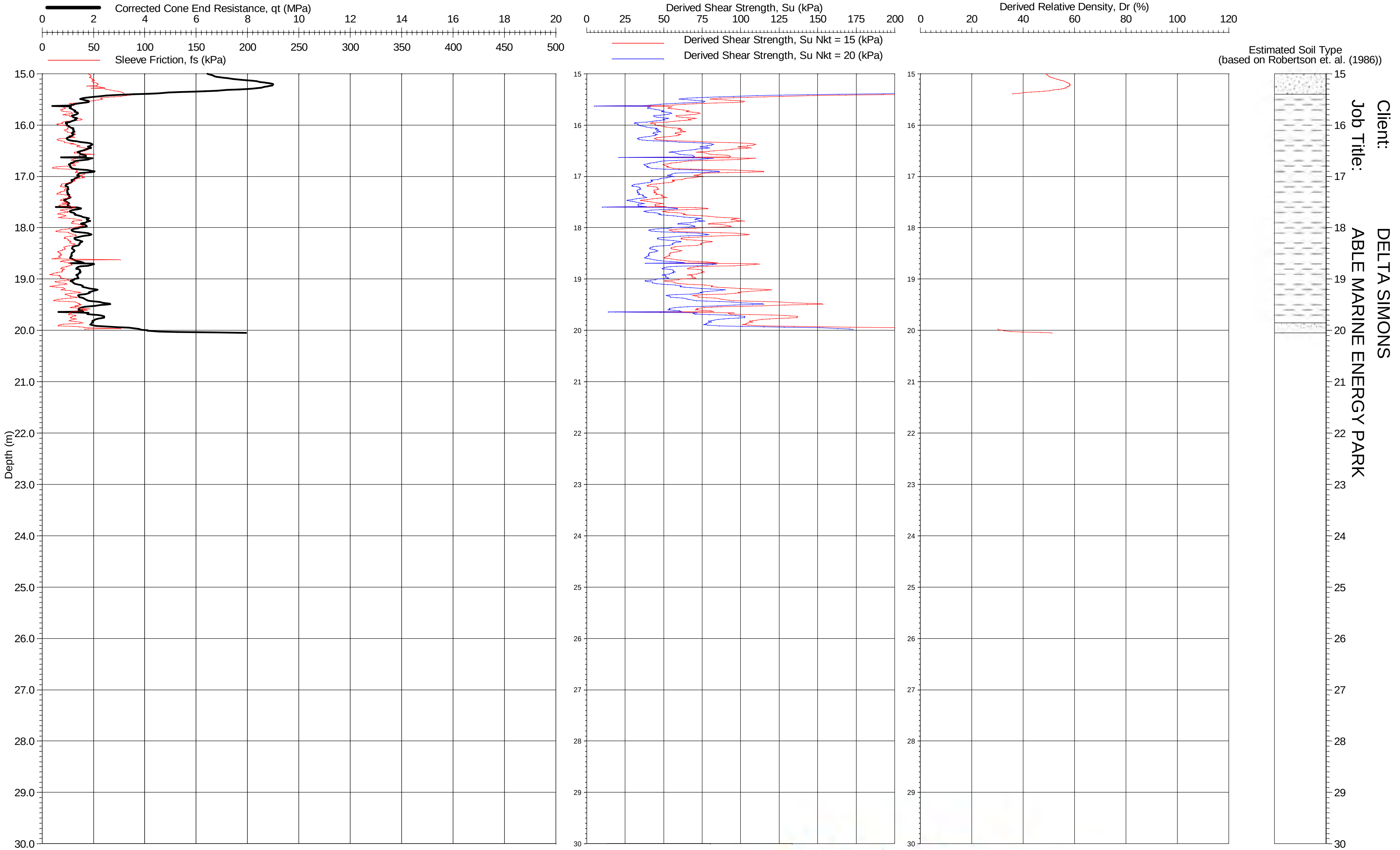
PIEZO CONE PENETRATION TEST
CPT 05

Form: CPT0004



Location: HUMBERSIDE
Coordinates: -
Ground Level: -
Cone & Rig Used: 5405.104 - CPT 001
Remarks: Test refused on total pressure.

Date of Test: 01/02/2011
Date of Plot: 19/04/2011
File Name: 1110107 - CPT 05
Checked By:

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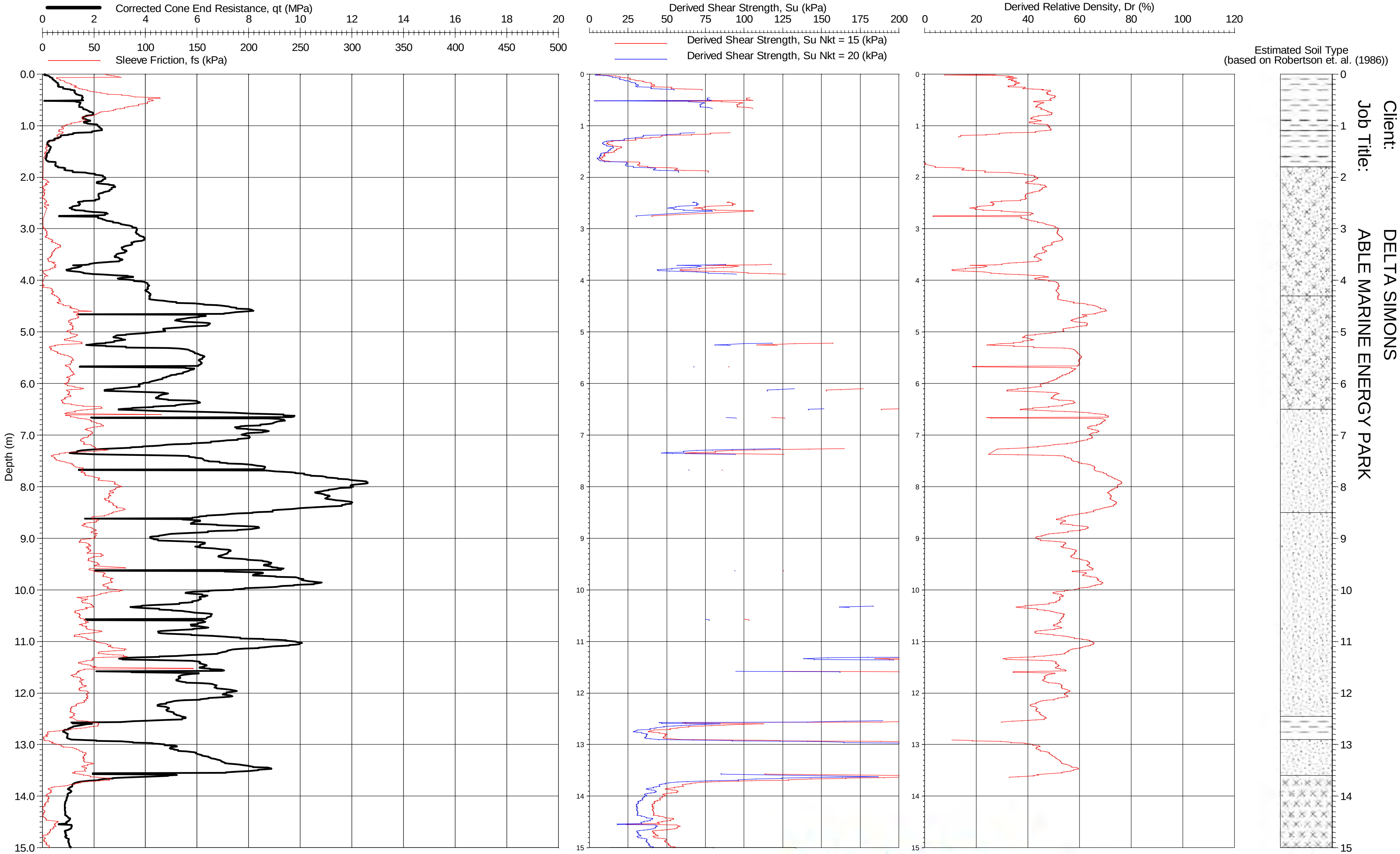
PIEZO CONE PENETRATION TEST
CPT 05

Form: CPT0004



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: 5405.104 - CPT 001

Remarks: Test refused on total pressure.

Date of Test: 03/02/2011

Date of Plot: 19/04/2011

File Name: 1110107 - CPT 06

Checked By:

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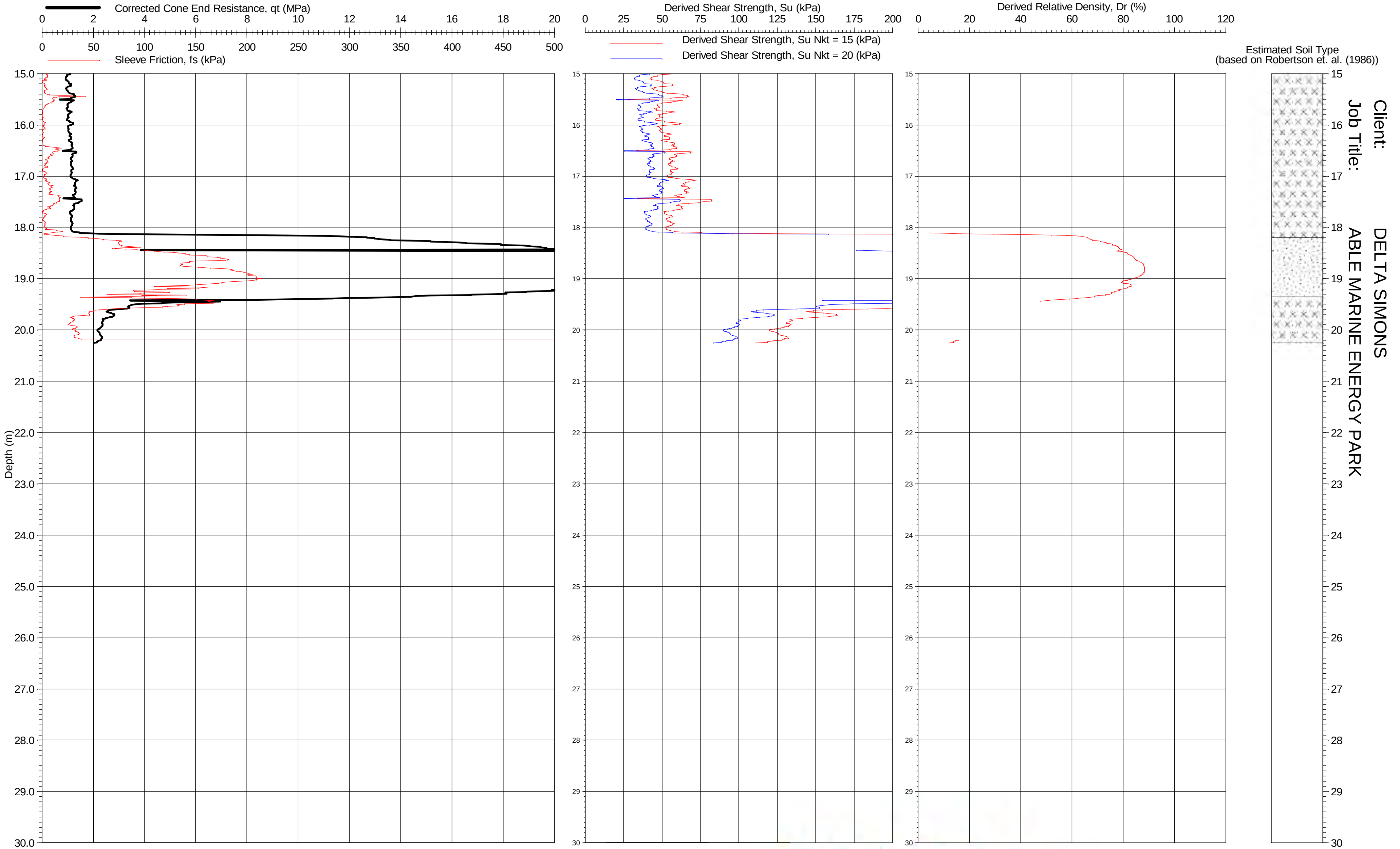
PIEZO CONE PENETRATION TEST

CPT 06

Form: CPT0004



Location:	HUMBERSIDE	Date of Test:	03/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 06
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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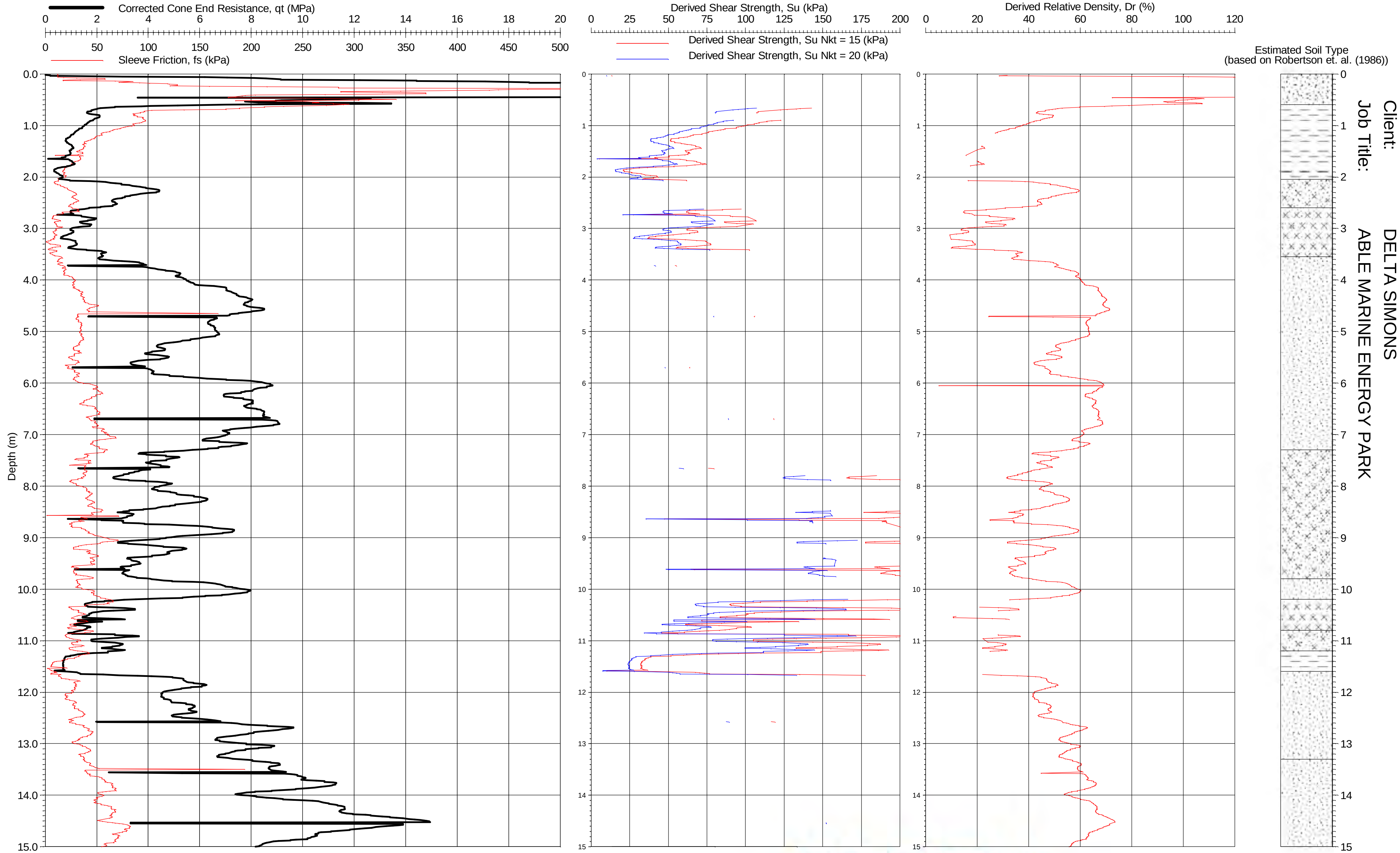
PIEZO CONE PENETRATION TEST
CPT 06

Form: CPT0004



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: 5405.104 - CPT 001

Remarks: Test refused on total pressure.

Date of Test: 04/02/2011

Date of Plot: 19/04/2011

File Name: 1110107 - CPT 07

Checked By:

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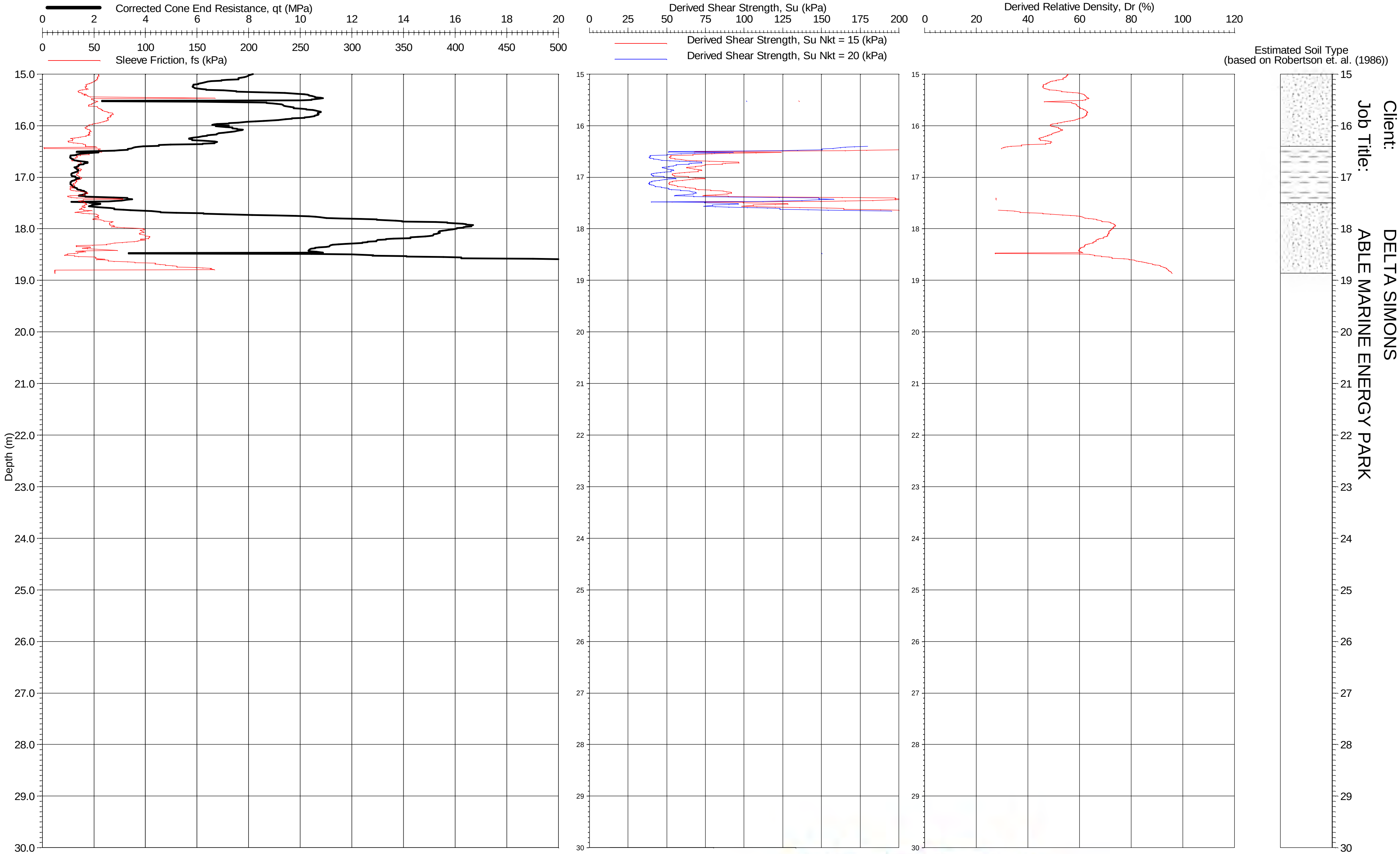
PIEZO CONE PENETRATION TEST
CPT 07

Form: CPT0004



Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 07
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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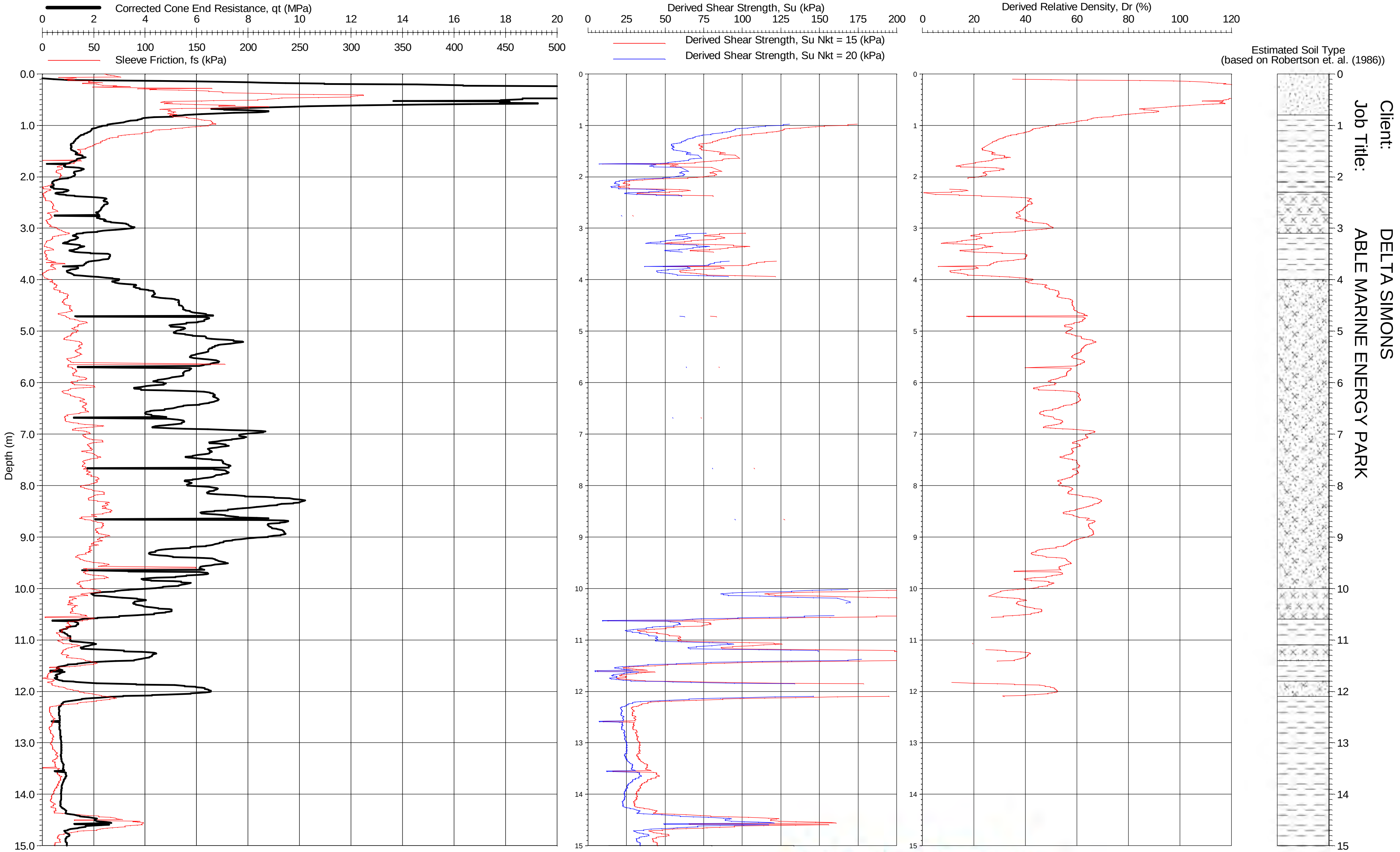
PIEZO CONE PENETRATION TEST

CPT 07

Form: CPT0004



Location: HUMBERSIDE
Coordinates: -
Ground Level: -
Cone & Rig Used: 5405.104 - CPT 001
Remarks: Test refused on total pressure.

Date of Test: 04/02/2011
Date of Plot: 19/04/2011
File Name: 1110107 - CPT 08
Checked By:

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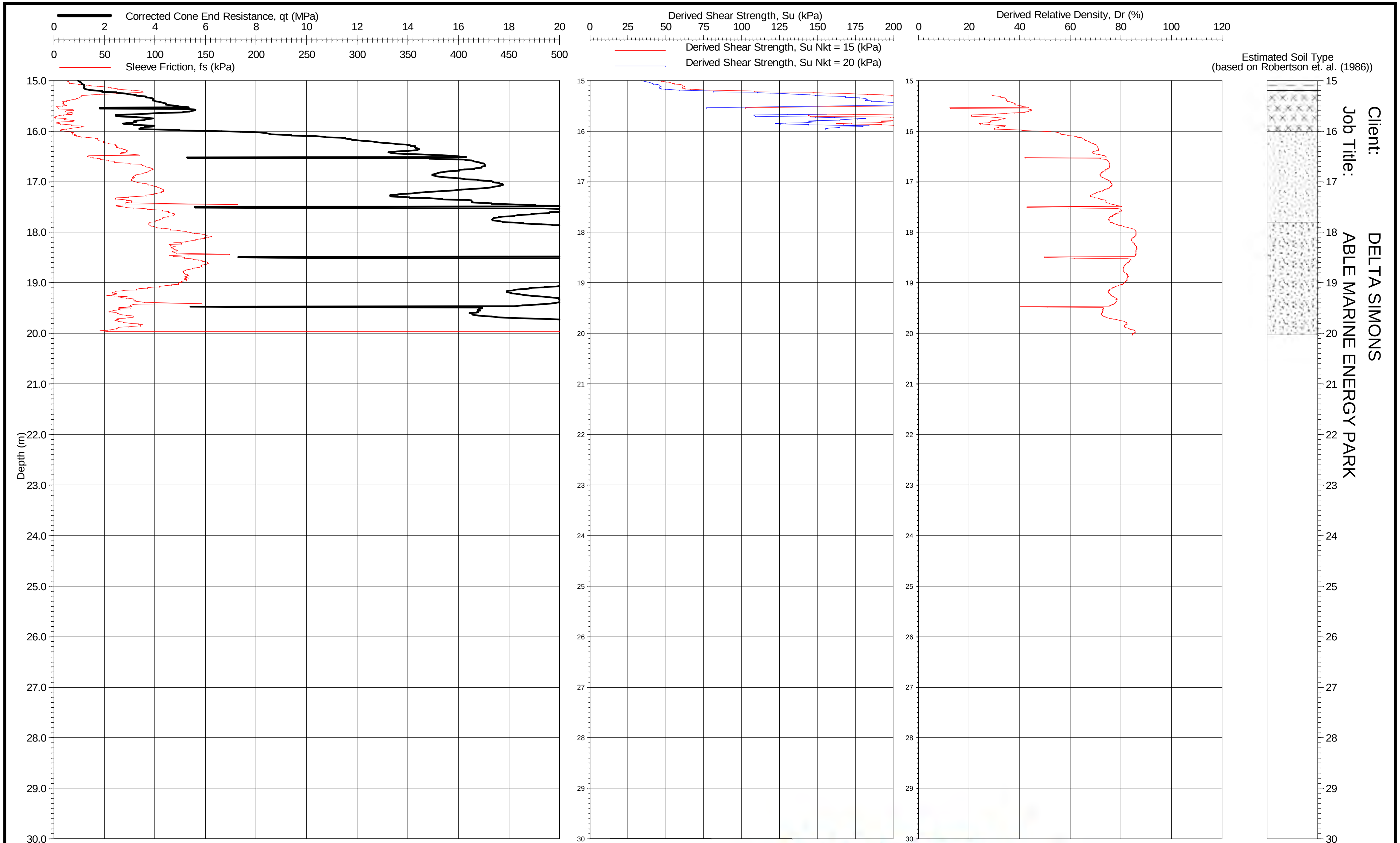
PIEZO CONE PENETRATION TEST
CPT 08

Form: CPT0004



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 08
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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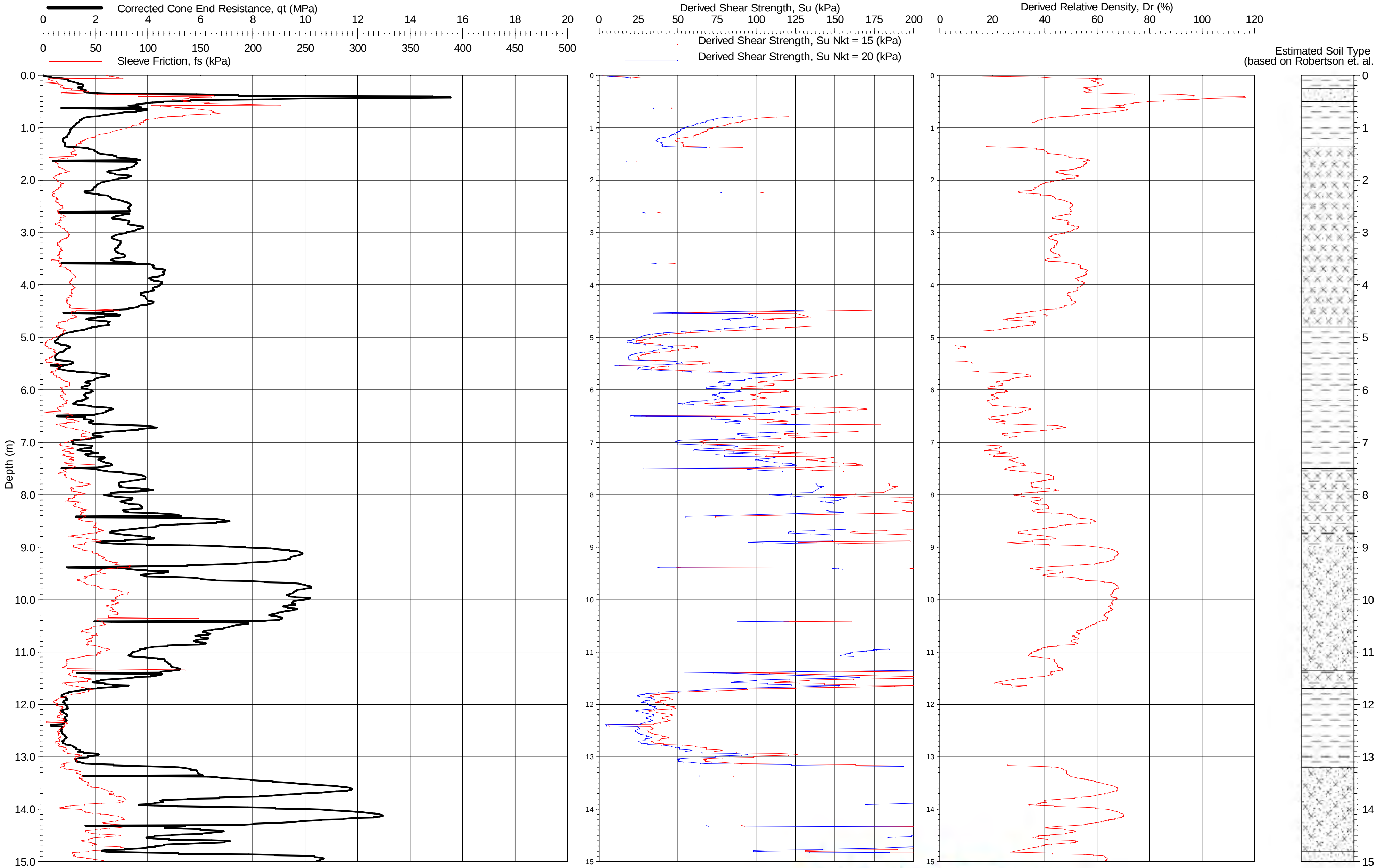
PIEZO CONE PENETRATION TEST
CPT 08

Form: CPT0004

Client: DELTA SIMONS
Job Title: ABLE MARINE ENERGY PARK



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 09
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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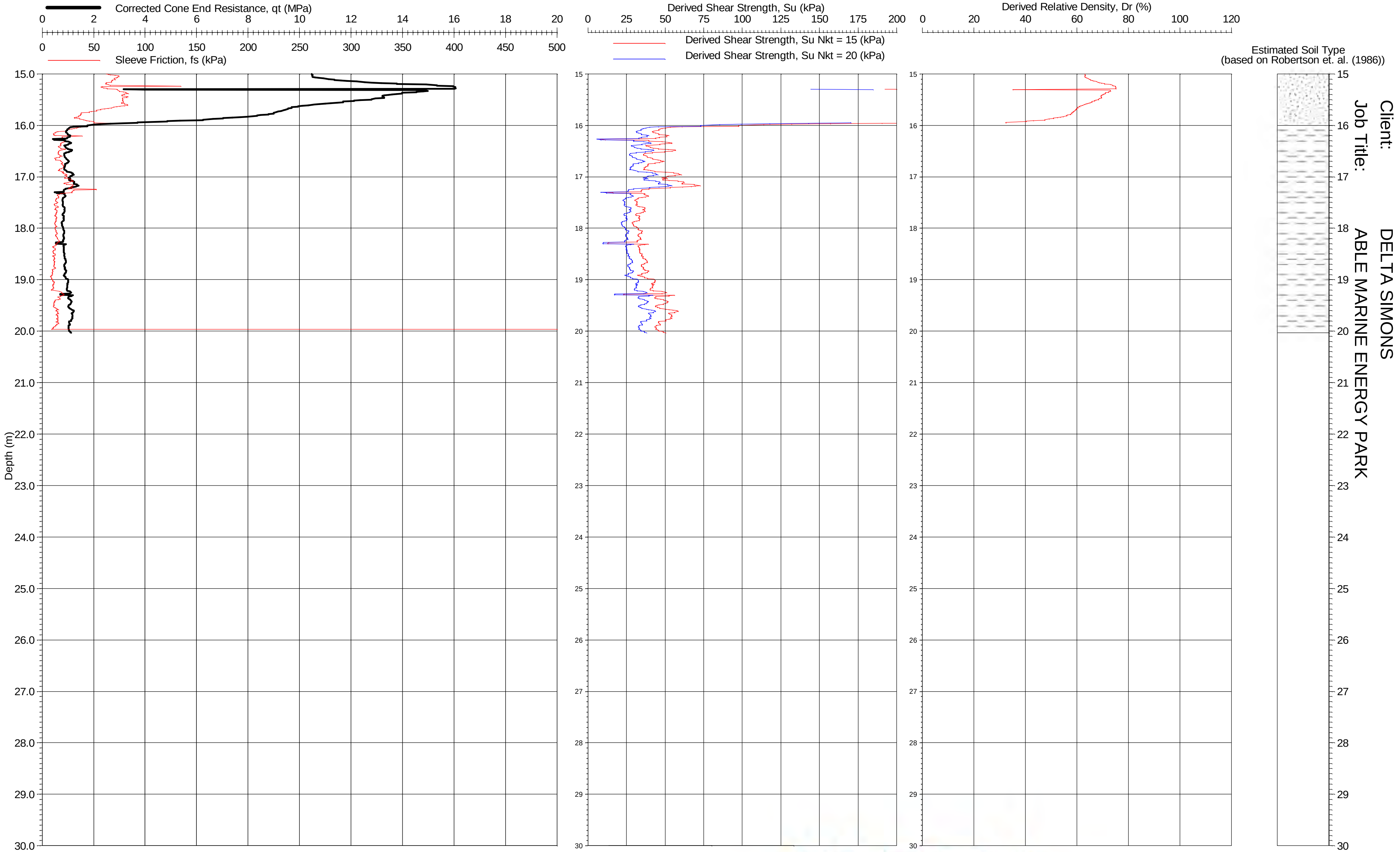
PIEZO CONE PENETRATION TEST
CPT 09

Form: CPT0004



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 09
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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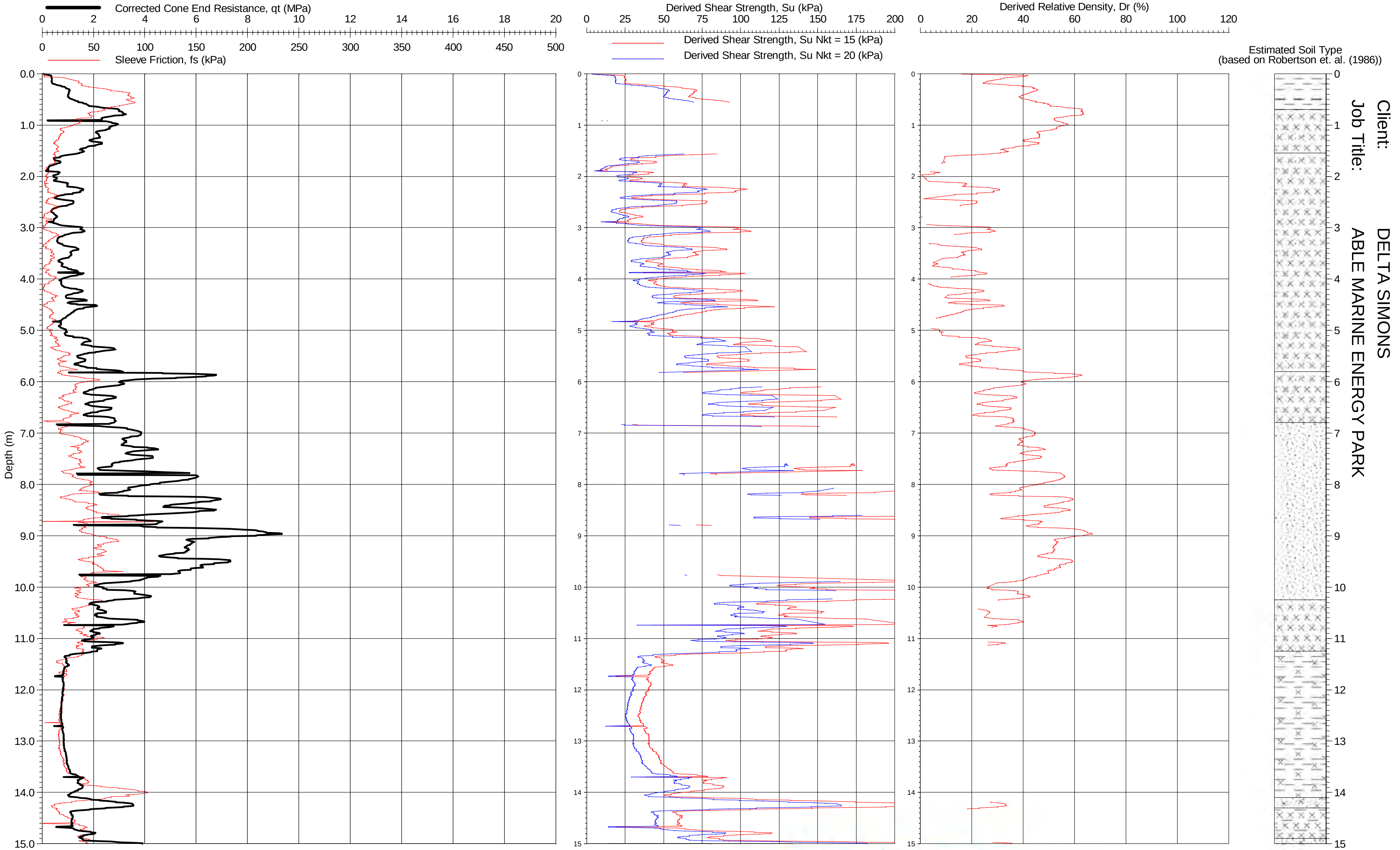
PIEZO CONE PENETRATION TEST

CPT 09

Form: CPT0004



Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 10
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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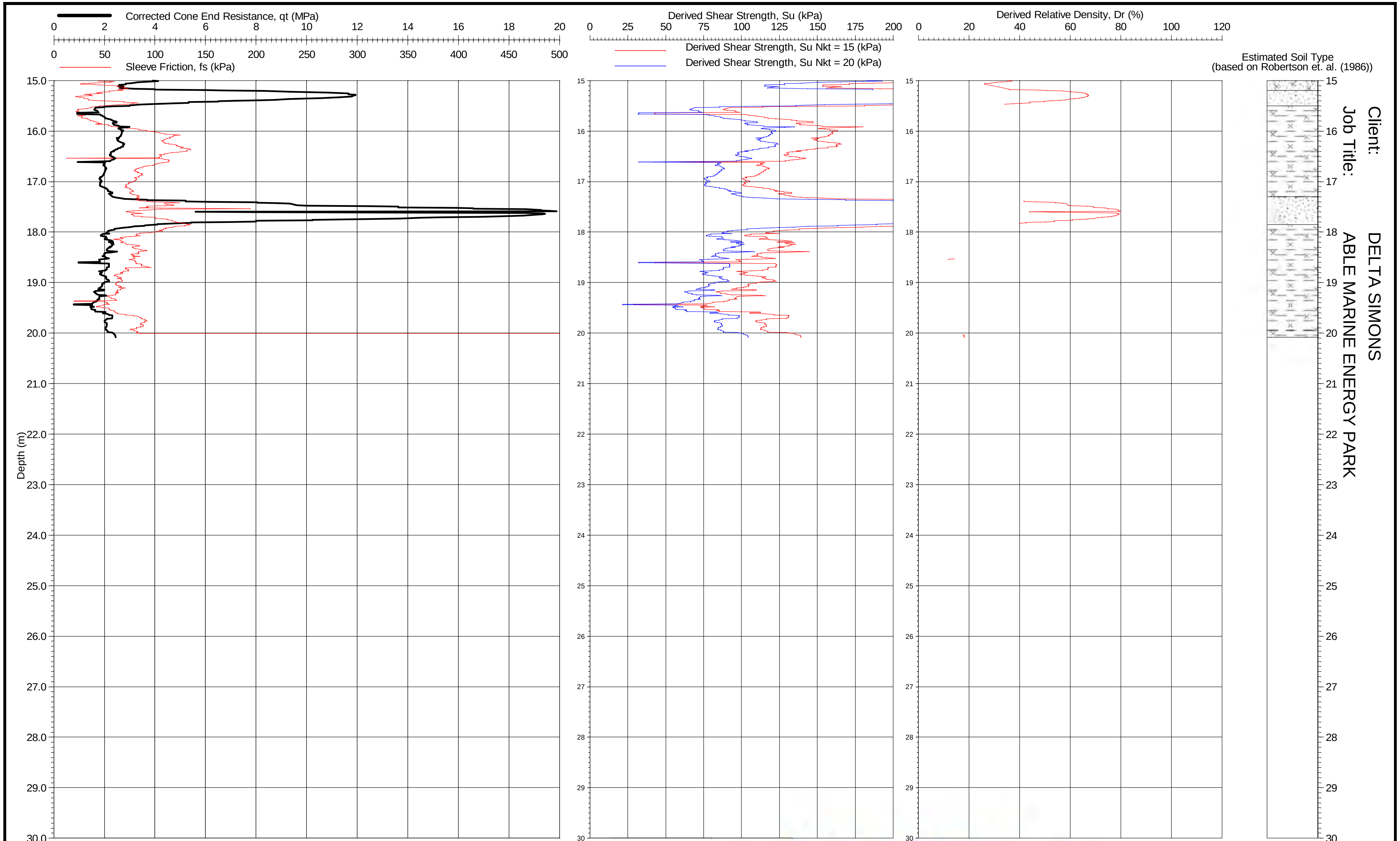
PIEZO CONE PENETRATION TEST
CPT 10

Form: CPT0004



Location: HUMBERSIDE

Coordinates: -

Ground Level: -

Cone & Rig Used: 5405.104 - CPT 001

Remarks: Test refused on total pressure.

Date of Test: 04/02/2011

Date of Plot: 19/04/2011

File Name: 1110107 - CPT 10

Checked By:

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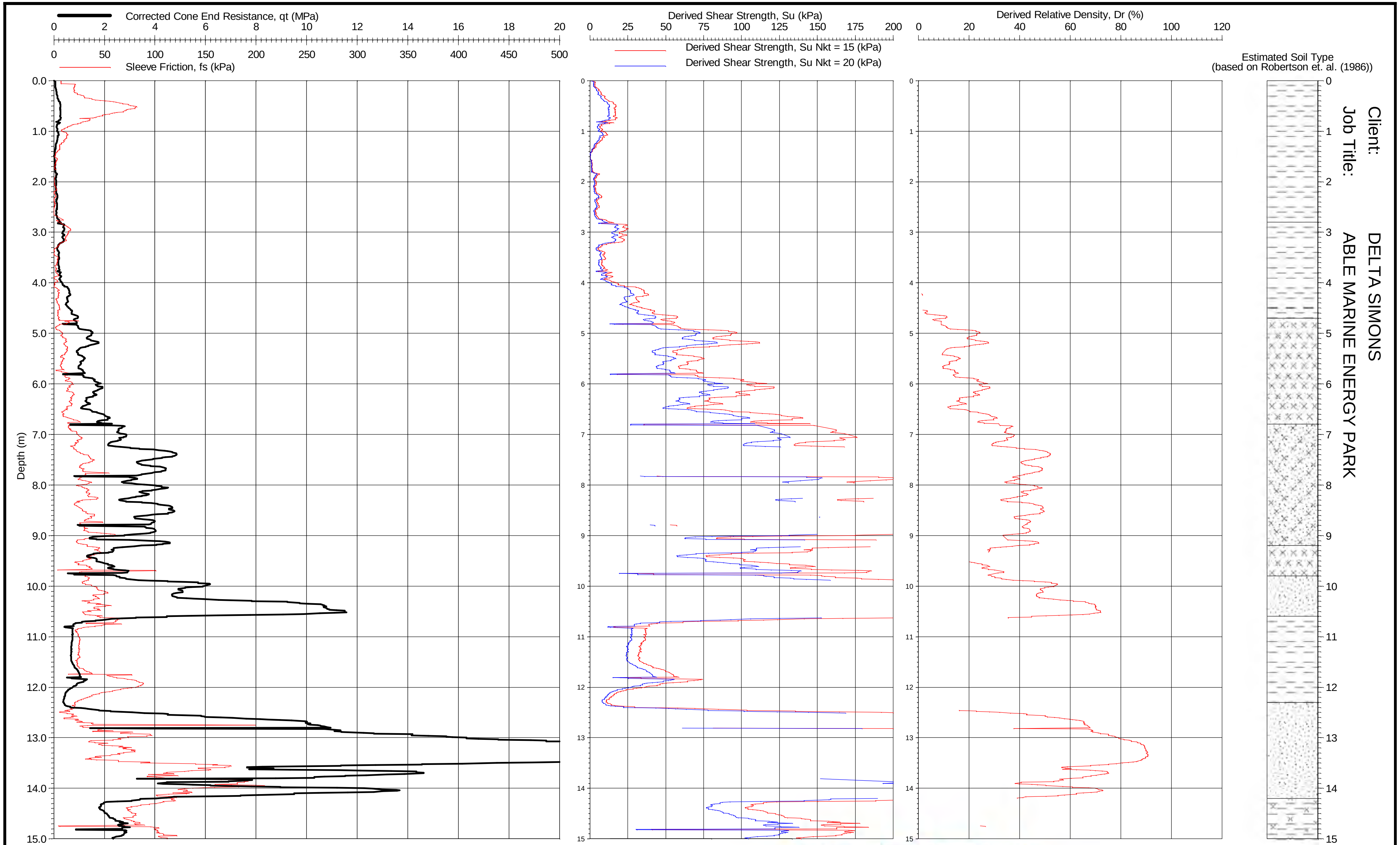
PIEZO CONE PENETRATION TEST

CPT 10

Form: CPT0004



Location: HUMBERSIDE
Coordinates: -
Ground Level: -
Cone & Rig Used: 5405.104 - CPT 001
Remarks: Test refused on total pressure.

Date of Test: 04/02/2011
Date of Plot: 19/04/2011
File Name: 1110107 - CPT 11
Checked By:

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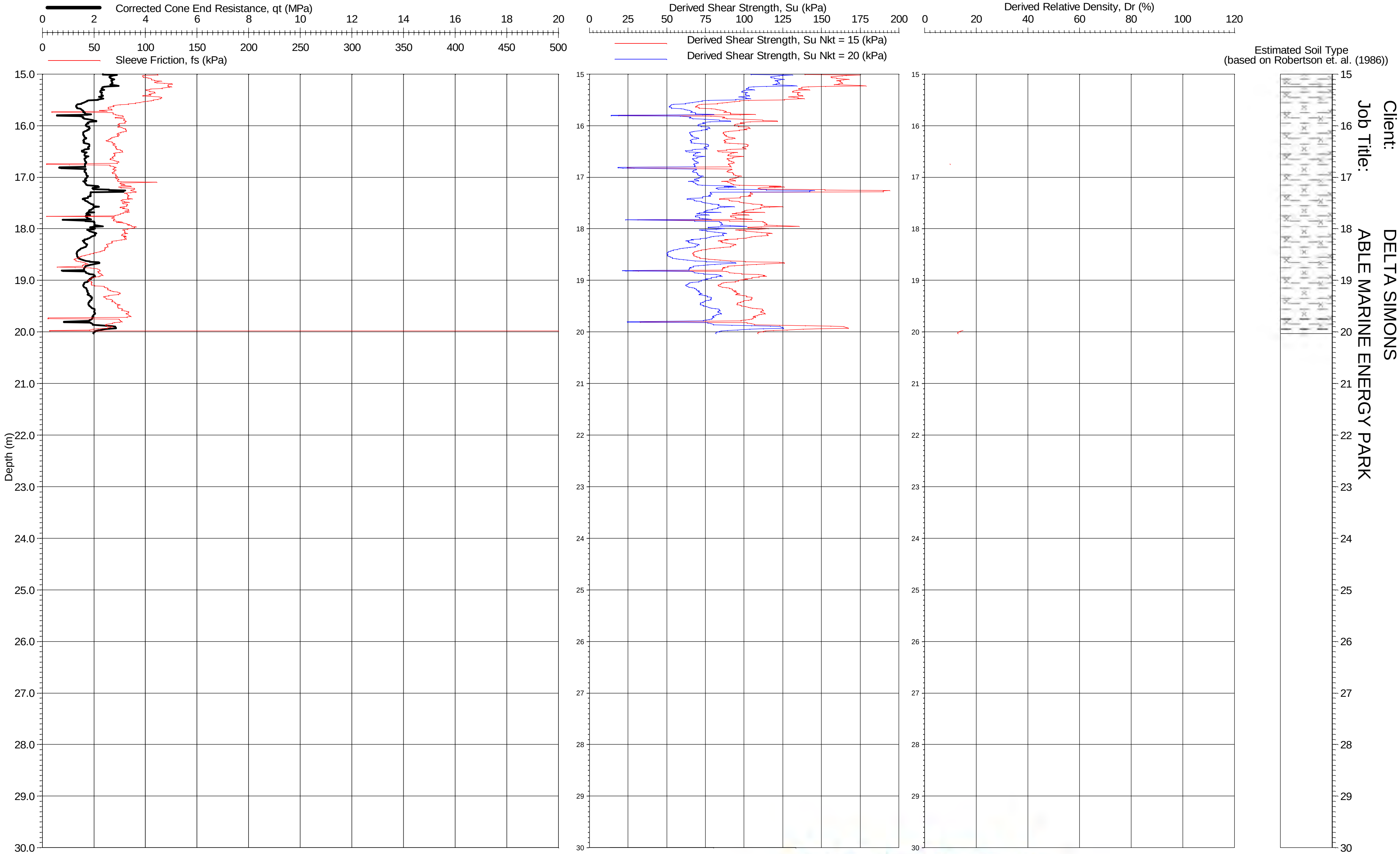
PIEZO CONE PENETRATION TEST
CPT 11

Form: CPT0004



Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 11
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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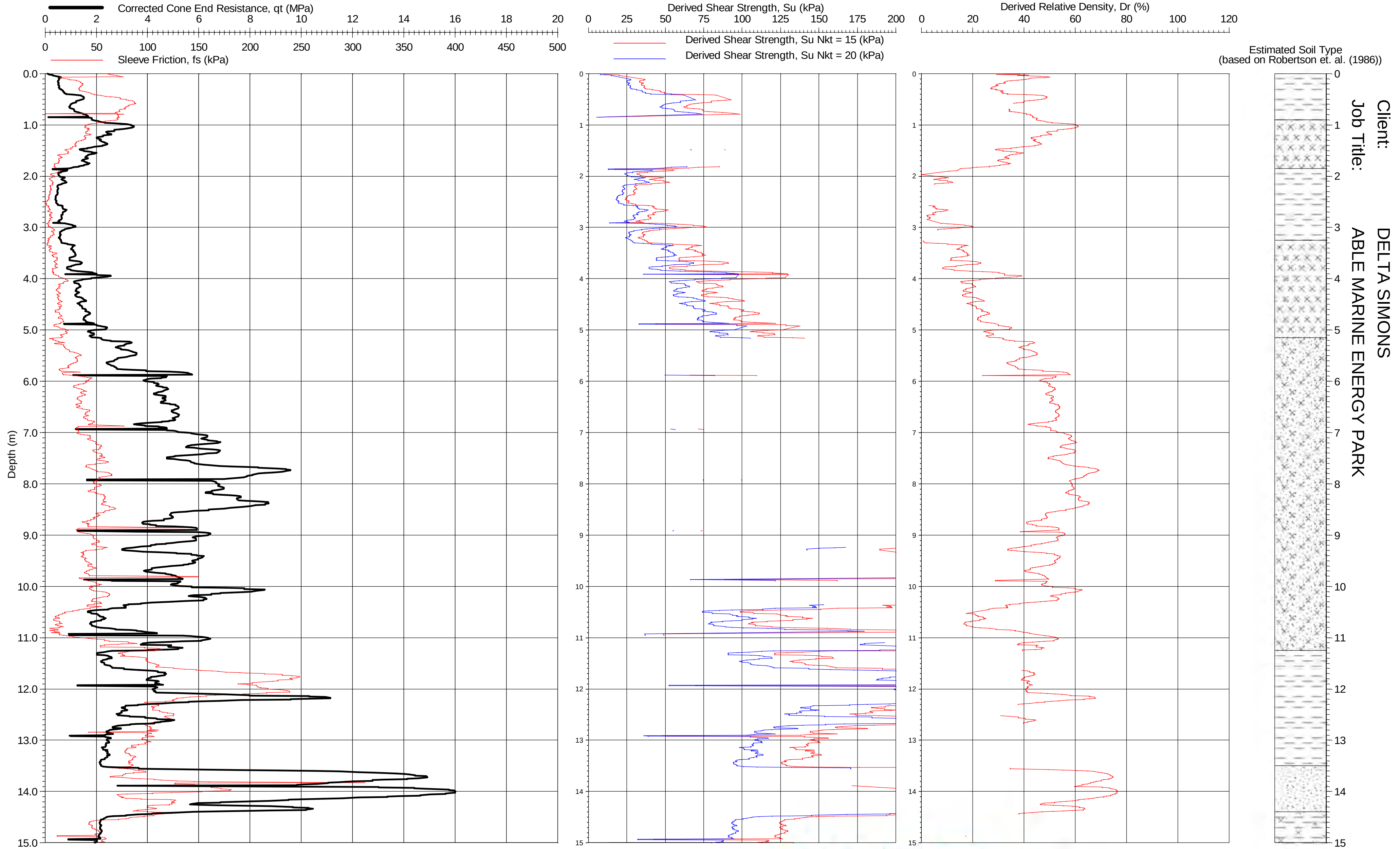
PIEZO CONE PENETRATION TEST

CPT 11

Form: CPT0004



Location: HUMBERSIDE
Coordinates: -
Ground Level: -
Cone & Rig Used: 5405.104 - CPT 001
Remarks: Test refused on total pressure.

Date of Test: 04/02/2011
Date of Plot: 19/04/2011
File Name: 1110107 - CPT 12
Checked By:

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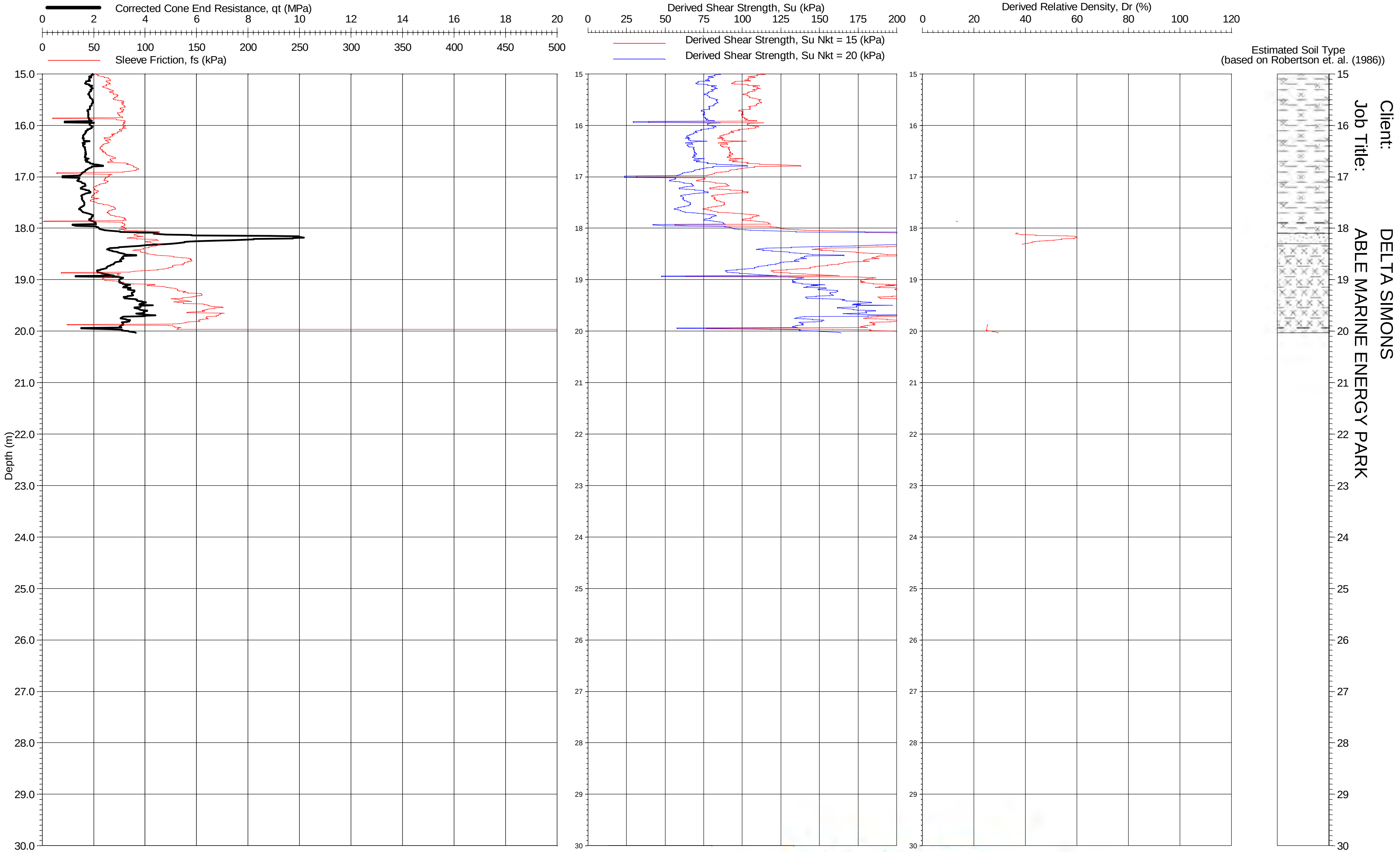
insitusi.com

PIEZO CONE PENETRATION TEST
CPT 12

Form: CPT0004



Client: DELTA SIMONS

Job Title: ABLE MARINE ENERGY PARK

Location:	HUMBERSIDE	Date of Test:	04/02/2011
Coordinates:	-	Date of Plot:	19/04/2011
Ground Level:	-	File Name:	1110107 - CPT 12
Cone & Rig Used:	5405.104 - CPT 001	Checked By:	
Remarks:	Test refused on total pressure.		

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PIEZO CONE PENETRATION TEST

CPT 12

Form: CPT0004

BACTEC International Limited
37 Riverside
Sir Thomas Longley Road
Rochester, Kent
ME2 4DP
United Kingdom

Tel: +44 (0)1634 296757
Fax: +44 (0)1634 296779
E-mail: bactec.int@bactec.com

Branches/Offices in:

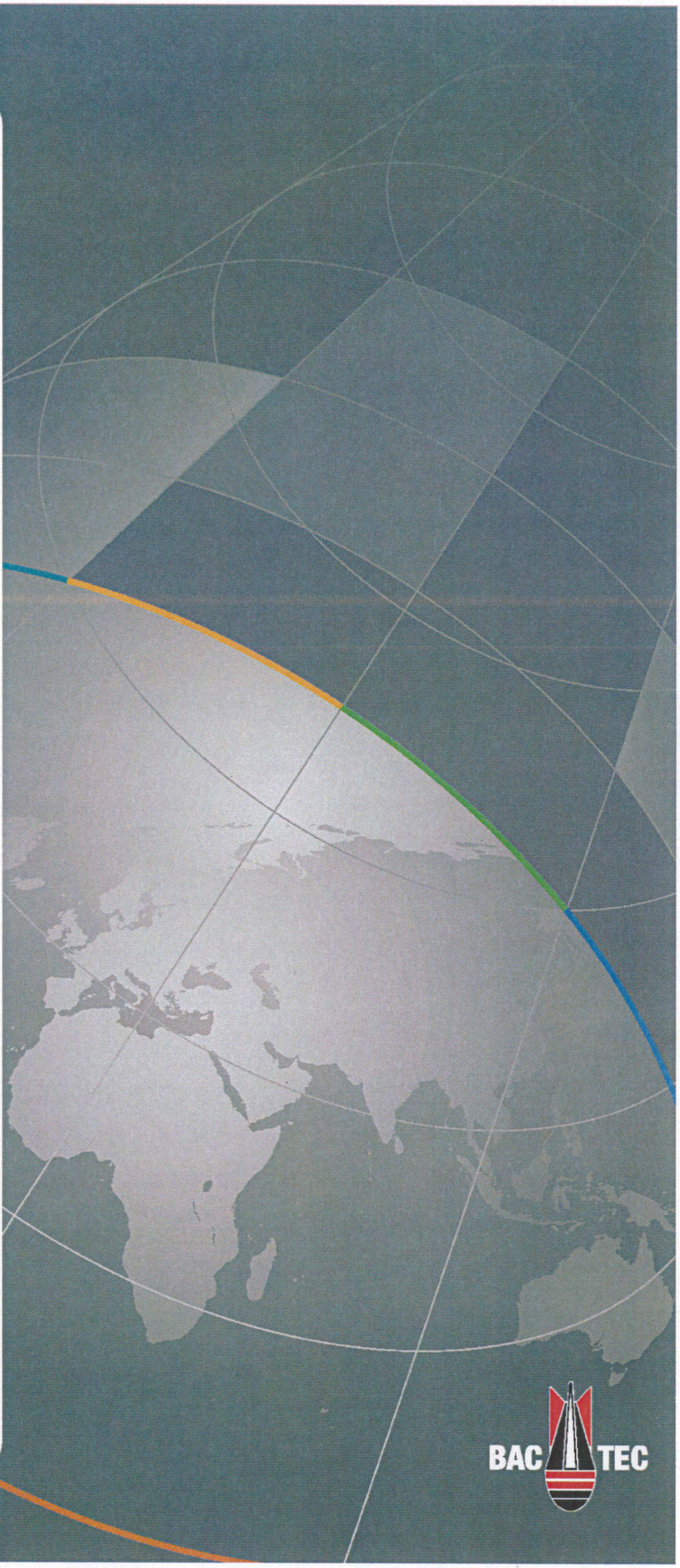
- Australia
- Cambodia
- Lao PDR
- Lebanon
- Libya
- Mozambique

Website: www.bactec.com

LLOYD'S REGISTER QUALITY ASSURANCE ISO14001 UKAS ENVIRONMENTAL MANAGEMENT 001

LLOYD'S REGISTER QUALITY ASSURANCE ISO9001 UKAS QUALITY MANAGEMENT 001

THE QUEEN'S AWARDS FOR ENTERPRISE 2008



BAC TEC

Appendix II

Appendix II

delta-simons
environmental consultants

A different perspective

Delta-Simons Environmental Consultants Ltd.
The Lawn, Union Road, Lincoln LN1 3BL
Tel: 0870 0400 012
Fax: 01522 882567
Email: info@deltasimons.com

delta-simons environmental consultants

BOREHOLE LOG

Project				BH No
Cherry Cobb Sands				BH 1
Job No: 10-2041.01	Date: 03-02-11 04-02-11	Ground Level (m)	Co-Ordinates ()	
Contractor: Delta Driling/Infosoil				Sheet: 1 of 2

SAMPLES & TESTS			Water	STRATA				Geology	Instrument/ Backfill
Depth	Type No	Remarks		Reduced Level	Legend	Depth (Thick-ness)	DESCRIPTION		
0.50-1.00	D					(1.00) 1.00	MADE GROUND: comprising brown and grey clayey fine to medium, and locally coarse, angular red brick fill.		
1.20-1.65	D	N8					Possible MADE GROUND comprising soft to firm light brown, locally silty, sandy, becoming very sandy with depth, clay.		
1.65-2.00	B					(1.30)			
2.00-2.45	U					2.30			
2.65-3.00	B						Loose to medium dense, damp, becoming wet with depth, grey silty fine and medium SAND.		
3.00-4.00	P	No Rec							
4.00-5.00	P	No Rec	1						
5.00-5.45	D	N15							
5.01-6.00	B					(6.50)			
6.20-6.65	D	N12							
6.50-7.00	B								
7.70-8.15	D	N14							

Boring Progress and Water Observations						Chiselling			Water Added		GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt	From	To	Hours	From	To	

All dimensions in metres Scale 1:50	Client: Able (UK)	Method/ Plant Used: Dando 150	Logged By: KDM

Delta-Simons Environmental Consultants Ltd.
The Lawn, Union Road, Lincoln LN1 3BL
Tel: 0870 0400 012
Fax: 01522 882567
Email: info@deltasimons.com

delta-simons environmental consultants

BOREHOLE LOG

Project				BH No
Cherry Cobb Sands				BH 1
Job No: 10-2041.01	Date: 03-02-11 04-02-11	Ground Level (m)	Co-Ordinates ()	
Contractor: Delta Driling/Infosoil				Sheet: 2 of 2

Depth	Type No	Remarks	Water	Reduced Level	Depth (Thickness)	DESCRIPTION	Geology
8.15-9.00	B				8.80	Loose to medium dense, damp, becoming wet with depth, grey silty fine and medium SAND. *(continued)*	
9.30-10.30	P	80% Rec			(1.50) 10.30	Firm grey slighty sandy silty CLAY. Sand is fine.	
10.30-10.75	D	N11				Loose to medium dense wet grey silty fine and medium SAND.	
10.75-11.30	B						
11.80-12.25	D	N11			(2.90)		
12.30-13.00	B				13.20		
13.20-14.20	P	80% Rec				Soft to firm brown and grey sandy CLAY interbedded with thick (200-300mm+) bands of soft brown slighty sandy PEAT. Sand is fine to medium.	
14.20-14.65	D	N16			(2.00)		
14.30-15.00	B						
15.00-15.45	U				15.20		
					15.45	Soft dark brown sandy PEAT. Sand is fine to coarse.	
					15.65	Brown medium SAND.	

Boring Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia. mm	Water Dpt

Chiselling

From	To	Hours

Water Added

From	To

GENERAL REMARKS

All dimensions in metres Scale 1:50	Client: Able (UK)	Method/ Plant Used: Dando 150	Logged By: KDM

Appendix III

delta-simons
environmental consultants

A different perspective

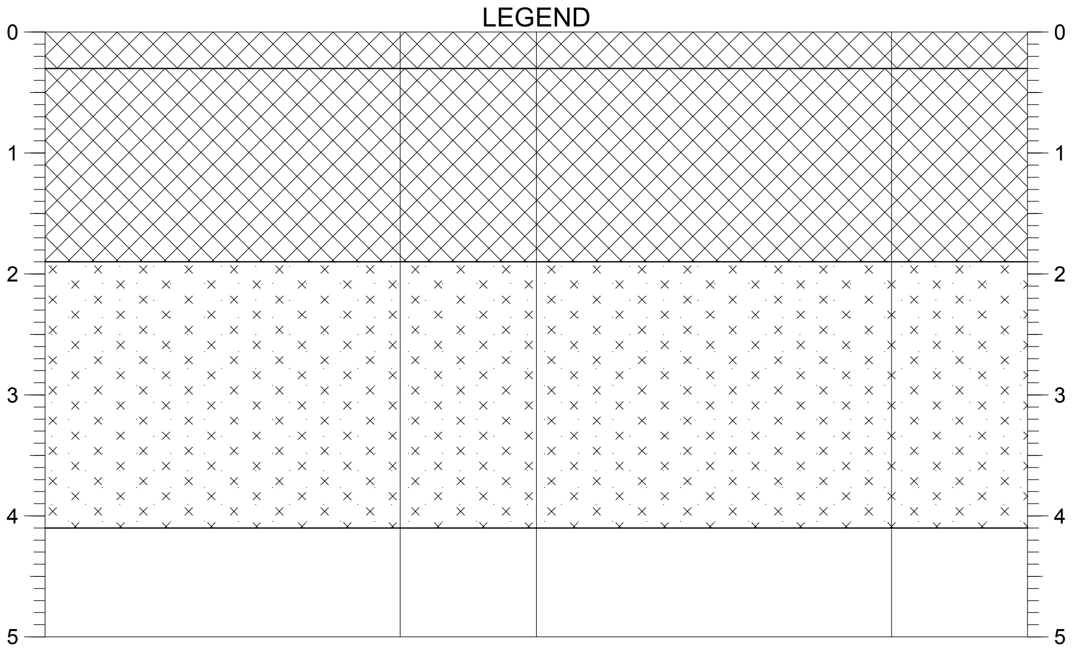
Appendix III

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

delta-simons environmental consultants

Project: **Cherry Cobb Sands**	Project No: **10-2041.01**	**TP 1**
TRIAL PIT LOG	Date Started: **03-02-2011**	Page 1 of 1

LEGEND



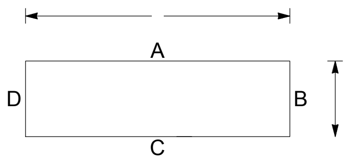
STRATA

Depth	No	DESCRIPTION
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.
0.30		Possible MADE GROUND: comprising light brown soft to firm sandy to very sandy clay, with occasional lenses of medium brown sand.
1.90		Grey sandy SILT. Sand is fine to medium.

SAMPLES & TESTS

Depth	No	PID	HSV	PP
0.00	DS1			
0.50			45	
0.50	1		47	
0.50	2		50	
0.50	3		62	
1.00			60	
1.00	1		58	
1.00	2			
1.00	3			
1.00-1.50	BB1			
1.00	DS2			
2.00-2.50	BB2			
2.00	DS3			
3.00-3.50	BB3			
3.00	DS4			
4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

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The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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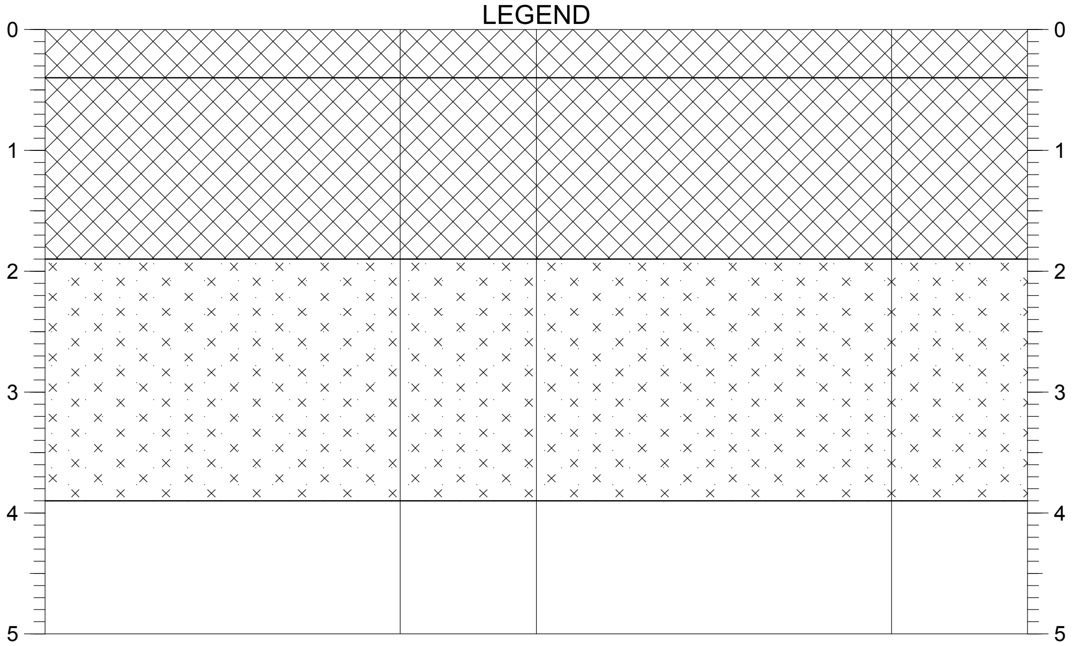
environmental consultants

Project:	Project No:	
Cherry Cobb Sands	**10-2041.01**	**TP 10**
TRIAL PIT LOG	Date Started: **03-02-2011**	

LEGEND



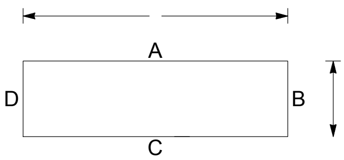
STRATA

Depth	No	DESCRIPTION
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.
0.40		Possible MADE GROUND: comprising light brown silty very clayey sand with some lenses of medium brown silty sand and some pockets of firm light brown silty sandy clay (possible historically reclaimed estuarine alluvium).
1.90		Grey sandy SILT. Sand is fine to medium.

SAMPLES & TESTS

Depth	No	PID	HSV	PP
0.00	DS1			
0.50			38	
0.50	1		46	
0.50	2		44	
0.50	3		64	
1.00			71	
1.00	1		65	
1.00	2			
1.00	3			
1.00-1.50	BB1			
1.00	DS2			
2.00-2.50	BB2			
2.00	DS3			
3.00-3.50	BB3			
3.00	DS4			
4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

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The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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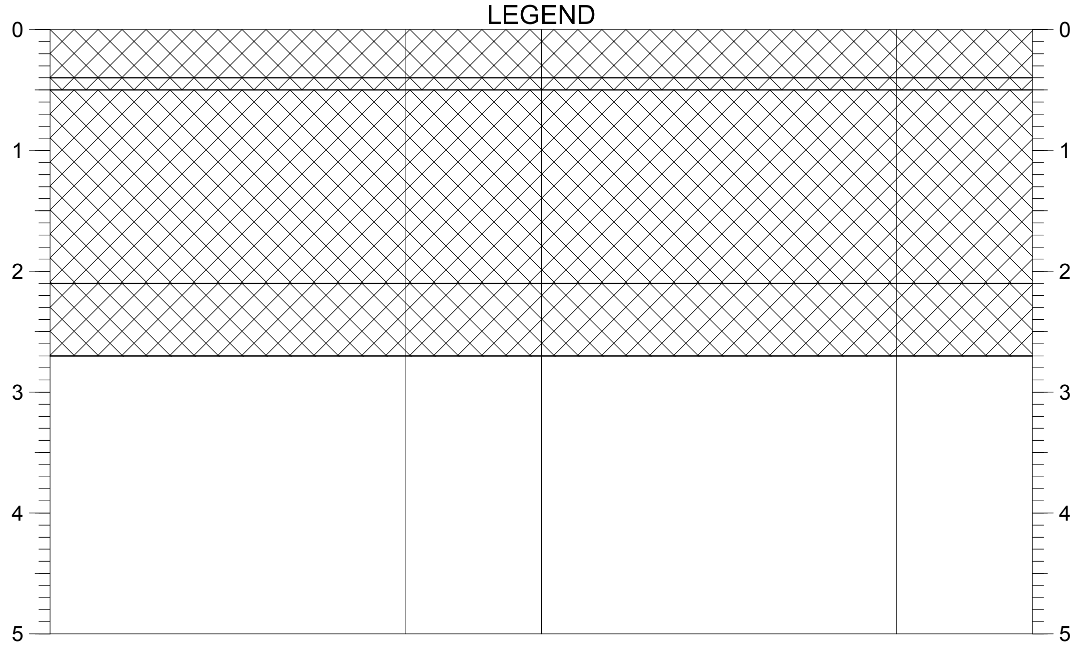
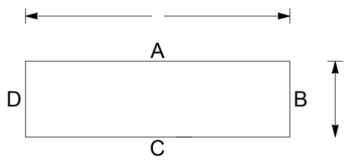
Project: **Cherry Cobb Sands**	Project No: **10-2041.01**	**TP 11**
TRIAL PIT LOG	Date Started: **04-02-2011**	Page 1 of 1

LEGEND



STRATA			SAMPLES & TESTS				
Depth	No	DESCRIPTION	Depth	No	PID	HSV	PP
0.00		MADE GROUND: comprising dark brown sandy gravelly clayey topsoil with occasional fine to medium pottery and glass fragments.	0.20	DS1			
0.40		MADE GROUND: comprising brown fine to medium sandy gravel fill. Gravel is fine to medium angular and subangular concrete and brick fragments.	0.50	DS1			
0.50		MADE GROUND: comprising grey and black clayey fine to coarse sand and fine to coarse subrounded to angular gravel with glass bottles, glass fragments, whole and half house bricks, asbestos sheet fragments, possible asbestos wool, timber and metals fragments. Very strong VOC and hydrocarbon odour noted.	1.10 1.50	DS2 DS3			
2.10		Possible MADE GROUND: very soft slightly gravelly fibrous peat with occasional red brick, glass and pottery fragments.	2.20-2.50 2.20	BB1 DS4			

Shoring/Support:
Stability: Unstable, flooded and collapsing during excavation below 1.50m.



REMARKS:
Trial-pit terminated at 2.70m due to UXO and cross-contamination risk

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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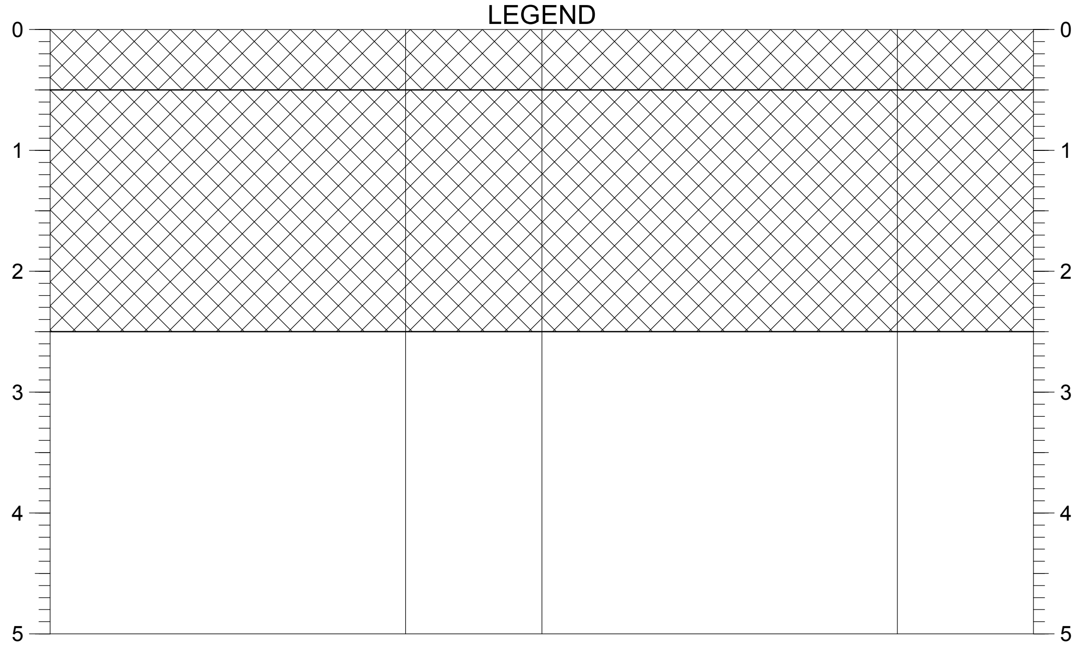
environmental consultants

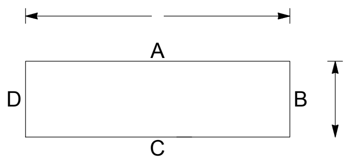
Project:	Project No:	
Cherry Cobb Sands	**10-2041.01**	**TP 12**
TRIAL PIT LOG	Date Started: **04-02-2011**	Page 1 of 1

LEGEND



STRATA			SAMPLES & TESTS				
Depth	No	DESCRIPTION	Depth	No	PID	HSV	PP
0.00		MADE GROUND: comprising dark brown sandy gravelly clayey topsoil with occasional fine to medium pottery and glass fragments.	0.30	DS1			
0.50		MADE GROUND: comprising grey and black fine to coarse sand and fine to coarse subrounded to angular gravel with glass bottles, glass fragments, whole and half house bricks, asbestos sheet fragments, possible asbestos wool, timber and metals fragments and sheets. Very strong VOC and hydrocarbon odour noted.	0.50-1.00	BB1			
			0.50	DS2			
		From 1.10m: becoming clayey and wet	1.20	DS3			
		From 1.90m: becoming locally purple and blue	1.90	DS4			

Shoring/Support:
Stability: Unstable, flooded and collapsing during excavation below 1.50m.



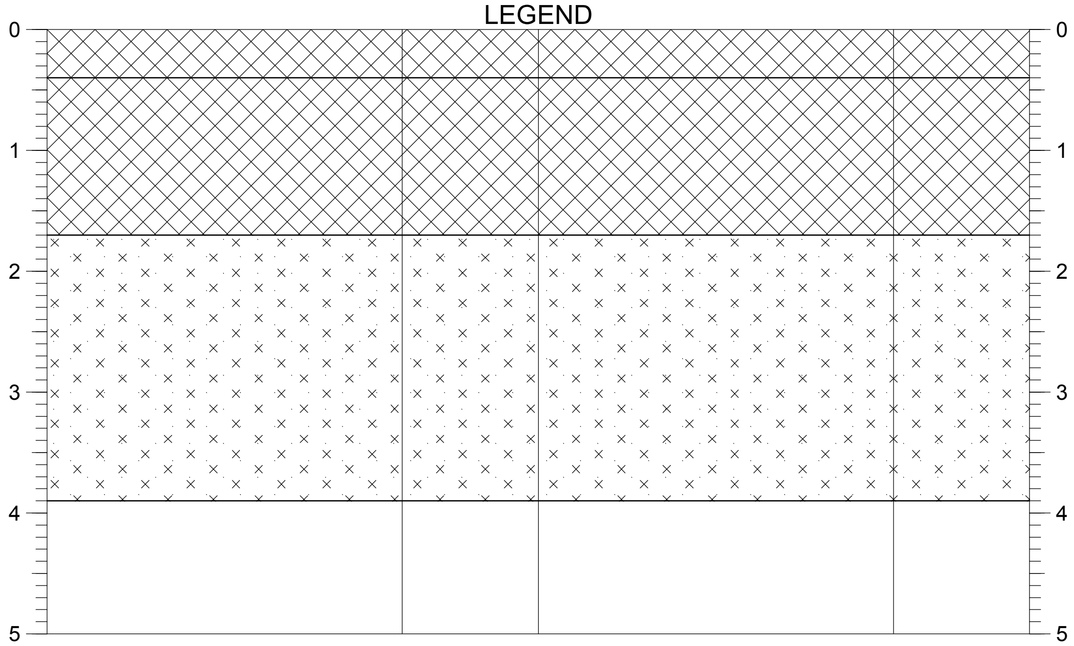
REMARKS:
Trial-pit terminated at 2.50m due to UXO and cross-contamination risk

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

Project: **Cherry Cobb Sands**	Project No: **10-2041.01**	**TP 13**
TRIAL PIT LOG	Date Started: **04-02-2011**	

LEGEND



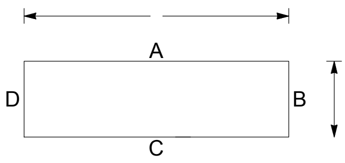
STRATA

Depth	No	DESCRIPTION
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.
0.40		Possible MADE GROUND: comprising light brown very clayey very silty sand with some pockets of soft to firm light brown silty clay (possible historically reclaimed estuarine alluvium).
1.70		Grey sandy SILT. Sand is fine to medium.

SAMPLES & TESTS

Depth	No	PID	HSV	PP
0.00	DS1			
0.50			44	
0.50	1		46	
0.50	2		49	
0.50	3		68	
1.00			64	
1.00	1		60	
1.00	2			
1.00	3			
1.00-1.50	BB1			
1.00	DS2			
2.00-2.50	BB2			
2.00	DS3			
3.00-3.50	BB3			
3.00	DS4			
4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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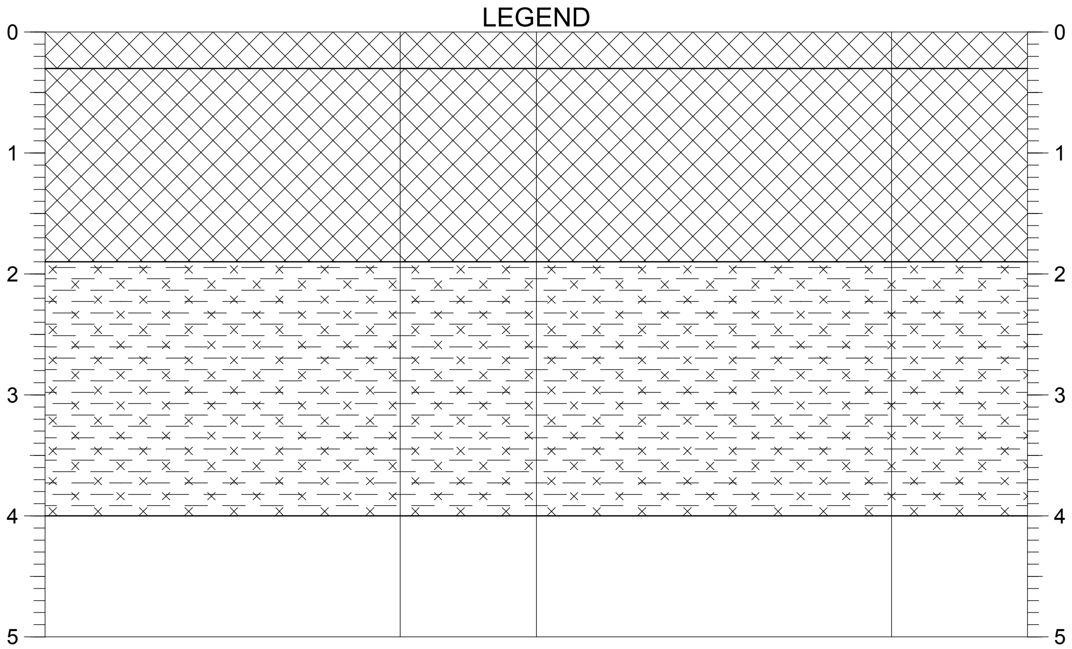
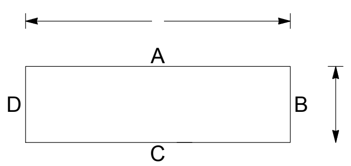
Project:	Project No:	
Cherry Cobb Sands	**10-2041.01**	**TP 14**
TRIAL PIT LOG	Date Started: **04-02-2011**	Page 1 of 1

LEGEND



STRATA			SAMPLES & TESTS				
Depth	No	DESCRIPTION	Depth	No	PID	HSV	PP
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.	0.00	DS1			
0.30		Possible MADE GROUND: comprising light brown soft to firm sandy to very sandy clay.	0.50			47	
			0.50	1		49	
			0.50	2			
			0.50	3		62	
			1.00			64	
			1.00	1		58	
			1.00	2			
			1.00	3			
1.90		Soft, locally firm, grey CLAY interbedded with light grey silt.	1.00-1.50	BB1			
			1.00	DS2			
			2.00-2.50	BB2			
			2.00	DS3			
			3.00-3.50	BB3			
			3.00	DS4			
			4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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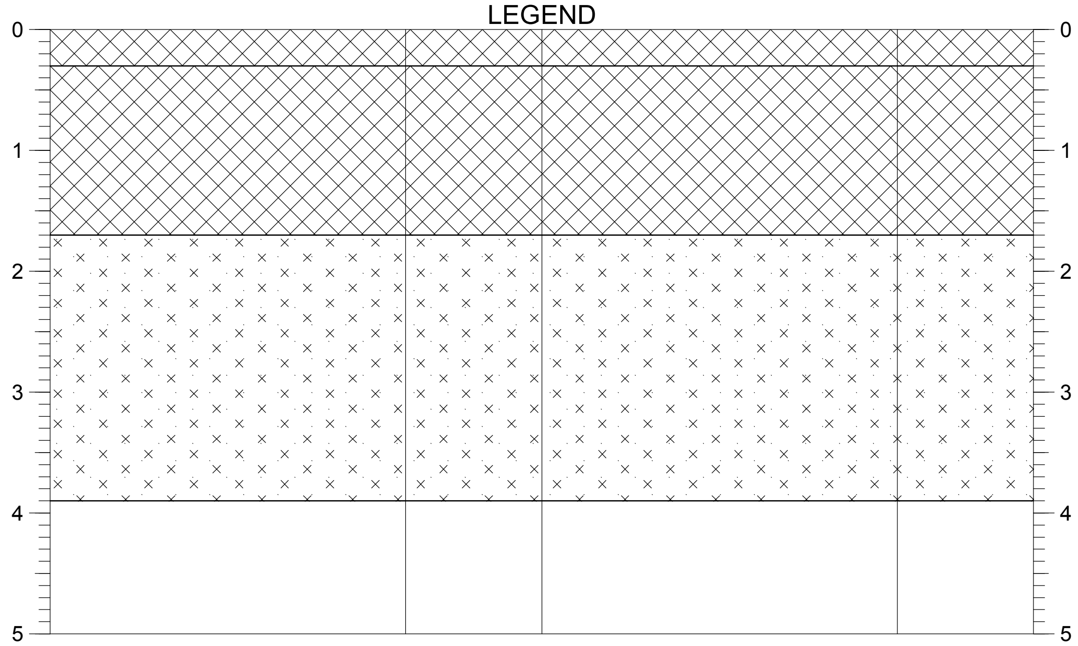
Project: **Cherry Cobb Sands**	Project No: **10-2041.01**	**TP 2**
TRIAL PIT LOG	Date Started: **03-02-2011**	Page 1 of 1

LEGEND



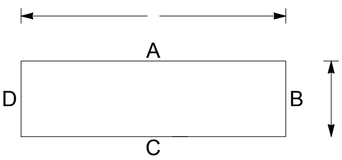
STRATA

Depth	No	DESCRIPTION
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.
0.30		Possible MADE GROUND: comprising light brown soft to firm sandy to very sandy clay, with occasional lenses of medium brown sand.
1.70		Grey sandy SILT. Sand is fine to medium.

SAMPLES & TESTS

Depth	No	PID	HSV	PP
0.00	DS1			
0.50			48	
0.50	1		46	
0.50	2		50	
0.50	3		58	
1.00			60	
1.00	1		56	
1.00	2			
1.00	3			
1.00-1.50	BB1			
1.00	DS2			
2.00-2.50	BB2			
2.00	DS3			
3.00-3.50	BB3			
3.00	DS4			
4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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Project: **Cherry Cobb Sands**

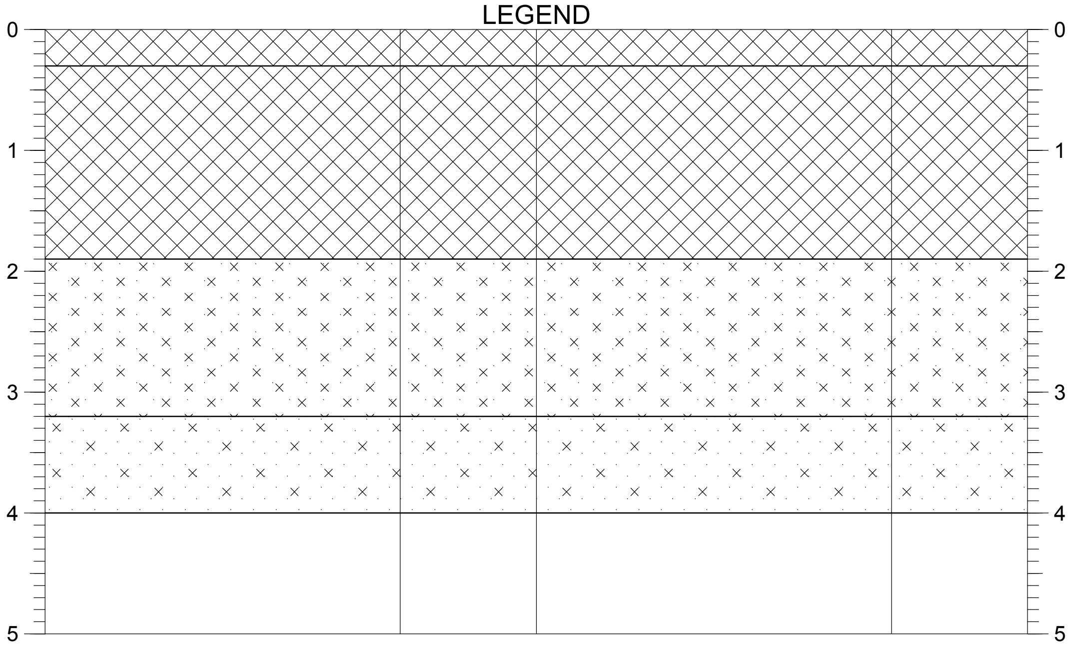
Project No: **10-2041.01**

TP 3

TRIAL PIT LOG

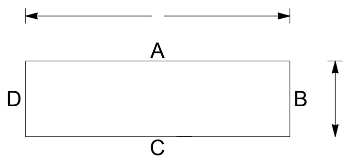
Date Started: **03-02-2011**

LEGEND



STRATA			SAMPLES & TESTS				
Depth	No	DESCRIPTION	Depth	No	PID	HSV	PP
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.	0.00	DS1			
0.30		Possible MADE GROUND: comprising light brown soft to firm sandy to very sandy clay, with occasional lenses of medium brown sand.	0.50			50	
			0.50	1		48	
			0.50	2		50	
			0.50	3		64	
			1.00			66	
			1.00	1		64	
			1.00	2			
			1.00	3			
1.90		Grey sandy SILT. Sand is fine to medium.	1.00-1.50	BB1			
			1.00	DS2			
			2.00-2.50	BB2			
			2.00	DS3			
			3.00-3.20	BB3			
3.20		Wet light grey silty medium SAND.	3.00	DS4			
			3.50-4.00	BB4			
			4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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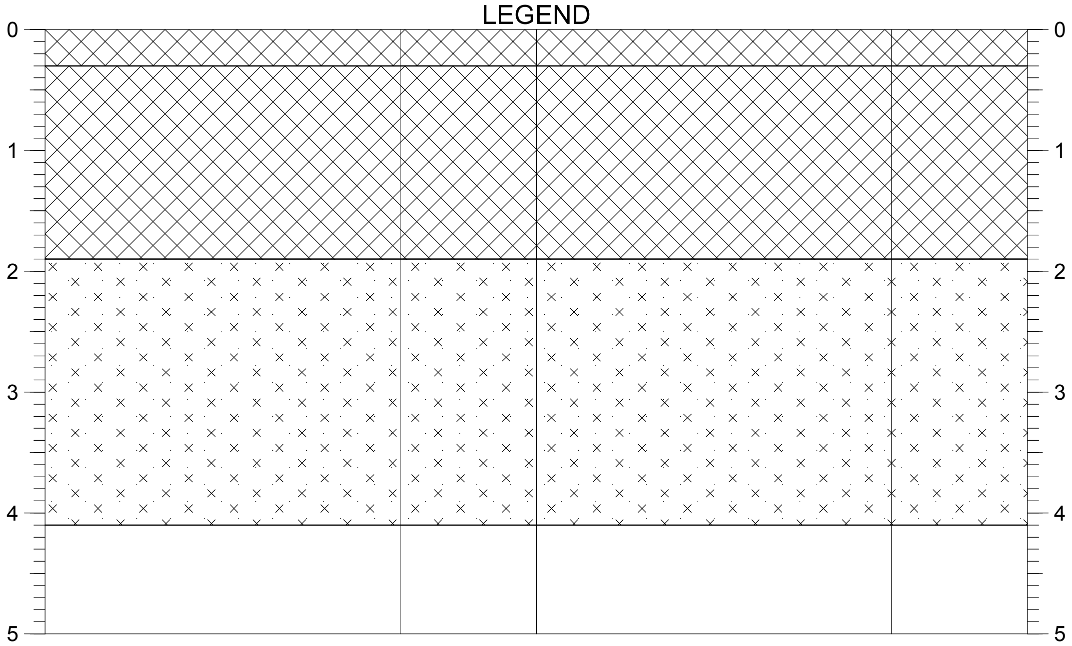
Project:	Project No:	
Cherry Cobb Sands	**10-2041.01**	**TP 4**
TRIAL PIT LOG	Date Started: **03-02-2011**	Page 1 of 1

LEGEND



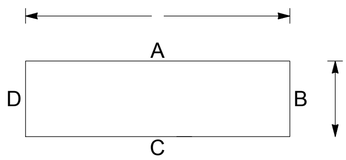
STRATA

Depth	No	DESCRIPTION
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.
0.30		Possible MADE GROUND: comprising light brown soft to firm sandy to very sandy clay, with occasional lenses of medium brown sand.
1.90		Grey sandy SILT. Sand is fine to medium.

SAMPLES & TESTS

Depth	No	PID	HSV	PP
0.00	DS1			
0.50			42	
0.50	1		46	
0.50	2		44	
0.50	3		61	
1.00			60	
1.00	1		67	
1.00	2			
1.00	3			
1.00-1.50	BB1			
1.00	DS2			
2.00-2.50	BB2			
2.00	DS3			
3.00-3.50	BB3			
3.00	DS4			
4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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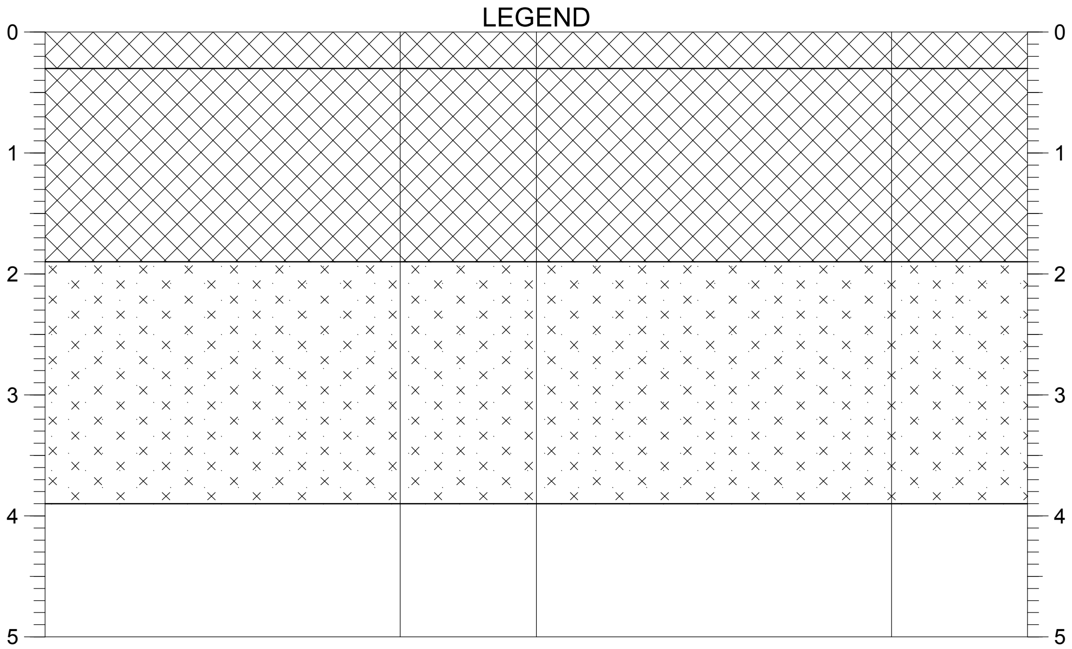
Project: **Cherry Cobb Sands**	Project No: **10-2041.01**	**TP 5**
TRIAL PIT LOG	Date Started: **03-02-2011**	Page 1 of 1

LEGEND



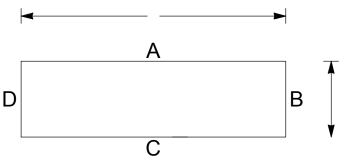
STRATA

Depth	No	DESCRIPTION
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.
0.30		Possible MADE GROUND: comprising light brown soft to firm sandy to very sandy clay, with occasional lenses of medium brown sand.
1.90		Grey sandy SILT. Sand is fine to medium.

SAMPLES & TESTS

Depth	No	PID	HSV	PP
0.00	DS1			
0.50			50	
0.50	1		48	
0.50	2		50	
0.50	3		58	
1.00			64	
1.00	1		68	
1.00	2			
1.00	3			
1.00-1.50	BB1			
1.00	DS2			
2.00-2.50	BB2			
2.00	DS3			
3.00-3.50	BB3			
3.00	DS4			
4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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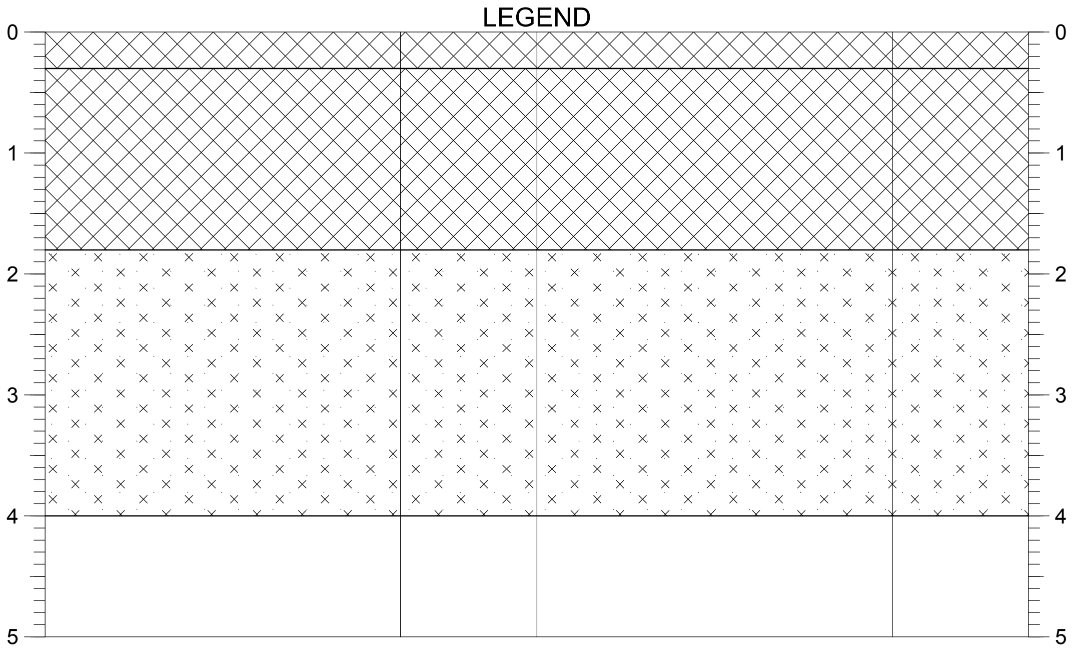
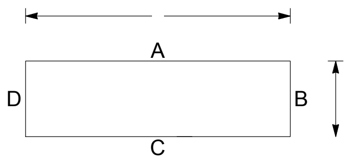
Project:	Project No:	
Cherry Cobb Sands	**10-2041.01**	**TP 6**
TRIAL PIT LOG	Date Started: **03-02-2011**	Page 1 of 1

LEGEND



STRATA			SAMPLES & TESTS				
Depth	No	DESCRIPTION	Depth	No	PID	HSV	PP
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.	0.00	DS1			
0.30		Possible MADE GROUND: comprising light brown clayey very sandy silt with occasional lenses of medium brown sand and pockets of firm light brown clay (possible historically reclaimed estuarine alluvium).	0.50			50	
			0.50	1		52	
			0.50	2		50	
			0.50	3		66	
			1.00			62	
			1.00	1		74	
			1.00	2			
1.80		Grey sandy SILT. Sand is fine to medium.	1.00	3			
			1.00-1.50	BB1			
			1.00	DS2			
			2.00-2.50	BB2			
			2.00	DS3			
			3.00-3.50	BB3			
			3.00	DS4			
			4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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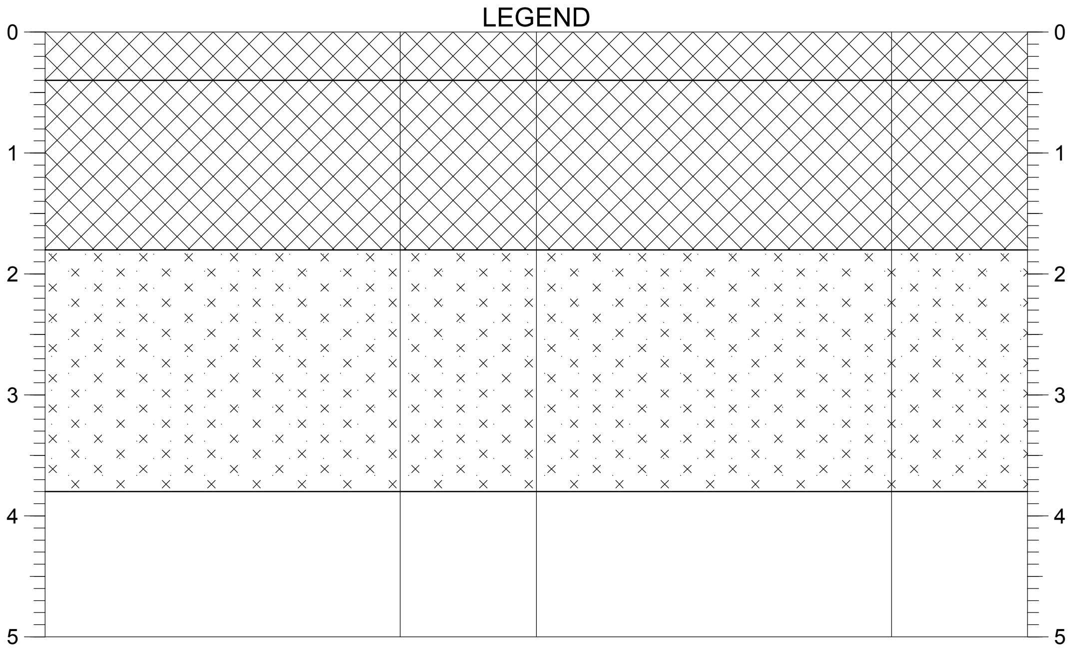
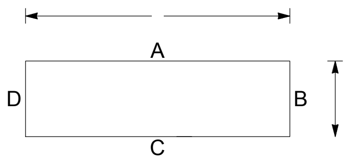
Project: **Cherry Cobb Sands**	Project No: **10-2041.01**	**TP 7**
TRIAL PIT LOG	Date Started: **03-02-2011**	Page 1 of 1

LEGEND



STRATA			SAMPLES & TESTS				
Depth	No	DESCRIPTION	Depth	No	PID	HSV	PP
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.	0.00	DS1			
0.40		Possible MADE GROUND: comprising light brown clayey very sandy silt with frequent lenses of medium brown sand and some pockets of soft to firm light brown very sandy clay (possible historically reclaimed estuarine alluvium).	0.50			42	
			0.50	1		43	
			0.50	2		49	
			0.50	3		62	
			1.00			64	
			1.00	1		63	
			1.00	2			
1.80		Grey sandy SILT. Sand is fine to medium.	1.00	3			
			1.00-1.50	BB1			
			1.00	DS2			
			2.00-2.50	BB2			
			2.00	DS3			
			3.00-3.50	BB3			
			3.00	DS4			
			4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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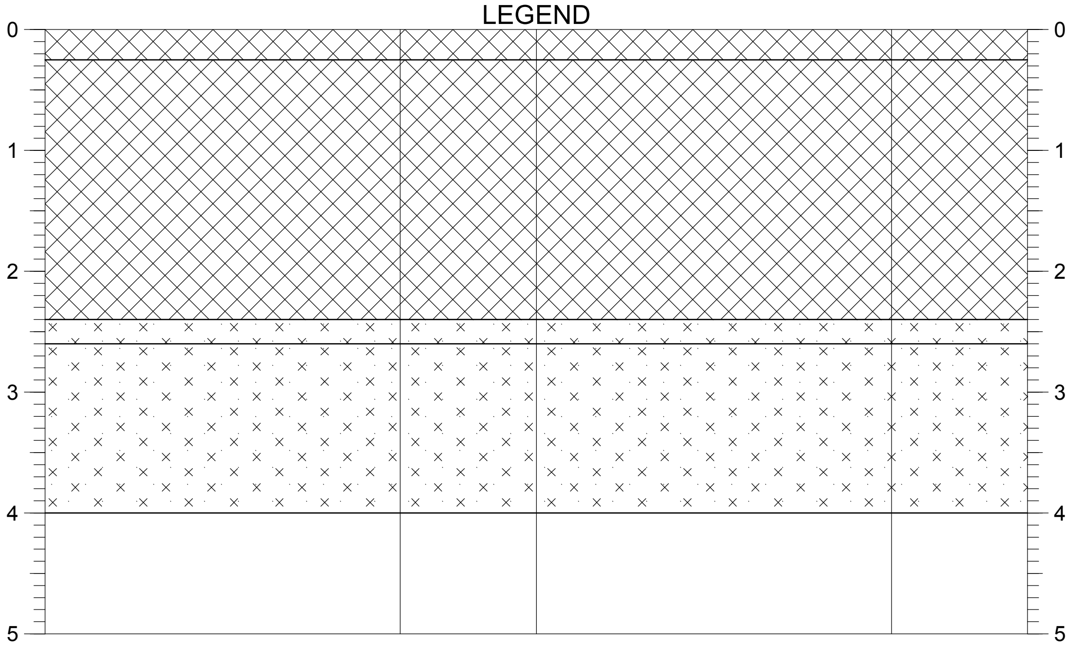
Project:	Project No:	
Cherry Cobb Sands	**10-2041.01**	**TP 8**
TRIAL PIT LOG	Date Started: **03-02-2011**	Page 1 of 1

LEGEND



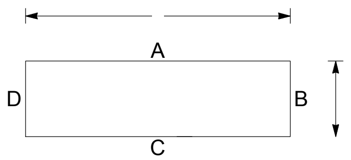
STRATA

Depth	No	DESCRIPTION
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.
0.25		Possible MADE GROUND: comprising light brown clayey very silty sand with some lenses of medium brown sand and some pockets of soft to firm light brown silty clay (possible historically reclaimed estuarine alluvium).
2.40		Light brown silty fine SAND.
2.60		Grey sandy SILT. Sand is fine to medium.

SAMPLES & TESTS

Depth	No	PID	HSV	PP
0.00	DS1			
0.50			42	
0.50	1		48	
0.50	2		46	
0.50	3		64	
1.00			68	
1.00	1		63	
1.00	2			
1.00	3			
1.00-1.50	BB1			
1.00	DS2			
2.00-2.50	BB2			
2.00	DS3			
3.00-3.50	BB3			
3.00	DS4			
4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Delta Simons Environmental Consultants Ltd
The Lawn, Union Road,
Lincoln LN1 3BL
Tel: 08700 400 012
Fax: 01522 882 567
Email: info@deltasimons.com

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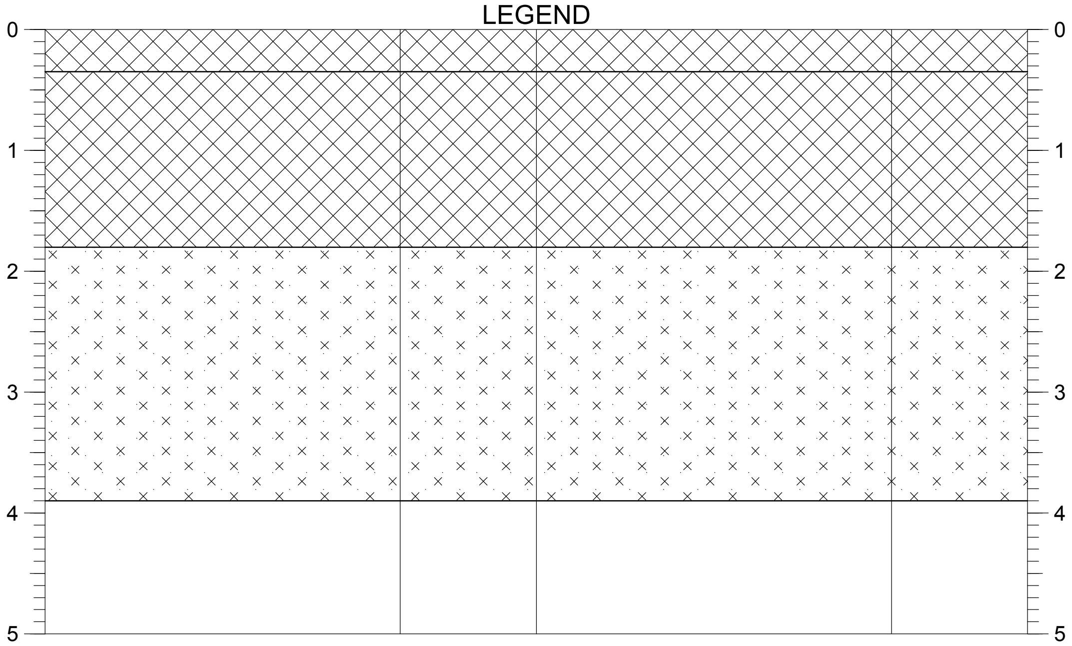
Project:	Project No:	
Cherry Cobb Sands	**10-2041.01**	**TP 9**
TRIAL PIT LOG	Date Started: **04-02-2011**	

LEGEND



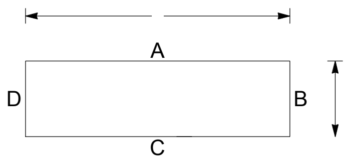
STRATA

Depth	No	DESCRIPTION
0.00		MADE GROUND: comprising brown sandy clayey reworked topsoil with frequent rootlets. Sand is fine to medium.
0.35		Possible MADE GROUND: comprising light brown clayey very silty sand with some lenses of medium brown sand and some pockets of soft to firm light brown silty clay (possible historically reclaimed estuarine alluvium).
1.80		Grey sandy SILT. Sand is fine to medium.

SAMPLES & TESTS

Depth	No	PID	HSV	PP
0.00	DS1			
0.50			49	
0.50	1		47	
0.50	2		52	
0.50	3		62	
1.00			66	
1.00	1		63	
1.00	2			
1.00	3			
1.00-1.50	BB1			
1.00	DS2			
2.00-2.50	BB2			
2.00	DS3			
3.00-3.50	BB3			
3.00	DS4			
4.00	DS4			

Shoring/Support:
Stability: Unstable below 3.0m, pit collapsed on completion.



REMARKS:

Plant Used:	Coordinates / Level (AOD):	Logged By:	Checked By:	Approved By:
3CX		KDM		

Appendix **IV**

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A different perspective

Appendix **IV**

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 1

Photograph 2 – Trial Pit 1 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 2

Photograph 2 – Trial Pit 2 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 3

Photograph 2 – Trial Pit 3 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 4

Photograph 2 – Trial Pit 4 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 5

Photograph 2 – Trial Pit 5 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 6

Photograph 2 – Trial Pit 6 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 7

Photograph 2 – Trial Pit 7 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 8

Photograph 2 – Trial Pit 8 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 9

Photograph 2 – Trial Pit 9 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 10

Photograph 2 – Trial Pit 10 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 11

Photograph 2 – Trial Pit 11 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 12

Photograph 2 – Trial Pit 12 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 13

Photograph 2 – Trial Pit 13 Spoil

CHERRY COBB SANDS
Delta-Simons Project No. 10-2041.01

Photograph 1 – Trial Pit 14

Photograph 2 – Trial Pit 14 Spoil

Appendix **V**

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A different perspective

BACTEC | Globally Trusted Locally Dependable

Explosive Ordnance Threat Assessment
in respect of
Able Marine Energy Park, Hull
for
Delta Simons

3433TA

19th January 2011

BACTEC

Explosive Ordnance Threat Assessment

in respect of

Able Marine Energy Park, Hull

for

Delta Simons

3433TA 19th January 2011

BACTEC International Limited
37 Riverside, Sir Thomas Longley Road, Rochester, Kent ME2 4DP, UK
Tel: +44 (0) 1634 296757 **Fax:** +44 (0) 1634 296779
Email: bactec.int@bactec.com
www.bactec.com

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Date of Issue: 19th January 2011 Copy no. 2

Originator: CRB

This Report has been produced in compliance with the Construction Industry Research and Information Association guidelines for the preparation of Detailed Risk Assessments in the management of UXO risks in the construction industry.

Glossary of Terms

AAA	Anti-Aircraft Artillery
ARP	Air-raid Precautions
BDO	Bomb Disposal Officer
EOD	Explosive Ordnance Disposal (current term for “bomb” disposal)
HE	High Explosive
HG	Home Guard
IB	Incendiary Bomb
kg	Kilogram
LCC	London County Council
LM	Land Mine
LSA	Land Service Ammunition (includes grenades, mortars, etc.)
Luftwaffe	German Air Force
m bgl	Metres Below Ground Level
MoD	Ministry of Defence
OB	Oil Bomb
PM	Parachute Mine
RAF	Royal Air Force
SI	Site Investigation
SAA	Small Arms Ammunition (small calibre cartridges used in rifles & machine guns)
UXB	Unexploded Bomb
UXO	Unexploded Ordnance
V-1	“Doodlebug” the first cruise type missile, used against London from June 1944. Also known as ‘Flying Bomb’.
V-2	The first ballistic missile, used against London from September 1944
WWI	First World War (1914 -1918)
WWII	Second World War (1939 – 1945)

Executive Summary

The Site: Located in the eastern part of Kingston upon Hull, the site is situated to the northern bank of the Humber Estuary. It is bounded by Cherry Cobb Sands Road to the north, existing flood defences and mudflats to the south, with undeveloped agricultural fields to the east and west in proximity to Stone Creek and Cherry Cobb Sands respectively.

The site is centred on the approximate National Grid Reference: 522320,420580 and runs north-west to south-east between the approximate points 521395,421945 to 523280,419195.

Proposed Works: The proposed development of the site involves a range of construction works in order to create a 'compensatory habitat'. These works are in response to the acquisition of the Killingholme Marshes, (opposite the site on the south bank of the Humber Estuary) for a newly proposed deep water facility.

Risk Assessment Methodology: In accordance with CIRIA guidelines this assessment has carried out research, analysed the evidence and considered the risks that the site has been contaminated with unexploded ordnance; that such items remained on site; that they could be encountered during the proposed works and the consequences that could result. Appropriate risk mitigation measures have been proposed.

Explosive Ordnance Risk Assessment: BACTEC concludes that there is a **Medium** risk from unexploded ordnance at the site of the proposed development. This is based on the following factors:

- Hull was severely and repeatedly bombed throughout WWII. The proposed development site is located on the northern banks of the Humber Estuary in close proximity to a number of bombing decoy sites, heavy anti-aircraft batteries and coastal batteries which are likely to have been targeted and/or attacked throughout the course of the war. However, due to the undeveloped nature of the site, which comprised open agricultural land, no specific references could be found (nor are likely to have been made) to bombing incidents within its boundary.
- As part of a larger area of open ground, it is improbable that evidence of UXO, such as entry holes, would have remained visible in such conditions and is unlikely to have been noted and dealt with at the time. Furthermore, due to its remote location and lack of immediate importance, the site is unlikely to have been subject to regular access during WWII, or subject to post-raid checks for evidence of UXO. Consequently, any UXO falling within the site boundary is likely to have gone unnoticed and unrecorded.
- The wider surrounding region, (particularly to the north) historically housed numerous military camps, including an unnamed site at Camerton, 3.5km to the north-west. It is known that Military and Home Guard training exercises would often take place in open countryside (such as the site); although there are very few available records of where these exercises took place. However, items of ordnance related to the Home Guard and Military (such as land service ammunition and small arms ammunition) have been encountered in the British countryside by members of the public and the construction industry. Subsequently the possibility cannot be discounted that such items may be encountered across the site, although the likelihood is considered low.
- The site is not known to have been subject to any significant post-war intrusive works. Consequently, a risk from shallow buried UXO and deeper buried UXBs will remain across the entire site area.

Bomb Penetration Assessment: It has been assessed that a 500kg bomb would have had a maximum bomb penetration depth of up to 12m below WWII ground level. Penetration depth could potentially have been greater if the UXB was larger (though only 4% of German bombs used in WWII over Britain were of that size). Note that UXBs may be found at any depth between just below the WWII ground level and the maximum penetration depth. This assessment has been made using generic geological information.

Risk Mitigation Measures: The following risk mitigation measures are recommended to support the proposed redevelopment works. It should be noted that there will be no risk to any shallow intrusive works being undertaken within the imported fill material within the site boundary:

All Works

- Site Specific Explosive Ordnance Safety and Awareness Briefings are given to all personnel conducting intrusive works.
- The Provision of Unexploded Ordnance Site Safety Instructions are provided for the site.

Shallow Intrusive Works

- Non-Intrusive Magnetometer Survey and target investigation ahead of any intrusive works, where appropriate. (It should be noted that an area of landfill is known to be situated on or in close proximity to the north-western parts of the site which may impair this method). In such locations, the following mitigation method is recommended:

- Explosive Ordnance Disposal (EOD) Engineer Presence on site to supervise all open excavations (in WWII ground level).

Deep Intrusive Works

- Down-hole Intrusive Magnetometer Survey of all pile/borehole locations and Target Investigation, if necessary.

In making this assessment and recommending these risk mitigation measures, the proposed works outlined in the 'Scope of the Proposed Works' section were considered. Should the planned works be modified or additional intrusive engineering works be considered, BACTEC should be consulted to see if a re-assessment of the risk or mitigation recommendations is necessary.

Contents

Annexes

Explosive Ordnance Threat Assessment

In Respect of

Able Marine Energy Park site, Hull

1. Introduction

1.1. Background

Delta Simons has commissioned BACTEC International Limited to conduct an Explosive Ordnance Threat Assessment for the proposed works at the Able Marine Energy Park site, Hull.

Unexploded Ordnance presents a significant threat to construction projects in parts of the UK as a result of enemy actions during the two 20th Century World Wars and historic British and Allied military activity.

Hull was one of the most heavily bombed cities of the UK during WWII due to its docks, heavy industries and its location on the east coast which meant it was easily located by Luftwaffe bombers. The city was bombed throughout the duration of the war and sustained many concentrated attacks, leaving few areas undamaged.

One of the legacies of this conflict is buried unexploded air-dropped bombs or anti-aircraft projectiles resulting from the failure of a proportion of the weapons to function as designed. It is commonly accepted that the failure rate of these munitions was approximately 10% and, depending on their shape, weight, velocity and ground conditions many penetrated the ground and came to rest at depth. Intensive efforts were made during and after the war to locate and render safe all UXO but, unsurprisingly, not all were found and dealt with. This is evidenced by the regular, ongoing discoveries of unexploded ordnance during construction-related intrusive ground works.

The UK was also bombed during WWI, though to a much lesser extent, and it is thought that a similar proportion of these weapons also malfunctioned. There have been occasional finds of unexploded WWI bombs in recent years but the risk of encountering them today is generally very low.

As a result of a generally increased risk awareness amongst professionals involved in ground engineering works and proactive health and safety measures, the threat to life and limb from unexploded ordnance has been minimised. However even the simple discovery of a suspected device during ongoing works can cause considerable disruption to production and cause unwanted delays and expense.

Such risks can be more fully addressed by a better understanding of the site-specific threat and the implementation of appropriate risk mitigation measures.

2. Construction Industry Duties and Responsibilities

2.1. The UK Regulatory Environment

There is no specific legislation covering the management and control of the UXO risk in the UK construction industry but issues regarding health and safety are addressed under a number of regulatory instruments, as outlined below.

In practice the regulations impose a responsibility on the construction industry to ensure that they discharge their obligations to protect those engaged in ground-intrusive operations (such as archaeology, site investigation, drilling, piling or excavations) from any reasonably foreseeable UXO risk.

2.2. The Health and Safety at Work Act, 1974

The Act places a duty of care on an employer to put in place safe systems of work to address, as far as is reasonably practicable, all risks (to employees and the general public) that are reasonably foreseeable.

2.3. Construction (Design and Management) Regulations 2007

This legislation defines the responsibilities of all parties (primarily the Client, the CDM Co-ordinator, the Designer and the Principal Contractor) involved with works.

Although UXO issues are not specifically addressed the regulations effectively place obligations on all these parties to:

- Ensure that any potential UXO risk is properly assessed
- Put in place appropriate risk mitigation measures if necessary
- Keep all parties affected by the risk fully informed
- Prepare a suitably robust emergency response plan

2.4. Other Legislation

Other relevant legislation includes the “Management of Health and Safety at Work Regulations 1999” and “The Corporate Manslaughter and Corporate Homicide Act 2007”.

3. The Role of the Authorities and Commercial Contractors

3.1. The Authorities

The Police have the responsibilities for co-ordinating the emergency services in the case of an ordnance-related incident on a construction site. They will make an initial assessment (i.e. is there a risk that the find is ordnance or not?) and if they judge necessary impose a safety cordon and/or evacuation and call the military authorities (JSEODOC - Joint Services Explosive Ordnance Disposal Operations Centre) to arrange for investigation and/or disposal. In the absence of an EOD specialist on site many Police Officers will use the precautionary principle, impose cordon(s)/evacuation and await advice from the JSEODOC.

The priority given to the request by JSEODOC will depend on their judgement of the nature of the threat (ordnance, location, people and assets at risk) and the availability of resources. They will respond immediately or as resources are freed up. Depending on the on-site risk assessment the item of ordnance may be removed or demolished (by controlled explosion) in-situ. In the latter case additional cordons and/or evacuations may be necessary.

Note that the military authorities will only carry out further investigations or clearances in very high profile or high risk situations. If there are regular ordnance finds on a site the JSEODOC may not treat each occurrence as an emergency and will encourage the construction company to put in place alternative procedures (i.e the appointment of a commercial contractor) to manage the situation and relieve pressure from the JSEOD disposal teams.

3.2. Commercial Contractors

In addition to pre-construction site surveys and follow-on clearance work, a commercial contractor is able to provide a reactive service on construction sites. The presence of a qualified EOD Engineer with ordnance recognition skills will avoid unnecessary call-outs to the authorities and the Contractor will be able to arrange for the removal and disposal of low risk ordnance. If high risk ordnance is discovered actions will be co-ordinated with the authorities with the objective of causing the minimum possible disruption to site operations whilst putting immediate, safe and appropriate measures in place.

4. This Report

4.1. Aims and Objectives

The aim of this report is to examine the possibility of encountering any explosive ordnance during the proposed works at the Able Marine Energy Park site, Hull. Risk mitigation measures will be recommended, if deemed necessary, to eliminate or reduce the threat from explosive ordnance during the envisaged works. The report follows the CIRIA Guidelines.

4.2. Risk Assessment Methodology

The following issues will be addressed in the report:

- The risk that the site was contaminated with unexploded ordnance.
- The risk that unexploded ordnance remains on site.
- The risk that ordnance may be encountered during the proposed works.
- The risk that ordnance may be initiated.
- The consequences of initiating or encountering ordnance.

Risk mitigation measures, appropriate to the assessed level of risk and site conditions, will be recommended if required.

4.3. Approach

In preparing this Explosive Ordnance Threat Assessment Report, BACTEC has considered general and, as far as possible, site specific factors including:

- Evidence of German bombing and delivery of UXBs.
- Site history, occupancy and conditions during WWII.
- The legacy of Allied military activity.
- Details of any known EOD clearance activity.
- The extent of any post war redevelopment.
- Scope of the current proposed works.

4.4. Sources of Information

BACTEC has carried out detailed historical research for this Explosive Ordnance Threat Assessment including accessing military records and archived material held in the public domain and in the MoD.

Material from the following sources has been consulted:

- The National Archives, Kew.
- Hull City Archives.
- Landmark Maps.
- English Heritage National Monuments Record.

- Relevant information supplied by Delta Simons.
- Available material from 33 Engineer Regiment (EOD) Archive.
- BACTEC's extensive archives built up over many years of research and hands-on Explosive Ordnance Disposal activities in the UK.
- Open sources such as published books, local historical records and the internet.

4.5. Reliability of Historical Records

4.5.1. General Considerations

This report is based upon research of historical evidence. Whilst every effort has been made to locate all relevant material BACTEC cannot be held responsible for any changes to the assessed level of risk or risk mitigation measures based on documentation or other information that may come to light at a later date.

The accuracy and comprehensiveness of wartime records is frequently difficult or impossible to verify. As a result conclusions as to the exact location, quantity and nature of the ordnance threat can never be definitive but must be based on the accumulation and careful analysis of all accessible evidence. BACTEC cannot be held responsible for inaccuracies or gaps in the available historical information.

4.5.2. Bombing Records

During WWII considerable efforts were expended in recording enemy air raids. Air Raid Precautions (ARP) wardens were responsible for making records of bomb strikes either through direct observation or by post-raid surveys. However their immediate priority was to deal with casualties and limit damage, so it is to be expected that records are often incomplete and sometimes contradictory. Record keeping in the early days of bombing was not comprehensive and details of bombing in the early part of the war were sometimes destroyed in subsequent attacks. Some reports may cover a single attack, others a period of months or the entire war.

Records of raids that took place on sparsely or uninhabited areas were often based upon third party or hearsay information and are not always reliable; records of attacks on military or strategic targets were often maintained separately from the general records and have not always survived.

5. The Site

5.1. Site Location

Located in the eastern part of Kingston upon Hull, the site is situated to the northern bank of the Humber Estuary. It is bounded by Cherry Cobb Sands Road to the north, existing flood defences and mudflats to the south, with undeveloped agricultural fields to the east and west in proximity to Stone Creek and Cherry Cobb Sands respectively.

The site is centred on the approximate National Grid Reference: 522320,420580 and runs north-west to south-east between the approximate points 521395,421945 to 523280,419195.

Site location maps are presented in Annex A.

5.2. Site Description

Approximately 190 hectares in size, the site is an irregularly shaped parcel of land currently comprising undeveloped agricultural fields, bisected by a series of minor water courses and drainage ditches. A number of mature trees also lie across the site in broken linear formations.

A recent aerial photograph showing the boundary of the site area is presented in Annex B.

6. Scope of the Proposed Works

6.1. General

The proposed development of the site involves a range of construction works in order to create a 'compensatory habitat'. These works are in response to the acquisition of the Killingholme Marshes, (opposite the site on the south bank of the Humber Estuary) for a newly proposed deep water facility.

6.2. Intrusive Ground Works

The works will predominantly involve the excavation, movement and placement of soil to form new flood defence earth embankments and other earthworks. A new flood defence will be constructed at the landward boundary of the site and is likely to be an earth embankment, approximately 3km long and 4m in height.

The current ground level across the site is approximately 2.5mOD; however it may be necessary to reduce ground levels by around 0.5m in some areas. Additional earthworks and landscaping may also be undertaken across the site area for the creation of pools and raised areas. Following the completion of all such works, the existing flood defence will be breached in one or more locations. This will involve excavating through the embankment to allow water ingress.

A site plan is presented in Annex C.

7. Ground Conditions

The published BGS mapping (Sheet 81: Patrington) 1:50,000 series indicates the site area to comprise Marine and Estuarine Alluvium over Till, underlain by Cretaceous Chalk to depth. The mapping also indicates that the land comprising the site area has been reclaimed by natural and anthropogenic (human) processes since the eighteenth century.

Additional information, provided by Delta Simons, indicates that a small, historic landfill site has been identified near to the western end of the study area. It is not known if this encroaches onto the site itself.

8. Site History

8.1. General

An assessment was made of pre and post-war historical maps for the site and is discussed below.

8.2. Pre-WWII

The 1910 map indicates that the site formed part of a larger area of undeveloped open marshland on the northern Humber foreshore. *Oil Well Creek* is shown present on the north-western extents of the site, whilst a series of *Drains* bisect the area. The main seaward and landward boundaries of the site are bounded by *Cherry Cobb Sand Bank*, whilst areas of *Mud Flats* and *Saltings* lie between the *Sand Bank* and the estuary.

8.3. Post-WWII

The date of the earliest available post-war map editions for the site area ranged between 1948-1951. No changes are evident across any part of the site, which remains undeveloped. A later 1975 map edition also demonstrates no significant changes to, or redevelopment of, the site.

9. The Threat from Aerial Bombing

9.1. General Bombing History of the North-East

9.1.1. First World War

London and Eastern England suffered aerial bombardment during WWI, beginning with indiscriminate night raids by Zeppelin airships. However as British defensive measures became more effective and aircraft development progressed, the German military switched to daylight raids by fixed wing aircraft in June 1917.

9.1.2. Second World War

At the start of WWII, the Luftwaffe planned to destroy key military installations, including RAF airfields and Royal Navy bases, during a series of daylight bombing raids. After the Battle of Britain these tactics were modified to include both economic and industrial sites. Targets included dock facilities, railway infrastructure, power stations, weapon manufacturing plants and gas works. As a result of aircraft losses, daylight raids were reduced in favour of attacking targets under the cover of darkness.

9.2. Aerial Delivered Ordnance in the Second World War

9.2.1. Generic Types of WWII German Air-delivered Ordnance

The nature and characteristics of the ordnance used by the Luftwaffe allows an informed assessment of the hazards posed by any unexploded items that may remain today. Detailed illustrations of German air delivered ordnance are presented at Annex D.

- HE Bombs: In terms of weight of ordnance dropped, HE bombs were the most frequent weapon deployed. Most bombs were 50kg, 250kg or 500kg (overall weight, about half of which was the high explosive) though large bombs of up to 2000kg were also used. HE bombs had the weight, velocity and shape to easily penetrate the ground intact if they failed to explode. Post-raid surveys would not always have spotted the entry hole or other indications that a bomb penetrated the ground and failed to explode and contemporary ARP documents describe the danger of assuming that damage, actually caused by a large UXB, was due to an exploded 50kg bomb. Unexploded HE bombs therefore present the greatest risk to present–day intrusive works.
- Blast Bombs/ Parachute Mines: Blast bombs generally had a slow rate of descent and were extremely unlikely to have penetrated the ground. Non-retarded mines would have shattered on most ground types, if they had failed to explode. There have been extreme cases when these items have been found unexploded, but this was where the ground was either very soft or where standing water had reduced the impact. BACTEC does not consider there to be a significant threat from this type of munition on land.
- Large incendiary bombs: This type of bomb ranged in size from 36kg to 255kg and had a number of inflammable fill materials (including oil and white phosphorus), and a small explosive charge. They were designed to explode and burn close to the surface but their shape and weight meant that they did have penetration capability. If they penetrated the ground complete combustion did not always occur and in such cases they remain a risk to intrusive works.
- 1 kg Incendiary Bombs (IB): These bombs, which were jettisoned from air-dropped containers, were unlikely to penetrate the ground and in urban areas would usually have been located in post-raid surveys. However, if bombs did not initiate and fell in water or dense vegetation, or became mixed with rubble in bomb damaged areas they could have been overlooked. Some variants had explosive heads and these present a risk of detonation during intrusive works.
- Anti-personnel (AP) Bomblets: AP bombs had little ground penetration ability and should have been located by the post-raid survey unless they fell into water, dense vegetation or bomb rubble.
- Specialist Bombs (smoke, flare, etc): These types do not contain high explosive and therefore a detonation consequence is unlikely. They were not designed to penetrate the ground.

9.2.2. German Air-delivered Ordnance Failure Rate

Based on empirical evidence, it is generally accepted that 10% of the German HE bombs dropped during WWII failed to explode as designed. This estimate is probably based on the statistics of wartime recovered UXBs and therefore will not have taken account of the unknown numbers of UXBs that were not recorded at the time, and is probably an underestimate.

The reasons for failures include:

- Fuze or gaine malfunction due to manufacturing fault, sabotage (by forced labour) or faulty installation.
- Clockwork mechanism failure in delayed action bombs.
- Failure of the bomber aircraft to arm the bombs (charge the electrical condensers which supplied the energy to initiate the detonation sequence) due to human error or equipment defect.
- Jettison of the bomb before it was armed or from a very low altitude. Most likely if the bomber was under attack or crashing.

War Office Statistics document that a daily average of 84 bombs which failed to function were dropped on civilian targets in Great Britain between 21st September 1940 and 5th July 1941. 1 in 12 of these (probably mostly fitted with time delay fuzes) exploded some time after they fell - the remainder were unintentional failures.

From 1940 to 1945 bomb disposal teams dealt with a total of 50,000 explosive items of 50 kg and over (i.e. German bombs), 7000 AAA shells and 300,000 beach mines. These operations resulted in the deaths of 394 officers and men. However, unexploded ordnance is still regularly encountered across the UK (see recent press articles, Annex E-1 and E-2).

9.2.3. UXB Ground Penetration

9.2.3.1. General Considerations

The actual penetration depth of aerial delivered bombs into the ground will have been determined by the mass and shape of the bomb, the velocity and angle of the bomb on impact (dependent on the height of release) and the nature of the ground and ground cover; the softer the ground, the greater the potential penetration. Peat, alluvium and soft clays are easier to penetrate than gravel and sand. Bombs are brought to rest or are commonly deflected by bedrock or large boulders.

9.2.3.2. The “j” Curve Effect

An air-dropped bomb falling from normal bombing altitude (say 5000m) into homogeneous ground will continue its line of flight but turn in an upwards curve towards the surface as it comes to rest. This offset from vertical is generally thought to be about one third of the penetration depth, but can be up to 15m depending on ground conditions or the bomb’s angle of impact.

9.2.3.3. Second World War Bomb Penetration Studies

During WWII the Ministry of Home Security undertook a major study on actual bomb penetration depths, carrying out statistical analysis on the measured depths of 1328 bombs as reported by Bomb Disposal, mostly in the London area. They then came to conclusions as to the likely average and maximum depths of penetration of different sized bombs in different geological strata.

The median penetration of 430 x 50kg German bombs in London Clay was 4.6m and the maximum penetration observed for the SC50 bomb was 9m.

They concluded that the largest common German bomb, 500kg, had a likely penetration depth of 6m in sand or gravel but 8.7m in clay. The maximum observed depth for a 500kg bomb was 10.2m and for a 1000kg bomb 12.7m. Theoretical calculations suggested that significantly greater penetration depths were probable.

9.2.4. Initiation of Unexploded Bombs

Unexploded bombs do not spontaneously explode. All high explosive requires significant energy to create the conditions for detonation to occur. In the case of unexploded German bombs discovered within the construction site environment, there are a number of potential initiation mechanisms:

- Direct impact onto the main body of the bomb: Unless the fuze or fuze pocket is struck, there needs to be a significant impact (e.g. from piling or large and violent mechanical excavation) to initiate a buried iron bomb. Such violent action can cause the bomb to detonate.
- Re-starting the clock timer in the fuze: Only a small proportion of German WWII bombs employed clockwork fuzes. It is probable that significant corrosion has taken place within the fuze mechanism over the last 60 years that would prevent clockwork mechanisms from functioning, nevertheless it was reported that the fuze in a UXB dealt with by 33 EOD Regiment in Surrey in 2002 did re-commence.
- Induction of a static charge, causing a current in an electric fuze: The majority of German WWII bombs employed electric fuzes. It is probable that significant corrosion has taken place within the fuze mechanism over the last 60 years such that the fuze circuit could not be activated.
- Friction impact initiating the (shock-sensitive) fuze explosive: This is the most likely scenario resulting in the bomb detonating.

Annex E-2 details UXB incidents where intrusive works have caused UXBs to detonate, resulting in death or injury and damage to plant.

9.3. Bombing of Hull

9.3.1. First World War Overview

During WWI Hull was targeted and bombed by Zeppelin Airships on a number of occasions; a map indicating the approximate positions of WWI attacks is presented in Annex F.

Due to the small scale of the map, it is not possible to determine the exact locations of air-raids over Hull. WWI bombs were generally smaller than those used in WWII and were dropped from a lower altitude, resulting in limited UXB penetration depths. Aerial bombing was often such a novelty at the time that it attracted public interest and even spectators to watch the raids in progress. For these reasons there is a limited risk that UXBs passed undiscovered in the urban environment. When combined with the relative infrequency of attacks and an overall low bombing density the threat from WWI UXBs is considered low and will not be further addressed in this report.

9.3.2. Second World War Overview

Hull presented a prime Luftwaffe target; the city was home to extensive port and dock facilities, large warehouses and heavy industries all vital to the war effort. Its location on the east coast made the city vulnerable to attack, especially given its position on the north bank of the Humber Estuary making it easy to locate even at night. Hull was also designated as an alternative target when conditions made other objectives difficult to reach. Some records even suggest that Hull served as a bombing point for training inexperienced pilots. Furthermore, the Port of Immingham, situated directly south of the site (on the southern banks of the Humber Estuary) was a naval base and headquarters for the Royal Navy throughout WWII and also earmarked for attack by the Luftwaffe. Consequently the Hull region and Humber Estuary in particular was fortified by a series of defensive installations including three heavy anti-aircraft batteries and two coastal batteries in close proximity to the study area and a series of decoy bombing sites.

The German military identified ten primary targets in the city and these included the following:

- St. Andrew’s Dock
- Albert and William Wright Docks
- City Docks
- Victoria Dock and Timber Yards

- Alexandra Dock
- King George Dock
- Electricity Power Station, Sculcoates
- Gasworks, Stoneferry
- Waterworks, Clough Road
- Oil Refinery, Salt End

A Luftwaffe reconnaissance photograph of the region, highlighting the Alexandra and King George Docks in central Hull, is presented in Annex G. Reports indicate that out of 192,660 habitable homes in Hull at the beginning of the war, only 5,938 escaped undamaged and over 152,000 people were rendered homeless. Approximately three million square feet of factory space and half the main shopping area were destroyed. The docks suffered repeated damage and were out of action for three weeks after the heaviest raids. Unlike many other British cities which experienced intensive 'Blitz' periods, the bombing of Hull was spread out over four years in more than 80 separate attacks.

Records of bombing incidents in the civilian areas of Hull were collected by the Air Raid Precautions wardens and collated by the Civil Defence Office. Some other organisations, such as the railways, maintained separate records.

Records would be in the form of typed or hand written incident notes, maps and statistics. Bombing data was carefully analysed, not only due to the requirement to identify those parts of the capital most needing assistance, but also in an attempt to find patterns in the Germans' bombing strategy in order to predict where future raids might take place.

These various types of records of bombing incidents for Hull are presented in the following sections.

9.3.3. Second World War Bombing Statistics

The following table summarises the quantity of German bombs (excluding 1kg incendiaries and anti-personnel bombs) falling on the County Borough of Kingston upon Hull between 1940 and 1945:

Record of German Ordnance Dropped on the County Borough of Kingston upon Hull	
Area Acreage	14091
High Explosive Bombs (all types)	1213
Parachute Mines	101
Oil Bombs	4
Phosphorus Bombs	70
Pilotless Aircraft (V1)	0
Fire Pot	4
Long Range Rocket (V2)	0
Total	**1392**
Items Per 1000 Acres	98.8

Source: Home Office Statistics.

Detailed records of the quantity and locations of the 1kg incendiary and anti-personnel bombs were not routinely maintained by the authorities as they were frequently too numerous to record. Although the incendiaries are not particularly significant in the threat they pose, they nevertheless are items of ordnance that were designed to cause damage and inflict injury and should not be overlooked in assessing the general risk to personnel and equipment. The anti-personnel bombs were used in much smaller quantities and are rarely found today but are potentially more dangerous.

This table does not include UXO found during or after WWII.

9.4. Site Specific WWII Bombing Records

9.4.1. Written ARP Bombing Incident Records

Written ARP reports were obtained from the National Archives and various secondary published sources and the table below details all recorded incidents potentially on and around the site during WWII.

Date	Weapon	Location / Remarks
20/06/1940	HE Bombs & IBs	IBs showered on East Hull, Victor Street and Buckingham Street, the immediate neighbourhood being the target. There were a few HEs, but little damage was done. Fifty fires were reported. One HE and an IB cluster dropped in the area of Chapman Street Railway Bridge
19/08/1940	HE Bombs	Bombs dropped on Hull
26/08/1940	HE Bombs	Bombs dropped on Hull
30/08/1940	HE Bombs	Bombing over Hull
03/09/1940	HE Bombs	Bombing over Hull
05/09/1940	HE Bombs	Bombs fell at Hull
06/09/1940	HE Bombs	Bombs dropped on Hull
26/02/1941	HE Bombs & IBs	Twenty-five enemy bombers attacked Hull, dropping twenty-five tonnes of HE (fifty-two bombs) and 3,888 IBs. Bombing was mainly visual and several small fires were reported in the docks area.
02/03/1941	HE Bombs & Parachute Mines	Hull attacked by twenty-four enemy bombers. Twenty-nine tonnes of HE (thirty-nine bombs were dropped- this figure includes some parachute mines), five people were killed
03/04/1941	IBs	Incendiary raid only on eastern Hull
04/04/1941	17 x HE Bombs & 3672 IBs	Nine enemy aircraft attacked Hull, delivering seventeen HEs and 3,672 IBs
08/04/1941	HE Bombs	Bombs fell in Hull
10/04/1941	HE Bombs	HE bombs dropped on Hull
11/04/1941	HE Bombs	Incidents reported in Hull. Aircraft engaged by Humber AA guns.
16/04/1941	HE Bombs	Air raids over Hull
24/04/1941	HE Bombs	Incidents reported over Hull
26/04/1941	HE Bombs	Extensive bombing attacks over Hull
27/04/1941	HE Bombs	Bombs fell on Hull
04/05/1941	HE Bombs	Bombing over Hull
06/05/1941	HE Bombs	Bombing over Hull
07/05/1941	HE Bombs	Bombing recorded over Hull
09/05/1941	HE Bombs	One hundred and twenty enemy aircraft dropped 157 tonnes of HE and 19,467 IBs. The areas most affected were the King George, Alexandra and Victoria Docks, and east and north Hull
12/05/1941	HE Bombs	Bombs dropped on Hull
07-08/05/1941	Unknown	Craters but little or no damage Salt End
29/06/1941	9 x HE	Fell in fields Salt End. No damage
10/07/1941	IBs	Incendiary only attack on east Hull

Date	Weapon	Location / Remarks
18/07/1941	172 HE HE Bombs & 4 x IB Clusters	East Hull and Victoria Dock
18/08/1941	20 x HE Bombs	Hull raided by about twenty-seven enemy aircraft which concentrated mainly on eastern Hull; however the central district also suffered. Twenty HEs were dropped, including two 1000kg bombs.

9.4.2. WWII Hull Bomb Plot Map

A comprehensive consolidated bomb plot map for the Hull region was located and consulted for the purposes of this report. However, the map does not extend to the area of the site itself, terminating approximately 6.5km to the north-west on the eastern extents of the city centre. It does however demonstrate that the highest densities of bombing were sustained within the key industrial and dock areas of Hull towards the city centre, with the number of incidents decreasing significantly towards the outer lying areas of the city.

9.4.3. Second World War Era Aerial Photographs

WWII-era aerial photography of the site area was obtained from the National Monuments Record Office, Swindon. An image dated 29th April 1947 is presented in Annex H.

The photograph, dating from the post-war period, shows the site to be occupied by a series of undeveloped open agricultural fields, with a small feature present on the north-western section, (thought to be Oil Well Creek) as described by pre-war historical mapping. Some evidence of possible HE bombing is apparent immediately adjacent this feature, with two small crater-like features visible. No further evidence of HE bombing (such as soil disturbance or bomb craters) is visible across any other part of the study site or immediate surrounding area. Note however that the image dates from approximately six years after the main period of bombing, by which time such features may not have remained detectable in such ground cover.

9.4.4. Bombing Decoy Sites

A national decoy authority headed by Colonel John Fisher Turner was set up in July 1940, and following earlier experiments in Glasgow and Sheffield, a system of urban lighting decoys was set up. These were known as "Civil" sites; Civil ‘QL’ for urban lighting simulation, and Civil ‘QF’ for dummy fires. "Q" - sites were equipped with assorted electrical and pyrotechnical apparatus to simulate the flare given from furnace doors, steel-making, railway marshalling yards, and light given off by inefficient blackout precautions.

Other sites simulated small fires started by incendiary bombs, with oil-storage area fire simulation being developed near large oil installations. A further variation on fire decoy sites was the "SF", or "Special Fires" sites. A larger, longer-burning type of fire was provided at these sites - known as "Starfish" sites - to draw incendiary bombs, and hopefully as a consequence the full enemy payload, from falling on the larger conurbations and defence installations during heavy air raids. Decoy sites were effective in drawing the Luftwaffe’s attacks away from legitimate airfields – in 1940 alone ‘Q’ and ‘Starfish’ sites received nearly 200 attacks.

Hull was also home to a number of ‘N series’ or Naval Bombing Decoy Sites. These sites usually had a control bunker, protected by a blast wall at the entrance, with a small corridor separating two rooms, (one for the generator and one for the control room to operate switchgear for fires & lights). They were also often identifiable by an observation/escape hatch in the roof. However, an extensive and different form of Naval Bombing Decoy lies immediately adjacent to the west of the study site at Cherry Cobb Sands. The decoy comprised a series of artificially constructed pools of water, above which were a number of lamps suspended from wooden poles to shine light onto the water, in an attempt to mimic Hull docks. Some of the artificial pools were shaped like lock gates to add realism to the decoys’ appearance. A recent aerial photograph, presented in Annex I, shows the concrete-walled pools to remain and highlights their immediate proximity to the study site.

Records indicate that a further naval decoy and airfield decoy (or 'Starfish' site) also lie within 2km to the north-west on the northern banks of the Humber. Their presence indicates that it was anticipated that the area would receive Luftwaffe attention due to the strategically important targets in the region.

9.4.5. Abandoned Bombs

A post-air raid survey of buildings, facilities and installations would have included a search for evidence of bomb entry holes. If evidence were encountered, Bomb Disposal Officer teams would normally have been requested to attempt to locate, render safe and dispose of the bomb. Occasionally evidence of UXBs was discovered but due to a relatively benign position, access problems or a shortage of resources the UXB could not be exposed and rendered safe. Such an incident may have been recorded and noted as an Abandoned Bomb.

Given the inaccuracy of WWII records and the fact that these bombs were 'abandoned', their locations cannot be considered definitive, nor the lists exhaustive. The MoD states that 'action to make the devices safe would be taken only if it was thought they were unstable'. It should be noted that other than the 'officially' abandoned bombs, there will inevitably be UXBs that were never recorded.

BACTEC holds no records of officially registered abandoned bombs at or near the site of the proposed works.

9.4.6. EOD Bomb Disposal and Clearance Tasks

The information service from the Explosive Ordnance Disposal (EOD) Archive Information Office at 33 Engineer Regiment (EOD) is currently facing considerable delay. It has therefore not been possible to include any further official information regarding bomb disposal/clearance tasks on this site. If any relevant information is received at a later date Delta Simons will be advised.

BACTEC holds on record details of a series of EOD clearance tasks undertaken by the 33 Engineering Regiment in the Hull region in the post-war period. The nearest of these tasks are located at Saltend, approximately 8km north-west of the site.

9.4.7. Site Specific Bomb Penetration Considerations

When considering an assessment of the bomb penetration at the Able Marine Energy Park site, Hull, the following parameters would be used:

- Geology – Marine and Estuarine Alluvium over Till over Cretaceous Chalk.
- Impact Angle and Velocity – 80-90^{O} from horizontal and 267 metres per second.
- Bomb Mass and Configuration – The 500kg SC (General Purpose) HE bomb, without retarder units or armour piercing nose. This was the largest of the common bombs used against Britain.

Taking into account the above-mentioned factors it has been assessed that a 500kg bomb would have had a maximum bomb penetration depth of up to **12m** below WWII ground level. Penetration depth could potentially have been greater if the UXB was larger (though only 4% of German bombs used in WWII over Britain were of that size). Note that UXBs may be found at any depth between just below the WWII ground level and the maximum penetration depth. This assessment has been made using generic geological information.

9.5. Likelihood of Post-raid UXO Detection

Utilising the available historical bombing records as reviewed in sections 9.1 to 9.4, it is possible to make an assessment of the likelihood that evidence of unexploded ordnance would have been noted on a site during the war and the incident dealt with or recorded at the time. Factors such as bombing density, frequency of access, ground cover, damage and failure rate have been taken into consideration.

9.5.1. Density of Bombing

Bombing density is an important consideration for assessing the possibility that UXBs remain in an area. A very high density of bombs can for example result in increased levels of damage sustained to structures, greater likelihood of errors in record keeping and a higher risk that UXBs fell over the area.

Hull was severely and repeatedly bombed throughout WWII. The proposed development site is located on the northern banks of the Humber Estuary in close proximity to a number of bombing decoy sites, heavy anti-aircraft batteries and coastal batteries which are likely to have been targeted and/or attacked throughout the course of the war. However, due to the undeveloped nature of the site, which comprised open agricultural land, no specific references could be found (nor are likely to have been made) to bombing incidents within its boundary.

9.5.2. Ground Cover

The degree and type of groundcover present during WWII would have a significant effect on the visual evidence at ground level which may have indicated the presence of buried UXO.

An assessment of the historical mapping and RAF aerial photography indicates that the site comprised undeveloped open ground during WWII. It is improbable that evidence of UXO, such as entry holes, would have remained visible in such conditions and is unlikely to have been noted and dealt with at the time.

9.5.3. Frequency of Access

Unexploded ordnance at sites where human access was infrequent would have a higher chance of being overlooked than at those sites which were subject to greater occupancy. The importance of a site or facility to the war effort is also an important consideration as such sites are likely to have been both frequently accessed and are also likely to have been subject to post-raid checks for evidence of UXO.

Due to the sites remote location and lack of immediate importance, it is unlikely to have been subject to frequent or regular access during WWII, or subject to post-raid checks for evidence of UXO. Consequently, any UXO falling within the site boundary is likely to have gone unnoticed and unrecorded.

9.5.4. Damage

If structures on a site have been subject to significant bomb or fire damage, rubble and debris are likely to have been present; similarly an HE bomb strike on open ground is likely to have resulted in a degree of soil disturbance. Under such conditions there is a greater risk of the entry holes of unexploded bombs dropped during subsequent raids being obscured and going unnoticed.

There were no structures present on the site during WWII to which any damage could be ascribed.

9.5.5. Bomb Failure Rate

There is no evidence to suggest that the bomb failure rate in the vicinity of the site would have been different from the “approximately 10%” figure normally used.

10. The Threat from Allied Military Ordnance

10.1. General

BACTEC has found no evidence to suggest that the area of the site had any other former military use which could have led to ordnance contamination.

The following potential military uses have been considered:

- o Anti-Aircraft Defences

- Home Guard
- Training or firing ranges or the storage of ammunition
- Military bases
- Defensive minefields (including pipemines)
- Defensive Positions
- Manufacture of explosives or ordnance

The most likely source of Allied ordnance is from anti-aircraft fire and Military activity, as discussed in the following section.

10.2. Defending Hull from Aerial Attack

Both passive and active defences were deployed against enemy bombers attacking targets in the Hull region.

Passive defences included measures to hinder the identification of targets (such as a lighting blackout at night and the camouflaging of strategic installations); to mislead bomber pilots into attacking decoy sites located away from the city and to force attacking aircraft to higher altitudes with the use of barrage balloons.

Active air defence relied on a coordinated combination of fighter aircraft to act as interceptors, anti-aircraft gun batteries and later the use of rockets and missiles, in order to actively engage and oppose attacking aircraft.

10.2.1. Anti-Aircraft Artillery and Projectiles

At the start of the war two types of AAA guns were deployed: Heavy Anti-Aircraft Artillery (HAA), using large calibre weapons such as the 3.7” QF (Quick Firing) gun and Light Anti-Aircraft Artillery (LAA) using smaller calibre weapons such as 40mm Bofors gun.

During the early war period there was a severe shortage of AAA available and older WWI 3” and modified naval 4.5” guns were deployed alongside those available 3.7” weapons. The maximum ceiling height of fire at that time was around 11,000m (for the 3.7” gun and less for other weapons). As the war progressed improved variants of the 3.7” gun were introduced and, from 1942, large 5.25 inch weapons began to be brought into service. These had significantly improved ceiling heights of fire reaching over 18,000m.

The LAA batteries were intended to engage fast low flying aircraft and were typically deployed around airfields or strategic installations. These batteries were mobile and could be moved to new positions with relative ease when required. The most numerous of these was the 40mm Bofors gun which could fire up to 120 x 40mm HE shells per minute to over 1800m.

The HAA projectiles were high explosive shells, usually fitted with a time delay or barometric pressure fuze to make them explode at a pre-determined height. If they failed to explode or strike an aircraft, they would eventually fall back to earth. Details of the most commonly deployed WWII AAA projectiles are shown below:

Gun type	Calibre	Shell Weight	Shell Dimensions
3.0 Inch	76mm	7.3kg	76mm x 356mm
3.7 Inch	94mm	12.7kg	94mm x 438mm
4.5 Inch	114mm	24.7kg	114mm x 578mm
40mm	40mm	0.9kg	40mm x 311mm

Although the larger unexploded projectiles could enter the ground they did not have great penetration ability and are therefore likely to be found close to WWII ground level. These shells are frequently mistakenly identified as small German air-delivered bombs, but are differentiated by the copper driving band found in front of the base. With a high explosive fill and fragmentation hazard these items of UXO present a significant risk if encountered. The smaller 40mm projectiles are similar in appearance and effect to small arms ammunition and, although still dangerous, present a lower risk.

Numerous unexploded AAA shells were recovered during and following WWII and are still occasionally encountered on sites today.

Two HAA batteries were situated in close proximity to the site, with one situated at Stone Creek approximately 550m to the south east and another 1.8km to the north-west at Little Humber. A further HAA battery and two coastal batteries were also situated within 5km of the study site on the northern banks of the Humber Estuary.

10.2.2. Rocket Projector “Z” Batteries

Initially developed as a naval AA defensive weapon these were deployed at sites around the UK from 1941 and proved to be an effective addition to AA defences. They comprised groups of multiple rocket launchers, laid out in a grid formation, which could project a 2 or 3 Inch HE rocket, known as an Unrotating Projectile (UP), to an altitude of 6000m and an effective ground range of over 9000m.

The rockets were tubular in section, measuring 0.9m (for the 2”) or 1.8m (for the 3”) in length with four stabilising fins at the base. They were usually fitted with 3.5kg or 8.2kg high explosive warhead similar to artillery shells. The larger warhead was reputed to have an effective blast radius of up to 20m. Some variants deployed a form of aerial mine described as a “small yellow bomb” which was designed to detach from the rocket at height and descend on a parachute with the objective of becoming snagged on target aircraft and then detonating.

The rocket body from an unexploded missile would not have survived impact with the ground but the warhead could have survived and penetrated below ground level in soft geology or become lost in bomb damage rubble.

Illustrations of Anti-Aircraft artillery, projectiles and rockets are presented at Annex J.

10.3. Anti-Invasion Defences

As with much of the east and south-east of England, a series of defensive positions were constructed along the Hull coastline during WWII. These predominantly comprised concrete pillboxes, gun emplacements, anti-tank obstacles and road blocks. Their objective was to ensnare and delay the possible German invasion forces.

From 2002 – 2004 English Heritage undertook a study of the WWII anti invasion landscape of England, entitled ‘The Defence of Britain’, mapping the location and type of the known defences around the country. It demonstrates that a number of pillboxes were situated on the northern banks of the Humber Estuary, the nearest of which was approximately 400m south-east of the study site.

10.4. Military Activity

10.4.1. Military Camps

Information obtained from the English Heritage Defence of Britain database for the north-east shows that a number of Military camps were located in the Hull region, although the full extent of these camps and activities conducted in and around them is unknown.

The nearest of these to the study site was an unnamed camp situated at Camerton, approximately 3.5km to the north of the site.

10.4.2. Military and Home Guard Training Activities

It is known that Military and Home Guard training exercises would often take place in open countryside or within areas in and around towns and villages; although there are very few available records of where these exercises took place. Items of ordnance related to the Home Guard and Military (such as land service ammunition and small arms ammunition) have been encountered in the British countryside by members of the public and the construction industry.

As an area of undeveloped open land, the possibility cannot be discounted that Home Guard training activities may have taken place within the site or immediately surrounding areas, especially given the known military presence in the local surrounding area across a number of decoy sites and defensive positions. Note however that no evidence of this could be found within the study site.

10.4.3. Land Service Ammunition (LSA) and Small Arms Ammunition (SAA)

Examples of various types of LSA are presented in Annex K. Some of the items of LSA likely to have been available are considered below:

- Unexploded Munitions – Mortars, Grenades and Explosives. A mortar relies on a striker hitting a detonator for explosion to occur. It is possible that the striker may already be in contact with the detonator and that only a slight increase in pressure would be required for initiation. Similarly, a grenade striker may either be in contact with the detonator or still be retained by a spring under tension, and therefore shock may cause it to function. Mortars and grenades can both be lethal. A grenade can have an explosive range of 15-20m.
- Fuzes – The fuzes used with munitions fired on ranges are mainly of the direct impact action variety. This means that if they failed to function on impact a needle/pin may have been driven into the detonator or a very sensitive explosive compound leaving the fuze in a dangerous state. An inadvertent impact on the fuze or munition could cause the munition to detonate. The 81mm mortar falls into this category and is known throughout the EOD community as a very dangerous munition to dispose of.
- Miscellaneous Items – Pyrotechnics come in a variety of types of flares and smoke generating compounds and can include the following:
  - Magnesium
  - Thermite
  - Phosphorus (red – white)
  - Calcium Phosphate
  - Sodium Nitrate
  - Aluminium Powder
  - Sodium Phosphide – phosphorus mixture
  - Magnesium – aluminium phosphide
  - Potassium bisulphate
  - Smoke compounds i.e. HC, FM and FS.

SAA would also have been issued and used by troops and members of the local Home Guard. However, even if it functioned the explosion is not contained within a barrel and detonation would only result in local overpressure and very minor fragmentation from the cartridge case. Examples of SAA are presented in Annex L.

The Home Guard also deployed a range of both conventional and unconventional weapons throughout the war. These included conventional rifles, machine guns, mortars and grenades and the more unconventional Northover Projector (a grenade launcher), Spigot Mortar, the Smith Gun, SIP grenades and Fougasse bombs. It appears that many of such items were simply buried when the Home Guard was disbanded in 1944. Items of ordnance related to the Home Guard are occasionally encountered by members of the public and the construction industry. As a result the possibility cannot be discounted that such items may have been disposed of on site. Examples of Home Guard weapons are presented in Annex M.

The ‘house-keeping’ of areas used historically by the Home Guard is known to have been poor with items of UXO burnt, buried or otherwise discarded within or close to the area surrounding such sites. Therefore possibility that some residual ordnance contamination may be present both within the study site and the surrounding area cannot be ruled out.

Items of ordnance do not become inert or lose their effectiveness with age. Time can indeed cause items to become more sensitive and less stable. This applies equally to items submerged in water or embedded in silts, clays or similar materials. The greatest risk occurs when an item of ordnance is struck or interfered with. This is likely to occur when mechanical equipment is used or when unqualified personnel pick up munitions.

11. Ordnance Clearance and Post-WWII Ground Works

11.1. General

The extent to which any ordnance clearance activities have taken place on site or extensive ground works have occurred is relevant since on the one hand they may indicate previous ordnance contamination but also may have reduced the risk that ordnance remains undiscovered.

11.2. EOD Clearance

BACTEC has no evidence that any official ordnance clearance operations have taken place on site. Note however that we have not yet received confirmation of this fact from 33 EOD Regiment (see section 9.4.6).

11.3. Post war Redevelopment

The site does not appear to have been subject to any significant post-war intrusive development.

12. The Overall Explosive Ordnance Threat Assessment

12.1. General Considerations

Taking into account the quality of the historical evidence, the assessment of the overall threat to the proposed works from unexploded ordnance must evaluate the following risks:

- That the site was contaminated with unexploded ordnance
- That unexploded ordnance remains on site
- That such items could be encountered during the proposed works
- That ordnance may be activated by the works operations
- The consequences of encountering or initiating ordnance

12.2. Quality of the Historical Record

The research has located and evaluated pre- and post-WWII Ordnance Survey maps, a consolidated WWII ARP bomb plot and written ARP records for the site.

No significant inconsistencies in the historical record have been noted. However, due to the undeveloped nature of the site, (which comprised a number of open fields/marshland) there were no obvious or specific landmarks within or close to the site to which any incidents could be attributed or referenced.

12.3. The Risk that the Site was Contaminated with Unexploded Ordnance

For the reasons discussed in section 9.5 BACTEC believes that there is a risk that unexploded high explosive bombs and/or anti-aircraft projectiles or incendiary bombs fell unnoticed and unrecorded within the site boundary.

- Hull was severely and repeatedly bombed throughout WWII. The proposed development site is located on the northern banks of the Humber Estuary in close proximity to a number of bombing decoy sites, heavy anti-aircraft batteries and coastal batteries which are likely to have been targeted and/or attacked throughout the course of the war. However, due to the undeveloped nature of the site, which comprised open agricultural land, no specific references could be found (nor are likely to have been made) to bombing incidents within its boundary.
- As part of a larger area of open ground, it is improbable that evidence of UXO, such as entry holes, would have remained visible in such conditions and is unlikely to have been noted and dealt with at the time. Furthermore, due to its remote location and lack of immediate importance, the site is unlikely to have been subject to regular access during

WWII, or subject to post-raid checks for evidence of UXO. Consequently, any UXO falling within the site boundary is likely to have gone unnoticed and unrecorded.

- The wider surrounding region, (particularly to the north) historically housed numerous military camps, including an unnamed site at Camerton, 3.5km to the north-west. It is known that Military and Home Guard training exercises would often take place in open countryside (such as the site); although there are very few available records of where these exercises took place. However, items of ordnance related to the Home Guard and Military (such as land service ammunition and small arms ammunition) have been encountered in the British countryside by members of the public and the construction industry. Subsequently the possibility cannot be discounted that such items may be encountered across the site, although the likelihood is considered low.

12.4. The Risk that Unexploded Ordnance Remains on Site

The risk from shallow buried UXO and deeper buried UXBs will remain across the entire the site area, which is not known to have been subject to any significant post-war intrusive works.

12.5. The Risk that Ordnance may be Encountered during the Works

The most likely scenarios under which a UXO could be encountered during construction works is during piling, drilling operations or bulk excavations for basement levels. The overall risk will depend on the extent of the works, such as the numbers of boreholes/piles (if required) and the volume of the excavations.

Since an air-dropped bomb may come to rest at any depth between just below ground level and its maximum penetration depth there is also a chance that such an item could be encountered during shallow excavations (for services or site investigations) into the original WWII ground level.

Note that there is no risk of encountering items of UXO during any works taking place within the post-war infill layer.

12.6. The Risk that Ordnance may be Initiated

The risk that UXO could be initiated if encountered will depend on its condition, how it is found and the energy with which it is struck. The most violent activity on most construction sites is percussive piling.

As a result items that are shallow buried present a slightly lower risk than those that are deep buried, since the force of impact is usually lower and they are more likely to be observed – when immediate mitigating actions can be taken.

12.7. The Consequences of Encountering or Initiating Ordnance

Clearly the consequences of an inadvertent detonation of UXO during construction operations would be catastrophic with a serious risk to life, damage to plant and a total site shutdown during follow-up investigations.

Since the risk of initiating ordnance is significantly reduced if appropriate mitigation measures are undertaken, the most important consequence of the discovery of ordnance will be economic. This would be particularly so in the case of high profile locations and could involve the evacuation of the public. The unexpected discovery of ordnance may require the closing of the site for any time between a few hours and a week with a potentially significant cost in lost time. Note also that the suspected find of ordnance, if handled solely through the authorities, may also involve loss of production since the first action of the Police in most cases will be to isolate the locale whilst awaiting military assistance, even if this turns out to have been unnecessary.

12.8. BACTEC's Assessment

Taking into consideration the findings of this study, BACTEC considers there to be a **Medium** risk from unexploded ordnance during the proposed works at the Able Marine Energy Park site, Hull:

	Level of Risk			
Type of Ordnance	Negligible	Low	Medium	High
German HE UXBs			*	
British AAA			*	
German incendiaries and anti-personnel bombs			*	
Other Allied Military Ordnance		*		

13. Proposed Risk Mitigation Methodology

13.1. General

BACTEC believes the following risk mitigation measures should be deployed to support the proposed works at the Able Marine Energy Park site, Hull.

13.2. Recommended Risk Mitigation Measures

All Works

- ***Site Specific Explosive Ordnance Safety and Awareness Briefings to all personnel conducting intrusive works:*** A specialised briefing is always advisable when there is a possibility of explosive ordnance contamination. It is an essential component of the Health & Safety Plan for the site and conforms to requirements of CDM Regulations 2007. All personnel working on the site should be instructed on the identification of UXB, actions to be taken to alert site management and to keep people and equipment away from the hazard. Posters and information of a general nature on the UXB threat should be held in the site office for reference and as a reminder.
- ***The Provision of Unexploded Ordnance Site Safety Instructions:*** These written instructions contain information detailing actions to be taken in the event that unexploded ordnance is discovered. They are to be retained on site and will both assist in making a preliminary assessment of a suspect object and provide guidance on the immediate steps to be taken in the event that ordnance is believed to have been found.

Shallow Intrusive Works

- ***Non-Intrusive Magnetometer Survey and target investigation ahead of any intrusive works, where appropriate*** – This survey is carried out using caesium vapour magnetometers linked to a data logger. Data is interpreted using advanced proprietary software which is capable of modelling the magnetic anomalies for mass, depth and location, thus providing information which can be used to locate discrete buried objects that may be ordnance. The system will typically locate buried ordnance to a depth of 4m for a 50kg bomb (the smallest HE bomb used by the Luftwaffe) and deeper for larger bombs. Additionally the survey will locate any buried services with a magnetic signature, will indicate areas of gross magnetic "contamination" (which may indicate unknown underground obstructions) and provide information on archaeological features. **It should be noted that an area of landfill is known to be situated on or in close proximity to the north-western parts of the site, which may impair this method. In such locations, the following mitigation is recommended:**
- ***Explosive Ordnance Disposal (EOD) Engineer Presence on Site to support intrusive works into WWII Ground Level:*** When on site the role of the EOD Engineer would include; monitoring works using visual recognition and instrumentation and immediate response to reports of suspicious objects or suspected items of ordnance that have been recovered by the ground workers on site; providing Explosive Ordnance Safety and Awareness briefings to any staff that have not received them earlier and advise staff of the need to modify working practices to take account of the ordnance threat, and finally to aid Incident Management which would involve liaison with the local authorities and Police should ordnance be identified and present an explosive hazard.

Deep Intrusive Works

- ***Intrusive Magnetometer Survey of all Borehole and pile locations down to a maximum bomb penetration depth:*** BACTEC can deploy a range of intrusive magnetometry techniques to clear ahead of all the pile locations. The appropriate technique is governed by a number of factors, but most importantly the site's ground conditions. The appropriate survey methodology would be confirmed once the enabling works have been completed. A site meeting would be required between BACTEC and the client to determine the methodology suitable for this site. Target investigation or avoidance will be recommended as appropriate.

In making this assessment and recommending these risk mitigation measures, the proposed works outlined in the 'Scope of the Proposed Works' section were considered. Should the planned works be modified or additional intrusive engineering works be considered, BACTEC should be consulted to see if a re-assessment of the risk or mitigation recommendations is necessary.

BACTEC International Limited 19th January 2011

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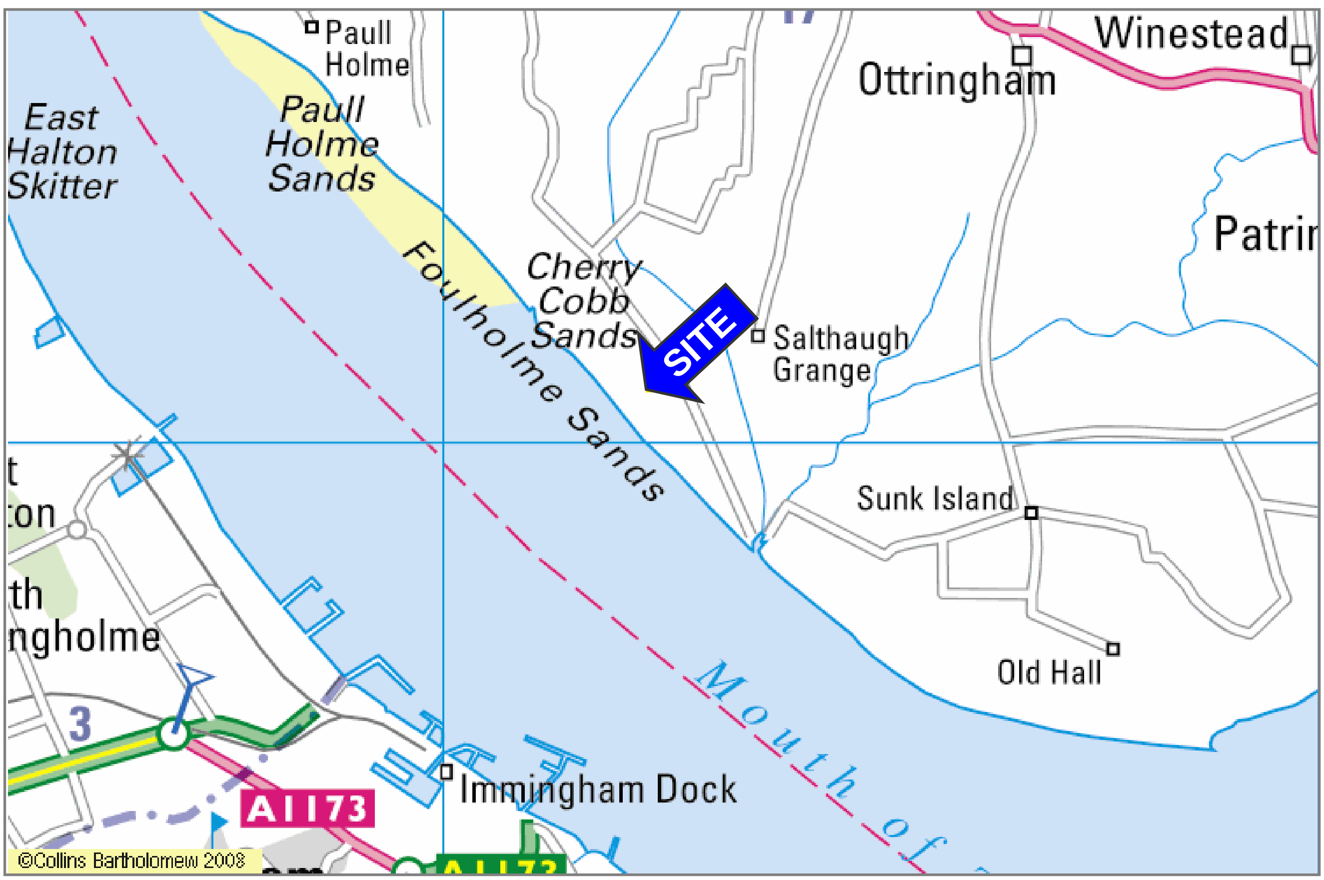
Annex A: Site Location Maps



Report Reference:	Client: Delta Simons
3433TA	Project: Able Marine Energy Park site, Hull

BAC TEC

Annex B: Recent Aerial Photograph of the Site

North

Recent Aerial Photograph of Site

Annex
B

Approximate site boundary

Report Reference:	Client:
3433TA	Delta Simons
	Project: Able Marine Energy Park site, Hull

Source: Google Earth ™ Mapping Services

Annex C: Site Plan

North

Site Plan

Annex **C**

Approximate site boundary

Report Reference:	Client:	
3433TA	Delta Simons	
	Project: Able Marine Energy Park site, Hull	BAC TEC

Source: Delta Simons

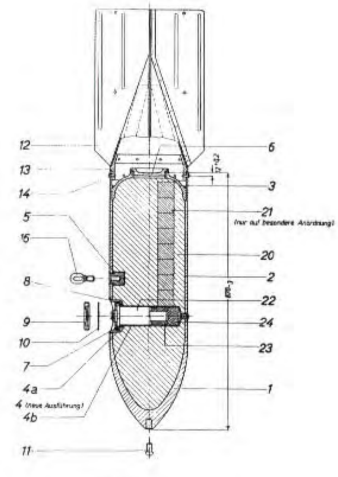
Annex D: German Air-Delivered Ordnance

SC 50

Bomb Weight:	40-54kg (110-119lb)
Explosive Weight:	c25kg (55lb)
Fuze Type:	Impact fuze/electro-mechanical time delay fuze
Bomb Dimensions:	1,090 x 280mm (42.9 x 11.0in)
Body Diameter:	200mm (7.87in)
Use:	Against lightly damageable materials, hangars, railway rolling stock, ammunition depots, light bridges and buildings up to three stories.
Remarks:	The smallest and most common conventional German bomb. Nearly 70% of bombs dropped on the UK were 50kg.

50kg bomb, London Docklands

Minus tail section

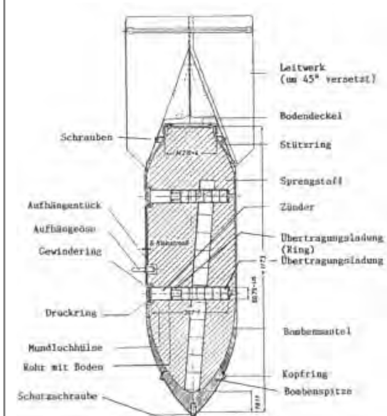


SC-50 JA (Güteklasse 1)

SC 250

Bomb weight:	245-256kg (540-564lb)
Explosive weight:	125-130kg (276-287lb)
Fuze type:	Electrical impact/mechanical time delay fuze.
Bomb dimensions:	1640 x 512mm (64.57 x 20.16in)
Body diameter:	368mm (14.5in)
Use:	Against railway installations, embankments, flyovers, underpasses, large buildings and below-ground installations.

250kg bomb, Hawkinge



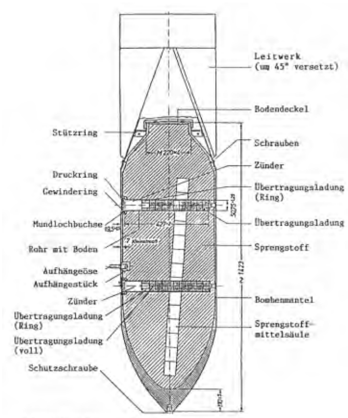
SC-250 JA (Güteklasse I)

SC 500

Bomb weight:	480-520kg (1,058-1,146lb)
Explosive weight:	250-260kg (551-573lb)
Fuze type:	Electrical impact/mechanical time delay fuze.
Bomb dimensions:	1957 x 640mm (77 x 25.2in)
Body Diameter:	470mm (18.5in)
Use:	Against fixed airfield installations, hangars, assembly halls, flyovers, underpasses, high-rise buildings and below-ground installations.

50kg bomb included for size comparison (see above)

500kg bomb, Felixstowe beach, April 2008



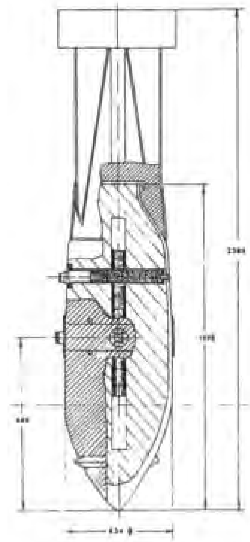
SC-500 J (Güteklasse I)

Report Reference:	Client:
3433TA	Delta Simons
	Project: Able Marine Energy Park site, Hull

Source: BACTEC International Limited and various historical sources

SC 1000

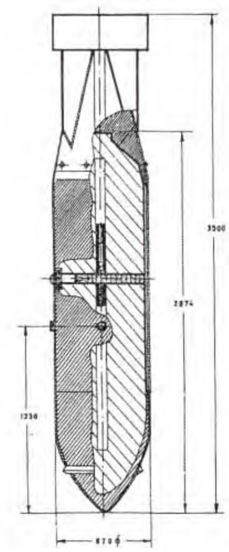
Bomb weight:	993-1,027kg (2189-2,264lb)
Explosive weight:	530-590kg (1,168-1,300lb)
Fuze type:	Electrical impact fuze
Bomb dimensions:	2,580 x 654mm (101.6 x 2.5in)
Body diameter:	654mm (25.75in)
Use:	Against unarmoured sea and land targets
Remarks:	Known as the 'Hermann'



SC 1800

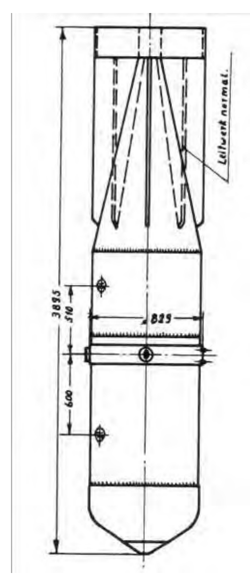
Bomb weight:	1,767-1,879kg (3,896-4,142lb)
Explosive weight:	1,000kg (2,205lb)
Fuze Type:	Electrical impact fuze
Bomb Dimensions:	3500 x 670mm (137 x 26in)
Use:	Against building complexes and large merchant vessels
Remarks:	Known as the 'Satan'

1800kg bomb, Bristol, 1941



SC 2500

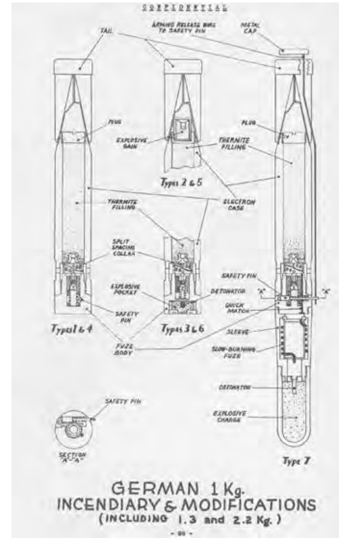
Bomb Weight:	Bomb weights have been quoted as 1,950kg (4,300lb) and 2,500kg (5,512lb)
Explosive Weight:	1,700kg (3,748lb)
Fuze Type:	Electrical impact fuze
Bomb Dimensions:	3,895 x 829mm (153.3 x 32.6in)
Body Diameter:	829mm (32.6in)
Use:	Against building complexes and merchant vessels.
Remarks:	The SC 2500 has an aluminium body with a welded head and tailpiece. Known as the 'Max'. Only a limited number were deployed.



1kg Incendiary Bomb

Bomb weight:	1.0 and 1.3kg (2.2 and 2.87lb)
Filling:	680gm (1.3lb) Thermite
Fuze type:	Impact fuze
Bomb dimensions:	350 x 50mm (13.8 x 1.97in)
Body diameter:	50mm (1.97in)
Use:	As incendiary – dropped in clusters against towns and industrial complexes
Remarks:	Jettisoned from air-dropped containers. Magnesium alloy case. Sometimes fitted with high explosive charge

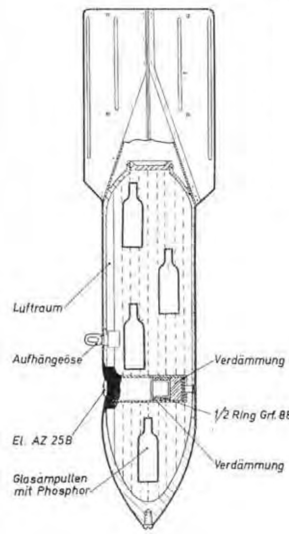
1. Scaffold pipe
2. Incendiary 1kg bomb
3. Incendiary bomb recently found on site in UK



C-50 A Phosphorous Bomb

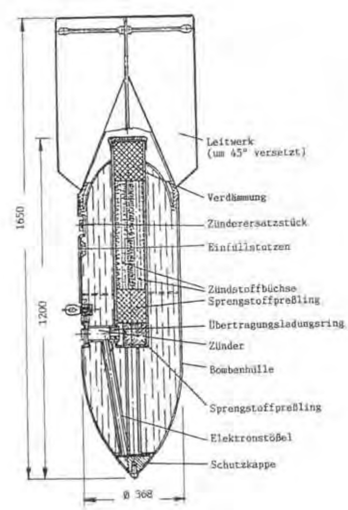
Bomb weight:	c41kg (90.4lb)
Explosive weight:	0.03kg (0.066lb)
Incendiary filling:	12kg (25.5lb) liquid filling with phosphor igniters in glass phials
Fuze type:	Electrical impact fuze
Bomb dimensions:	1,100 x 2800mm (43.3 x 11in)
Body diameter:	200mm (2.87in)
Use:	Against all targets where an incendiary effect is to be expected
Remarks:	Early fill was a phosphorous/ carbon disulphide incendiary mixture

Phosphorous Bomb, M25/A2, Kent



Flam C-250 'Oil Bomb'

Bomb weight:	125kg (276lb)
Explosive weight:	1kg (2.2lb)
Flammable weight:	74kg (163lb)
Filling:	Mixture of 30% petrol and 70% crude oil
Fuze type:	Super-fast electrical impact fuze
Bomb dimensions:	1,650 x 512.2mm (65 x 20.2in)
Body diameter:	368mm (14.5in)
Use:	Often used for surprise attacks on living targets, against troop barracks and industrial installations
Remarks:	Thin casing – not designed for ground penetration



Annex E: UXO Press Articles

20th July 2010 News – **Unexploded WWII Bomb** found near a Dorset beach
A 500lb high explosive bomb was discovered in heath-land near Purbeck Beach. It was subsequently detonated in a controlled explosion.
http://www.bbc.co.uk/news/uk-england-dorset-10699450

9th July 2010 News – **24 Phosphorus Grenades** dug up on a Dorset Beach
A box of Home Guard SIP grenades found on Cogden Beach was blown up by Army experts. The fragile glass munitions ignite on contact with air.
http://www.bbc.co.uk/news/uk-england-gloucestershire-10744279

17th May 2010 News – **Unexploded bomb** found in farmer's field
A live Second World War mortar shell was blown up by Army experts after a farmer found it in his field.
http://www.kentonline.co.uk/kentonline/news/2010/may/17/unexploded_bomb.aspx

30th April 2010 News – **Bomb** at Sheringham Shoal offshore wind site
A 250lb air-dropped German WWII bomb has been safely detonated on the Sheringham Shoal Offshore Wind Farm site.
http://www.renewableenergyfocus.com/view/9135/bomb-at-sheringham-shoal-offshore-wind-site/

11th March 2010 News – **Unexploded shells** found in Kent seaside town blown up
Five unexploded World War II shells have been blown up by bomb disposal experts in Kent.
http://news.bbc.co.uk/1/hi/england/kent/8561566.stm

6th March 2010 News – **WWII bomb** found by builders in central Southampton
A cordon remains in place in Southampton after an unexploded German World War II bomb was found at a building site.
http://news.bbc.co.uk/1/hi/england/hampshire/8549256.stm

9th December 2009 News – Builders dig up **Unexploded shell**
Workers have returned to a Leeds industrial estate after an unexploded shell was unearthed on a building site.
http://news.bbc.co.uk/1/hi/england/west_yorkshire/8403849.stm

9th November 2009 News – Old Woking, Surrey - **Unexploded wartime bomb** made safe
An unexploded World War II bomb has been made safe after it was found near a play area in Surrey.
http://news.bbc.co.uk/1/hi/england/surrey/8350967.stm

14th October 2009 News – Hove - 'Dad's Army' – **Bottle bombs found**
A street in Hove had to be evacuated after unexploded World War II bombs, in milk bottles, were found by a builder carrying out work at a house.
http://news.bbc.co.uk/1/hi/england/sussex/8306210.stm

29th September 2009 News – Weymouth Bay, Dorset – **Unexploded mine** hauled into net
A suspected unexploded World War II mine was caught in a fishing boat's net off the Dorset coastline, coastguards have said.
http://news.bbc.co.uk/1/hi/england/dorset/8281223.stm

11th September 2009 News – Stokes Bay, Gosport **Unexploded shell** find
Sailing vessels are being warned to avoid a part of the Solent after an unexploded shell was found.
http://news.bbc.co.uk/1/hi/england/hampshire/8249863.stm

18 August 2009 News – Ebberston, North Yorkshire – 500lb **WWII bomb** detonated
More than 1,000 people living in two villages in North Yorkshire have left their homes to allow a World War II bomb to be detonated.
http://news.bbc.co.uk/1/hi/england/north_yorkshire/8206474.stm

29 May 2009 News – Gillingham, Kent – '**Wartime shell**' sparks evacuation
The discovery of what was thought to be an unexploded wartime shell caused the evacuation of a Kent residential area.
http://news.bbc.co.uk/1/hi/england/kent/8074358.stm

22 May 2009 News – East Sussex – Building site **WWII bomb exploded**
A controlled explosion has been carried out on a World War II bomb found on a building site in East Sussex.
http://news.bbc.co.uk/1/hi/england/sussex/8062920.stm

11 May 2009 News – Wrecclesham – **Unexploded WWII bomb** discovered
A controlled explosion was carried out on an unexploded World War II mortar found in a Surrey field.
http://news.bbc.co.uk/1/hi/england/surrey/8043186.stm

6 May 2009 News – West Bexington, Dorset – **Unexploded mortar** shell detonated
An unexploded mortar shell has been detonated near the west Dorset coastline after it was discovered during excavation work.
http://news.bbc.co.uk/1/hi/england/dorset/8037032.stm

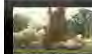
23 Apr 2009 News – Isle of Man – Paths open as **Mortars destroyed**
Experts have carried out controlled explosions on 12 mortar rounds found at an Isle of Man beauty spot.
http://news.bbc.co.uk/1/hi/world/europe/isle_of_man/8014209.stm

31 Mar 2009 News – Poole – **Unexploded grenade** found at quay
Bomb disposal experts were drafted in after a "pineapple-shaped" unexploded hand grenade was found opposite a quay.
http://news.bbc.co.uk/1/hi/england/dorset/7973666.stm

SKY NEWS Website of the Year — FIRST FOR BREAKING NEWS

M62 Motorway Closed For Detonation Of World War Two Bomb

VIDEO



Boom! WW2 Bomb Explodes 64 Years On 0:24

CHOOSE YOUR NEWS

5:04pm UK, Friday January 04, 2008

A busy motorway has been closed to allow for a wartime bomb to be detonated nearby.

The controlled explosion

Army expertsdestroyed the huge Second World War device in a controlled explosion near the M62.

The motorway was shut in both directions between junctions 37 and 38 as a safety precaution.

The "deeply buried" bomb had lain dormant in an East Yorkshire field for almost 64 years.

The device was discovered by a metal detecting enthusiast on New Year's Eve in a field near the B1230 at Balkholme, near Howden, which was also closed.

An Army bomb disposal team travelled up from Essex to join police, ambulance and fire services and utility companies at the scene.

Captain Tim Ives, of 33 Engineer Regiment, earlier said 10 soldiers would be employed to "reduce the effects of the controlled explosion by packing sand around the device".

Page last updated at 14:45 GMT, Friday, 22 May 2009 15:45 UK

E-mail this to a friend   Printable version

Building site WWII bomb exploded

Building site WWII bomb exploded

A controlled explosion has been carried out on a World War II bomb found on a building site in East Sussex.

The 110lb (50kg) SC50 bomb, thought to have been dropped from a German aircraft in 1940 or 1941, was found at the Hollenden House site in Bexhill.

Children at St Peter and St Paul Primary School next door in Buckhurst Road were sent home early after the discovery on Thursday.

Police said a 160ft (50m) cordon was put round the site during the blast.

BBC   14:23 GMT, Thursday, 5 June 2008 15:23 UK

E-mail this to a friend   Printable version

Unexploded bomb 'started to tick'

An unexploded World War II bomb started to tick and ooze liquid as experts tried to defuse it, police have said.

The large bomb was found in a river at Sugar House Lane, near Bromley-by-Bow Tube station in east London, on Monday.

Rush-hour travel was disrupted as overnight work to make the bomb safe continued into Thursday morning.

Police commander Simon O'Brien said: "It started to tick and ooze some pretty horrible substances." It stopped ticking when doused with liquid.

'Hero colleague'

"It measures approximately the size and length of a man, and weighs around 1,000kg (2,200lb).

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23 July 2010 Last updated at 18:28

Covert British troops 'could have buried' WWII devices

World War II incendiary devices found on a building site in Gloucestershire could have been left by covert British troops, according to researchers.

The bombs were put into vats of water to make them safe

More than 20 phosphorus bombs were unearthed in Birdlip after a digger hit one, causing it to burst into flames.

A former worker at the site said he saw a Home Guard officer burying objects there 65 years ago.

The Coleshill Auxiliary Research Team said auxiliary officers often used Home Guard uniforms as cover.

The secret Auxiliary Units were Britain's last line of defence in the event of a Nazi invasion.

Tom Sykes of the Coleshill Auxiliary Research Team said: "We know that the Auxiliary Units were issued with the AW [Albright and Wilson] phosphorus bombs so there is quite a high possibility that the guy who planted these bombs could have been an auxilier.

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Treasure hunter stumbles on deadly Dad's Army bomb cache

By MAIL ONLINE REPORTER
Last updated at 4:06 PM on 9th July 2010

Comments (0) | Add to My Stories

A treasure hunter escaped serious injury when he unearthed a cache of bombs that were buried by the Home Guard during the darkest days of World War 2.

The weapons - primed to go off when they made contact with the air - were secreted on a beach by a Captain Mainwaring of the day.

Loaded with dangerous benzene and phosphorus, the Dad's Army-style team would have used them in battle against Nazi troops in the event of invasion.

'Are you sure that's wise?': The Home Guard's stash of bombs finally goes off, 70 years late

Ian, from Shepton Mallet, Somerset, raised the alarm and a bomb disposal squad was scrambled to carry out a controlled explosion on the last-ditch weapons.

Sergeant Kay Howell, of the bomb disposal team, said the grenades were the type issued to the Home Guard and typically hidden near likely Nazi beachheads.

He said: 'They are particularly nasty with phosphorus which will instantly ignite on contact with the air and the benzene which is carcinogenic.'

'They are really just milk bottles with a metal top - no fuse, you just throw them.'

'If someone was digging by hand and a shovel went through it will immediately spontaneously ignite.'

'And you could certainly get badly burnt, although it is unlikely they would kill you.'

'It is not safe to transport them because the caps are so very badly corroded so we exploded them where they were.'

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NEWS LIVE BBC NEWS CHANNEL

Page last updated at 14:37 GMT, Wednesday, 2 June 2010 15:37 UK

World War II bomb kills three in Germany

Three people have been killed and six injured trying to defuse a World War II bomb in central Germany.

Workers building a sports stadium had earlier unearthed the bomb in the town of Goettingen.

It was not immediately clear why the bomb, reportedly weighing 500kg (1,100lb), had detonated.

Unexploded WWII bombs dropped by Allied planes are frequently found in Germany, though it is unusual for them to explode unexpectedly.

A special commission is investigating the causes of the explosion, while prosecutors are considering whether the team leader should face charges of manslaughter through culpable negligence, the BBC's Oana Lungescu reports from Berlin.

More than 7,000 people were immediately evacuated when the 500kg bomb was found. Several schools, a kindergarten and local companies remain closed.

Last week, another device was successfully defused close to the site.

In Berlin, four bombs have been found in the past two months, including one near the capital's main airport.

Top Left: Three people killed and six injured in Goettingen, central Germany
Top and Middle Right: Piling rig and dump truck after detonation of Allied UXB, Austria 2006. Emergency teams are aiding injured operator
Bottom Right: WWII bomb injures seventeen at construction site in Hattingen, Germany, in September 2008
Bottom Left: WWII Bomb Explodes on German Motorway. A highway construction worker in Germany accidentally struck an unexploded WWII bomb, causing an explosion which killed him and wrecked several passing cars in October 2006.

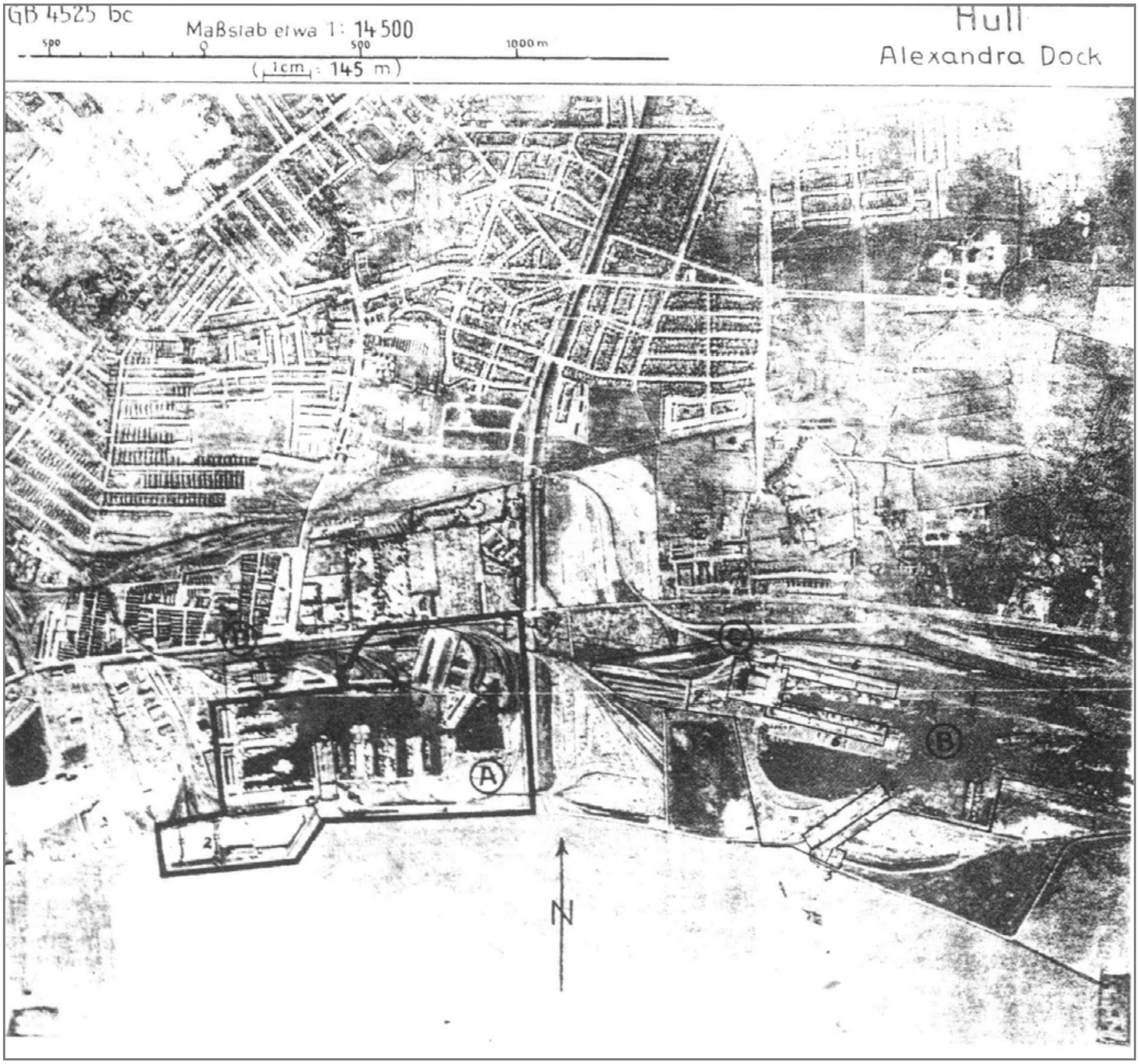
Annex F: WWI Air Raids and Naval Bombardments Map

CHART SHOWING THE EXACT LOCALITIES IN ENGLAND AND SCOTLAND THAT SUFFERED FROM HOSTILE AIR RAIDS AND BOMBARDMENTS FROM DECEMBER 16TH, 1914, TO JUNE 17TH, 1918.

Report Reference:	Client:	
3433TA	Delta Simons	BACTEC
	Project: Able Marine Energy Park site, Hull	

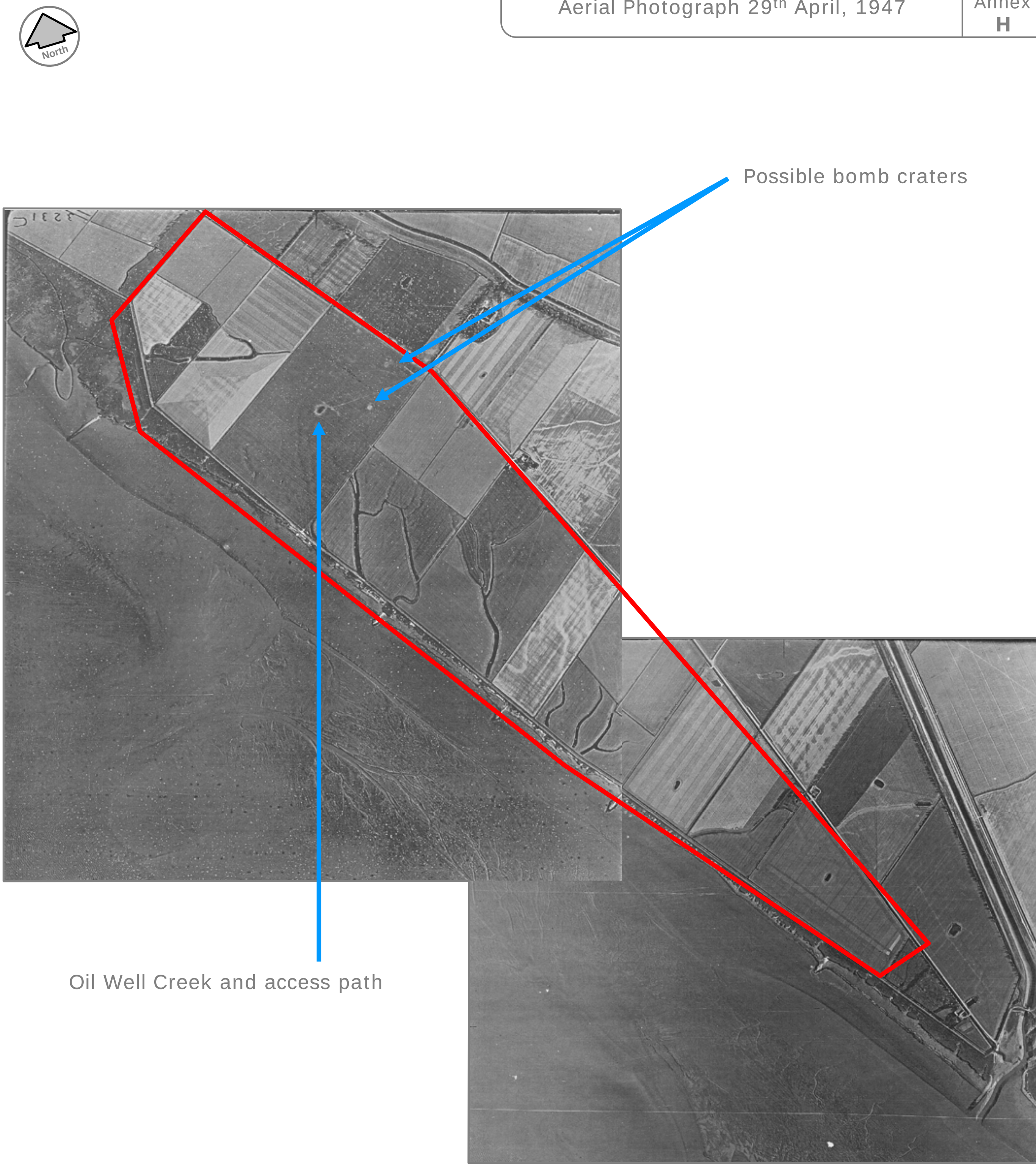
Source: National Archives

Annex G: Luftwaffe Reconnaissance Target Photograph



Luftwaffe target information relating to the Alexandra and King George Docks in Hull. This photograph probably dates from before the war but was updated on 12th September 1940. The targets identified are A Alexandra Dock: 1 – Sea Lock, 2 – Pier, and 3 – the Dry Docks. Target D is the Alexandra Dock Cold Storage Plant. The study site is located approximately 10.5km to the south-east, outside the area of the photograph.

Annex H: WWII-era RAF Aerial Photography



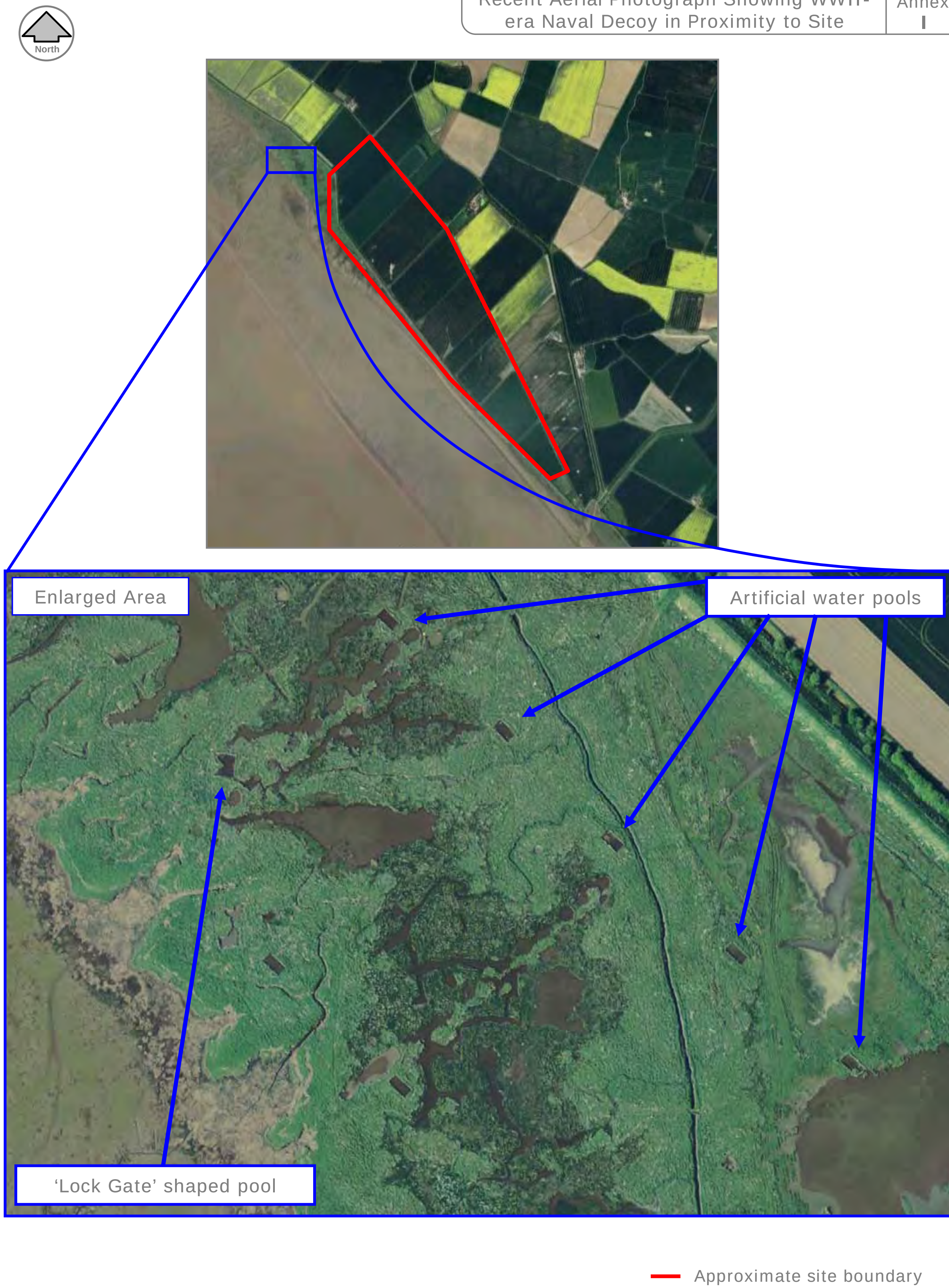
Report Reference:	Client: Delta Simons
3433TA	Project: Able Marine Energy Park site, Hull

Source: English Heritage National Monuments Record

Annex I: Recent Aerial Photograph Showing WWII-era Naval Decoy in Proximity to Site

Recent Aerial Photograph Showing WWII-era Naval Decoy in Proximity to Site

Annex I



Report Reference:	Client:	
3433TA	Delta Simons	
	Project: Able Marine Energy Park site, Hull	

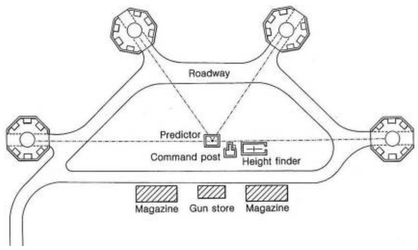
Source: Google Earth ™ Mapping Services/BACTEC

Annex J: Anti-Aircraft Artillery

3.7 inch Anti-Aircraft Projectile

Weight:	12.7kg (28lb)
Dimensions:	94 x 360mm (3.7 x 14.7in)
Carriage:	Mobile and Static Versions
Rate of Fire:	10-20 rounds per minute
Ceiling:	9-18,000m (29-59,000ft)
Muzzle Velocity:	792m/s (2,598ft/s)
Remarks:	4.5 inch projectiles were also commonly utilised

Slade Green's HAA battery, Dartford showing typical size and layout of the installation.



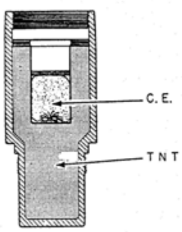
Layout plan for a typical HAA battery site.

Hyde Park 1939 3.7 Inch QF gun on mobile mounting

3.7 inch AA Projectile Minus Fuze

Rockets/Unrotated Projectiles

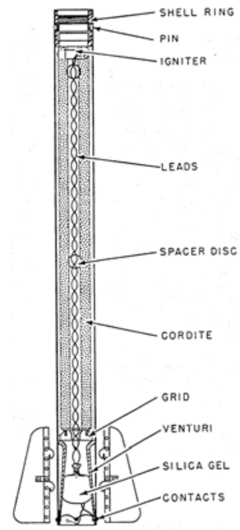
Weight:	Overall: 24.5kg (54lb) Warhead: 1.94kg (4.28lb)
Dimensions:	1930mm x 82.6mm (76 x 3.25in)
Carriage:	Mobile – transported on trailers
Ceiling:	6770m (22,200ft)
Maximum Velocity:	457mps (1,500 fps)



MK II HE Shell (3.5kg)

Rocket Battery in action

Home Guard soldiers load an anti-aircraft rocket at a 'Z' Battery



2" U.P AA Rocket

40mm Bofors Gun Projectile

Weight:	0.86kg (1.96lb)
Dimensions:	40mm x 310mm (1.6in x 12.2in)
Rate of Fire:	120 rounds per minute
Ceiling:	23,000ft (7000m)
Muzzle Velocity:	2,890 ft/s (881m/s)
Remarks:	Mobile batteries – normally few records of where these guns were located

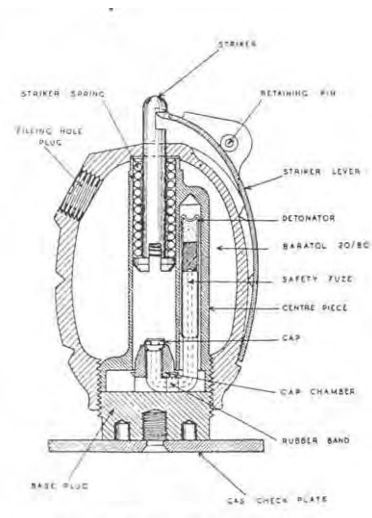
40mm Bofors gun and crew at Stanmore in Middlesex, 28 June 1940.

Unexploded 40mm Bofors projectile recovered from a marine environment

Annex K: Land Service Ammunition (LSA)

No. 36 'Mills' Grenade

Weight:	0.7kg filled (1lb 6oz)
Type:	Hand or discharger, fragmentation
Dimensions:	95 x 61mm (3.7 x 2.4in)
Filling:	Alumatol, Amatol 2 or TNT
Remarks:	4 second hand-throwing fuse with approximate 30m range. First introduced May 1918.



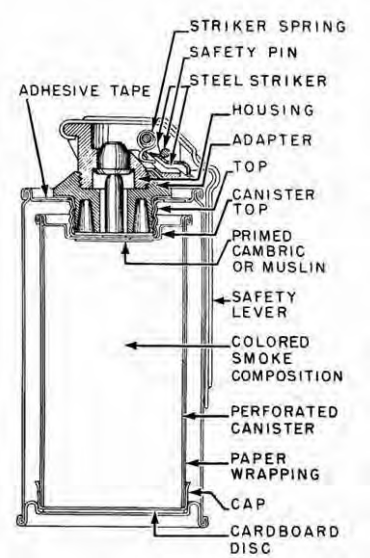
Grenade, .303 inch rifle, No. 36M, Mark I.

No. 69 Grenade

Weight:	0.38kg filled (0.8lb)
Type:	Percussion/Blast
Date Introduced:	December 1940
Remarks:	Black Bakelite body. Blast rather than fragmentation type. After unscrewing the safety cap, a tape is held when throwing the grenade releasing the safety bolt in the throwing motion. Detection is problematic due to its very low metal content.

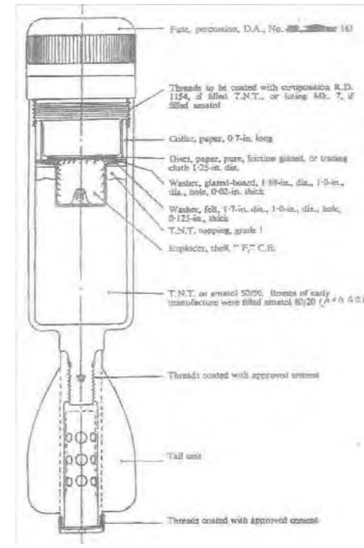
Typical Smoke Grenade

Dimensions:	Approx. 65 x 115mm (2.5 x 4.5in)
Type:	Smoke
Date Introduced:	Current MoD issue
Remarks:	Smoke grenades are used as ground-to-ground or ground-to-air signalling devices, target or landing zone marking devices, and screening devices for unit movement.



Typical 2 inch High Explosive Mortar

Bomb Weight:	1.02kg (2.25lb)
Type:	High Explosive
Dimensions:	51 x 290mm (2in x 11.4in)
Filling:	200g RDX/TNT
Maximum Range:	457m (500yds)
Remarks:	Fitted with an impact fuze which detonates the fuze booster charge (exploder) and, in turn, the high explosive charge. The main charge shatters the mortar bomb body, producing near optimum fragmentation and blast effect at the target.

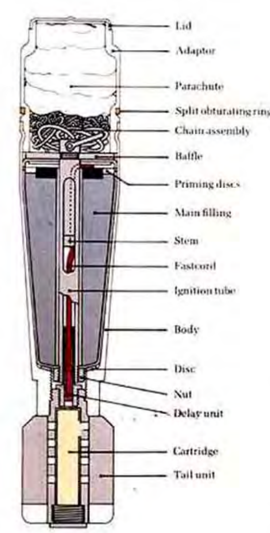


Typical 3 inch Smoke Mortar

Type:	Smoke
Dimensions:	c490 x 76mm (19.3in x 3in)
Filling:	Typically white phosphorous
Maximum Range:	2515m (2,750yds)
Remarks:	On impact, the fuze functions and initiates the bursting charge. The bursting charge ruptures the mortar bomb body and disperses the white phosphorous filler. The white phosphorous produces smoke upon exposure to the air.

Typical 2 inch Illuminating Mortar

Type:	Illum.
Dimensions:	51 x 290mm
Filling:	Various
Remarks:	The expulsion charge ignites and ejects the candle assembly. A spring ejects the parachute from the tail cone. The parachute opens, slowing the descent of the burning candle which illuminates the target.



Annex L: Small Arms Ammunition (SAA)

Small arms ammunition and cannon rounds up to 30mm

Recovered British WWII era SAA

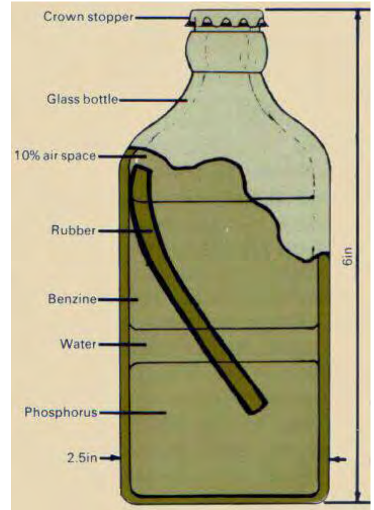
Annex M: Home Guard Weapons

Self Igniting Phosphorous (SIP) Grenades

Filling: White Phosphorous and Benzene

Remarks: The grenade comprised a glass bottle with a total volume of approximately one pint. It was filled with White Phosphorus, benzene, a piece of rubber and water. Over time the rubber dissolved to create a sticky fluid which would self ignite when the bottle broke. Fired by hand or Northover Projector.

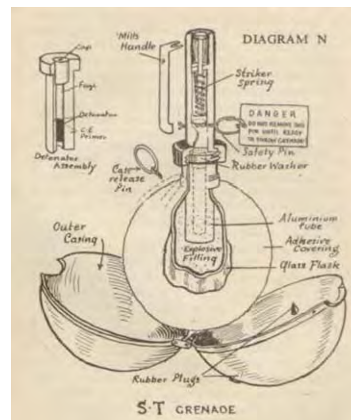




No 74 Grenade (Sticky Bomb)

Remarks: Designed as an anti-tank grenade and used by the Home Guard. The grenade consisted of a glass ball on the end of a Bakelite (plastic) handle. Inside the glass ball was an explosive filling whilst on the outside was a very sticky adhesive covering. Until used, this adhesive covering was encased in a metal outer casing.

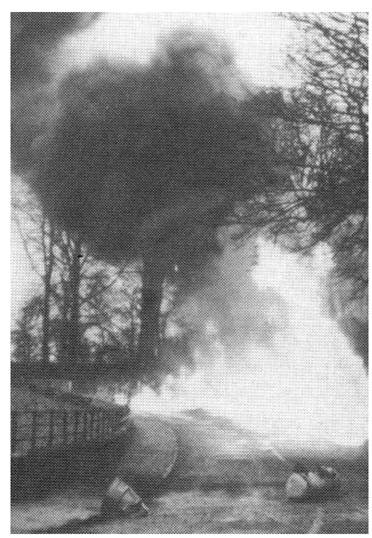




Flame Fougasse Bomb

Remarks: A Flame Fougasse was a weapon in which the projectile was a flammable liquid, typically a mixture of petrol and oil. It was usually constructed from a 40-gallon drum dug into the roadside and camouflaged. Ammonal provided the propellant charge which, when triggered, caused the weapon to shoot a flame 3m (10ft) wide and 27m (30 yards) long. Initially a mixture of 40% petrol and 60% gas oil was used, this was later replaced by an adhesive gel of tar, lime and petrol known as 5B.


www.pillbox-study-group.org.uk



BACTEC International Limited
37 Riverside
Sir Thomas Longley Road
Rochester, Kent
ME2 4DP
United Kingdom

Tel: +44 (0)1634 296757
Fax: +44 (0)1634 296779
E-mail: bactec.int@bactec.com

Branches/Offices in:

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THE QUEEN'S AWARDS FOR ENTERPRISE 2008

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Appendix VI

delta-simons
environmental consultants

A different perspective

LABORATORY REPORT

PSL Professional Soils Laboratory

UKAS TESTING 4043

Contract Number: PSL11/0404

Client's Reference: Report Date: 31 March 2011

Client Name: Delta-Simons Environmental Consultants
The Lawn
Union Road
Lincoln

LN1 3BL

For the attention of: Kevin McGee

Contract Title: Cherry Cobb

Date Received: 21-February-11
Date Commenced: 21-February-11
Date Completed: 07-March-11

Notes: **Observations and Interpretations are outside the UKAS Accreditation**

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	M Beastall (Laboratory Manager)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
TP1	BC1	B	1.00-1.50	Brown very silty CLAY.
TP2	BC2	B	1.00-1.50	Brown very silty CLAY.
TP3	BC3	B	1.00-1.50	Brown very silty CLAY.
TP4	BC4	B	1.00-1.50	Brown very silty CLAY.
TP6	BC5	B	1.00-1.50	Brown very silty CLAY.
TP9	BC6	B	1.00-1.50	Brown very silty CLAY.
TP10	BC7	B	1.00-1.50	Brown very silty CLAY.
TP13	BC8	B	1.00-1.50	Brown very silty CLAY.
TP14	BC9	B	1.00-1.50	Brown very silty CLAY.
TP2	GS1	B	3.00-3.50	Grey sandy slightly clayey SILT.
TP4	GS2	B	3.00-3.50	Grey sandy slightly clayey SILT.
TP5	GS3	B	2.00-2.50	Grey sandy slightly clayey SILT.
TP6	GS4	B	2.00-2.50	Grey sandy slightly clayey SILT.
TP7	GS5	B	2.00-2.50	Grey sandy slightly clayey SILT.
TP8	GS6	B	3.00-3.50	Grey sandy slightly clayey SILT.
TP9	GS7	B	3.00-3.50	Grey sandy slightly clayey SILT.
TP10	GS8	B	2.00-2.50	Grey sandy slightly clayey SILT.
TP13	GS9	B	3.00-3.50	Grey sandy slightly clayey SILT.
TP14	GC1	B	2.00-2.50	Grey very silty CLAY.

PSL
Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	03/03/11		04/03/11		04/03/11

CHERRY COBB (KM034).

Contract No: PSL11/0404

Client Ref:

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
MG1		B		MADE GROUND brown very gravelly slightly clayey very silty sand.
BH1		P	9.30	Brown very silty organic SAND.

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Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
	03/03/11		04/03/11		04/03/11

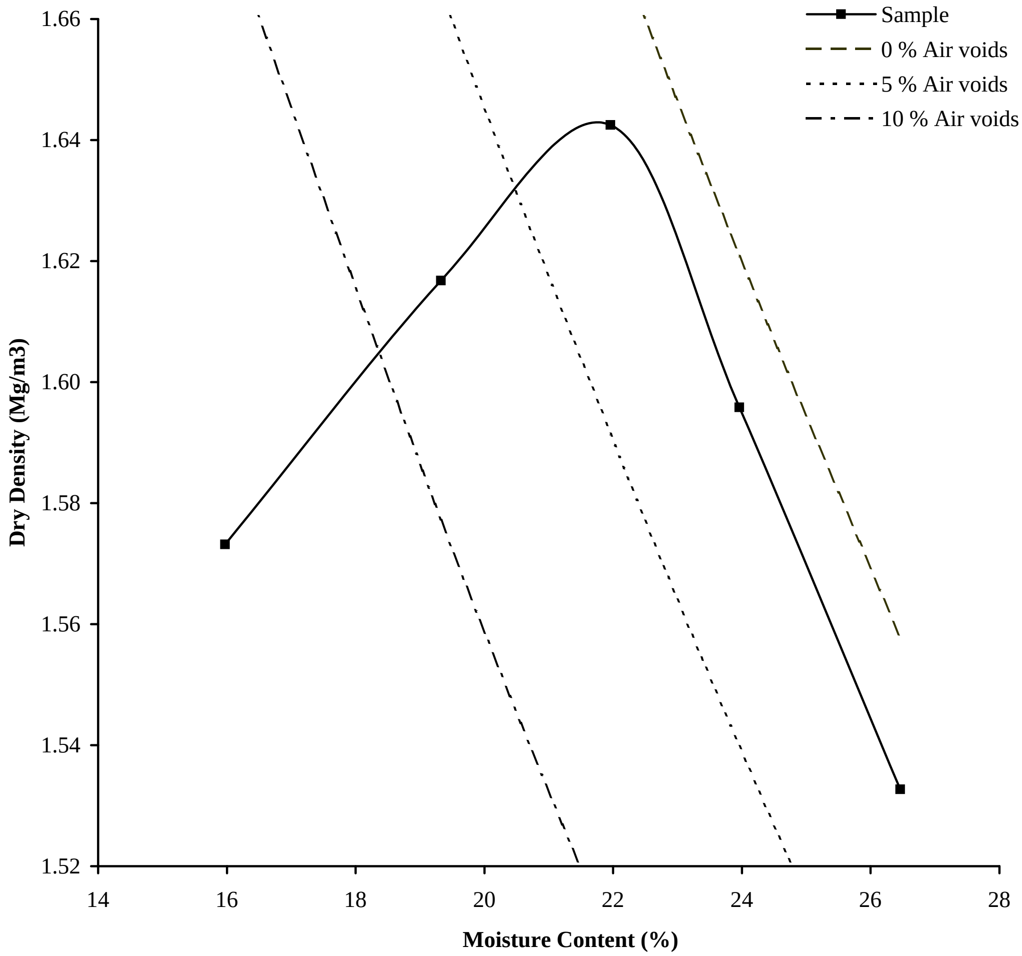
CHERRY COBB (KM034).

Contract No: PSL11/0404
Client Ref:

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP1**	**Depth (m) :**	**1.00-1.50**
Sample Number:	**BC1**	**Sample Type:**	**B**



Initial Moisture Content:	33	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.64	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		22		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

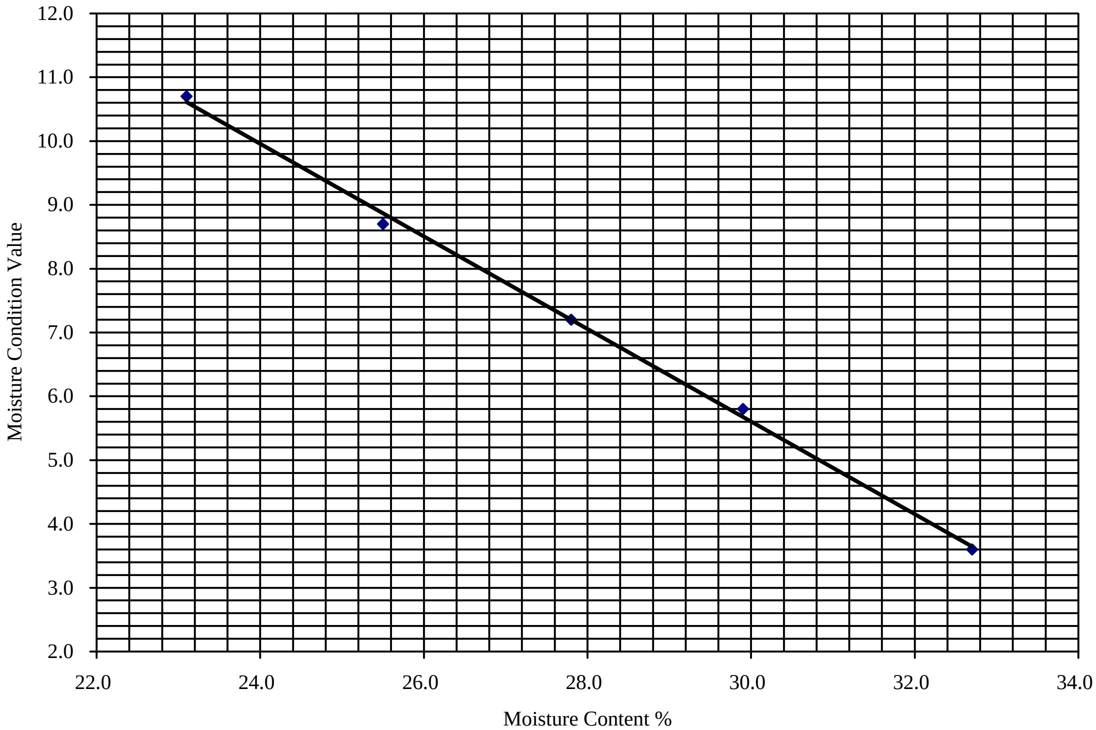
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

MOISTURE CONDITION VALUE CALIBRATION
BS1377 : Part 4 : 1990.

Hole Number: TP1 **Depth (m):** 1.00-1.50

Sample Number: BC1 **Sample Type:** B

Initial Moisture Content (%).:	33
Single/Separate Samples Tested.	Single
Material Retained on the 20mm BS Test Sieve (%).:	0



Test Results.

Test Number	**1**	**2**	**3**	**4**	**5**
Moisture Content (%)	23.1	25.5	27.8	29.9	32.7
MCV	10.7	8.7	7.2	5.8	3.6

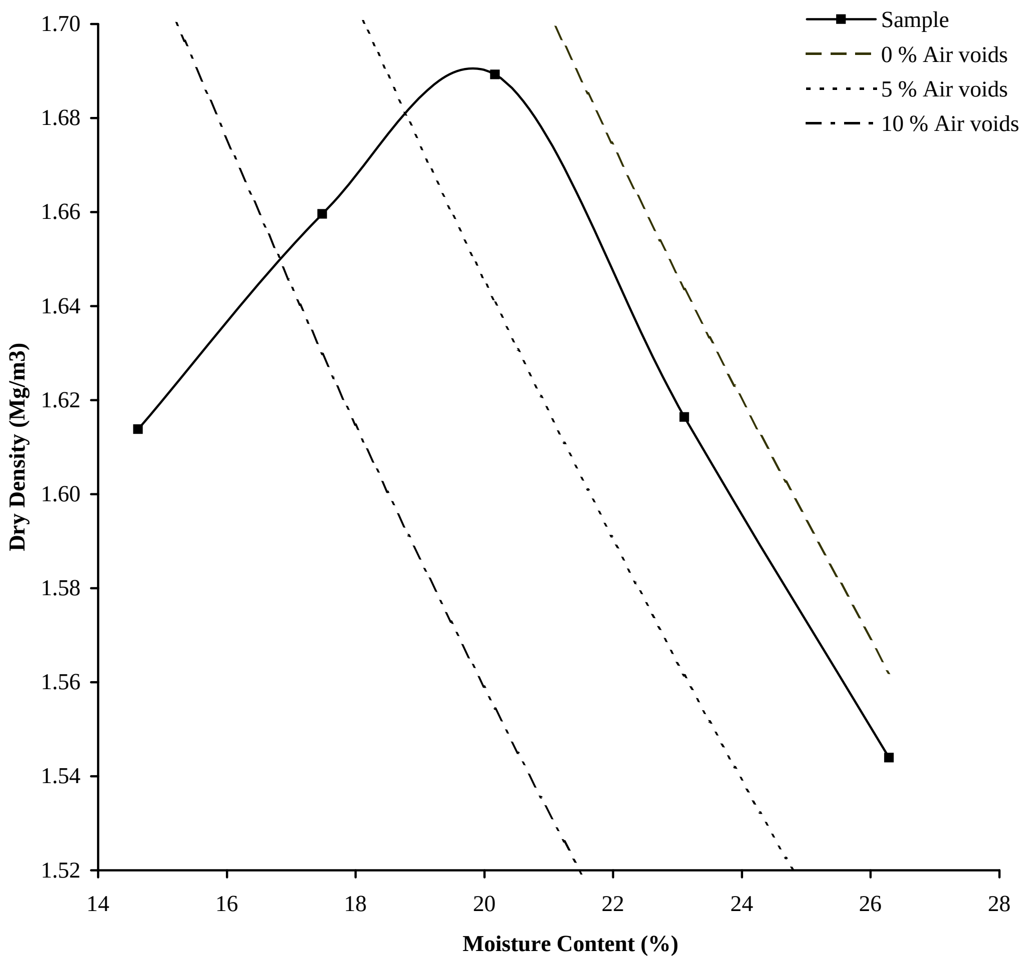
Checked	Date	Approved	Date
RC	04/03/11	RC	04/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No:** **PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP2**	**Depth (m) :**	**1.00-1.50**
Sample Number:	**BC2**	**Sample Type:**	**B**



Initial Moisture Content:	29	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.69	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		20		
Remarks	See Summary of Soil Descriptions.			

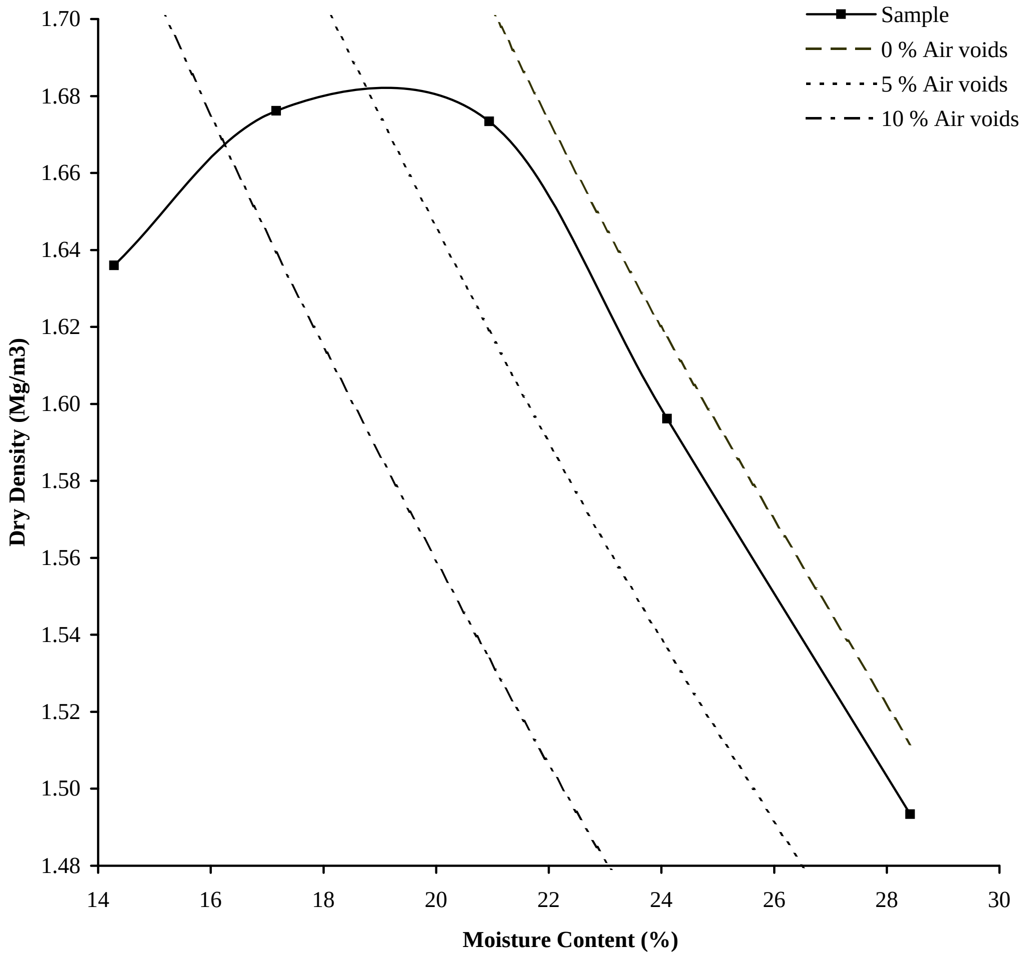
Checked By	Date	Approved By	Date

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP3**	**Depth (m) :**	**1.00-1.50**
Sample Number:	**BC3**	**Sample Type:**	**B**



Initial Moisture Content:	28	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.68	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		19		
Remarks	See Summary of Soil Descriptions.			

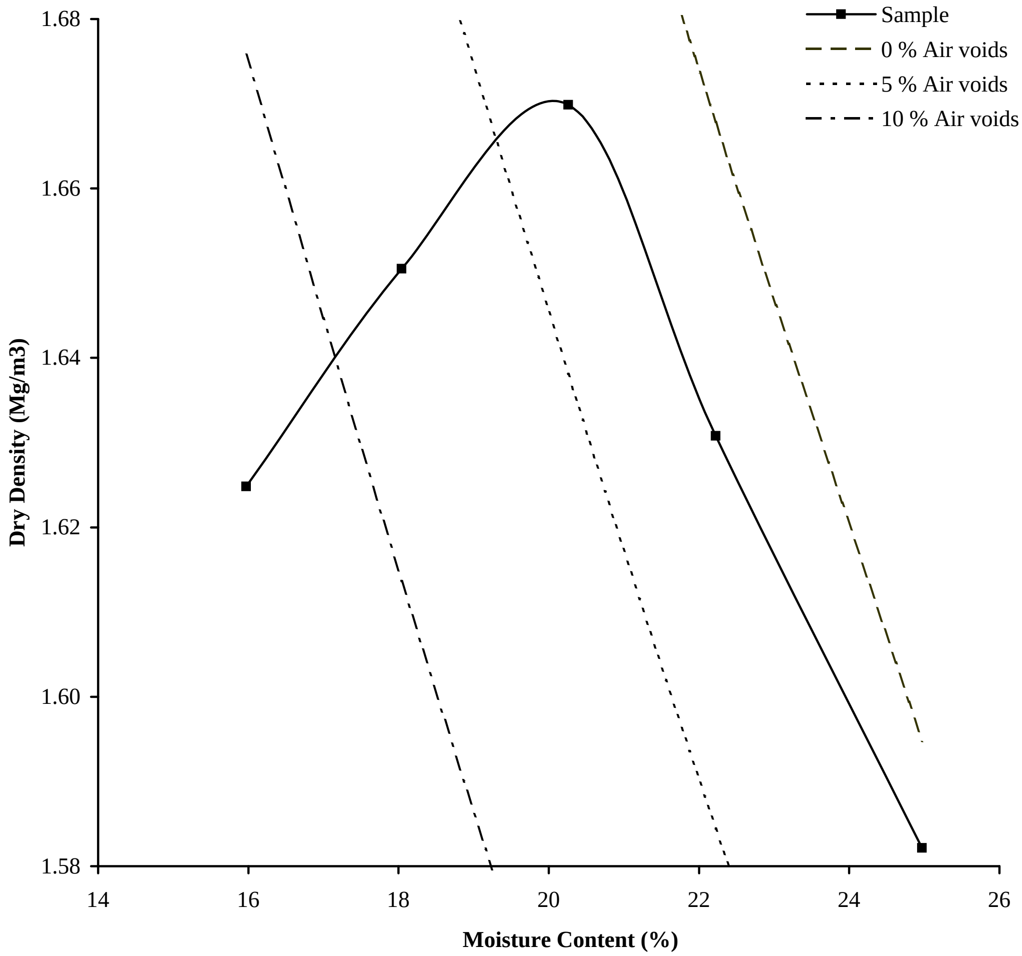
Checked By	Date	Approved By	Date
[signature]	04/03/11	[signature]	04/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP4**	**Depth (m) :**	**1.00-1.50**
Sample Number:	**BC4**	**Sample Type:**	**B**



Initial Moisture Content:	25	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.67	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		20		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

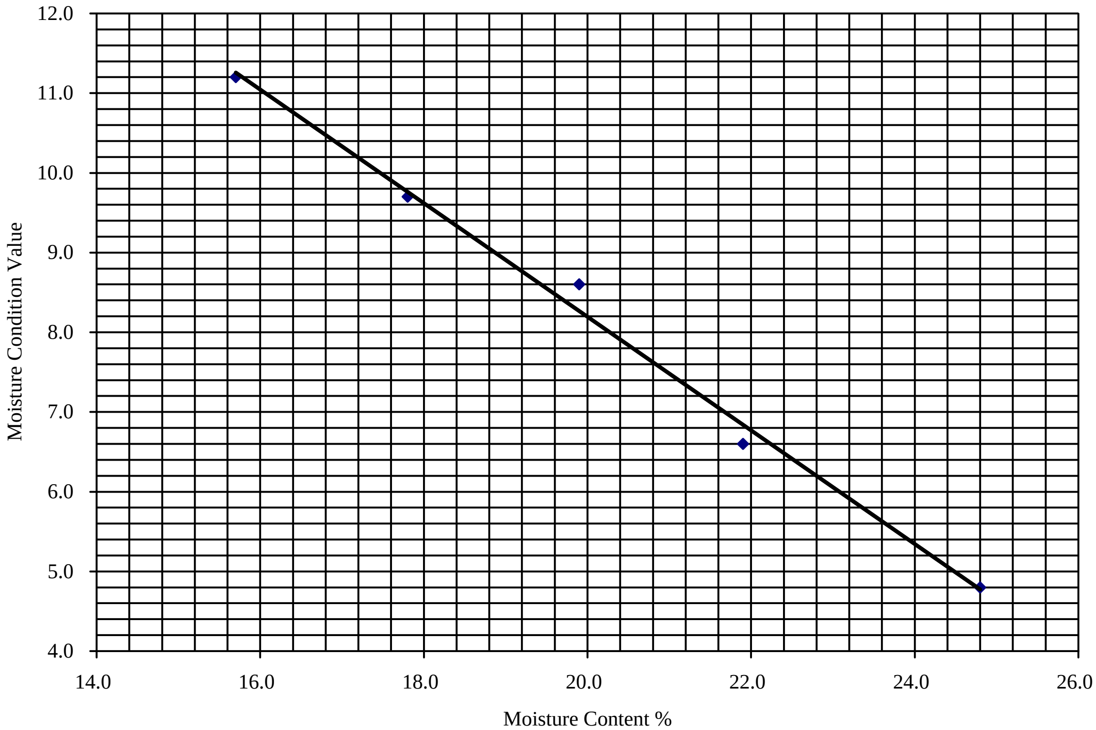
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

MOISTURE CONDITION VALUE CALIBRATION
BS1377 : Part 4 : 1990.

Hole Number: TP4 **Depth (m):** 1.00-1.50

Sample Number: BC4 **Sample Type:** B

Initial Moisture Content (%).:	24.8
Single/Separate Samples Tested.	Single
Material Retained on the 20mm BS Test Sieve (%).:	0



Test Results.

Test Number	**1**	**2**	**3**	**4**	**5**
Moisture Content (%)	15.7	17.8	19.9	21.9	24.8
MCV	11.2	9.7	8.6	6.6	4.8

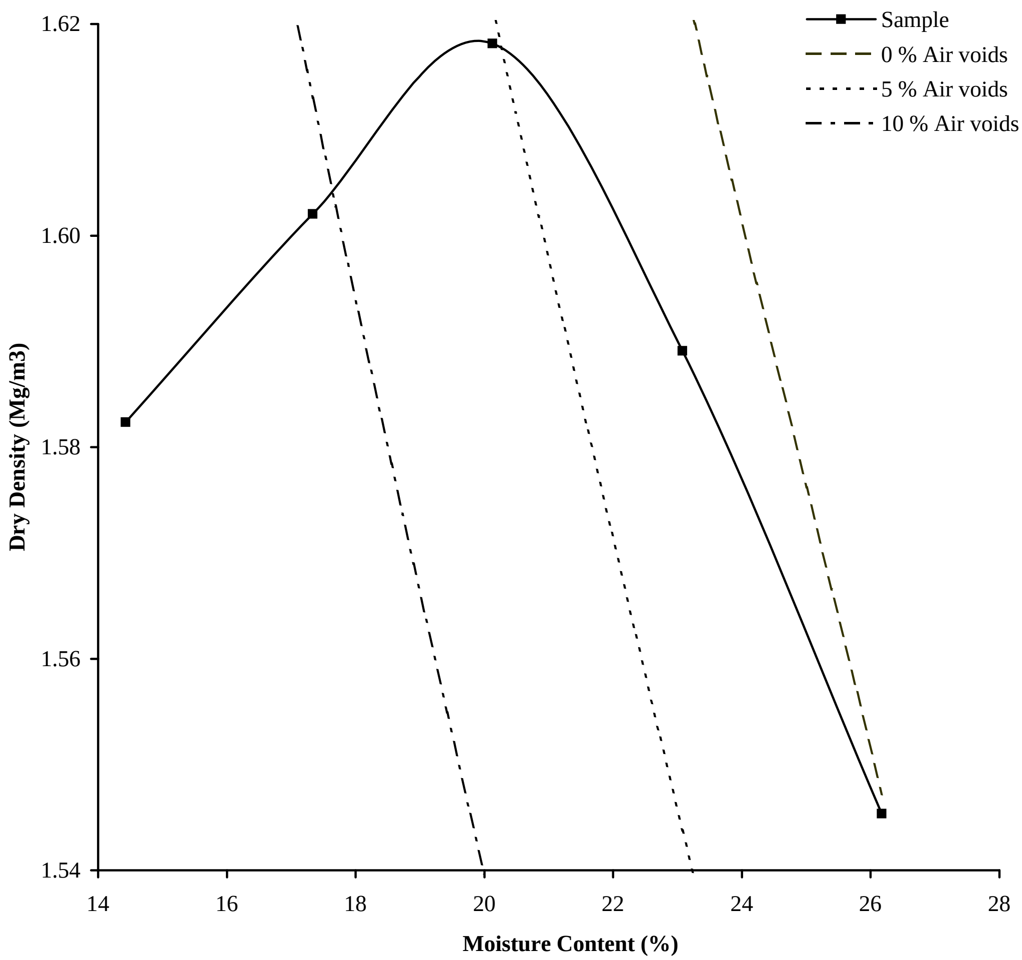
Checked	Date	Approved	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory	CHERRY COBB (KM034).	**Contract No:** **PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP6**	**Depth (m) :**	**1.00-1.50**
Sample Number:	**BC5**	**Sample Type:**	**B**



Initial Moisture Content:	29	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.60	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.62	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		20		
Remarks	See Summary of Soil Descriptions.			

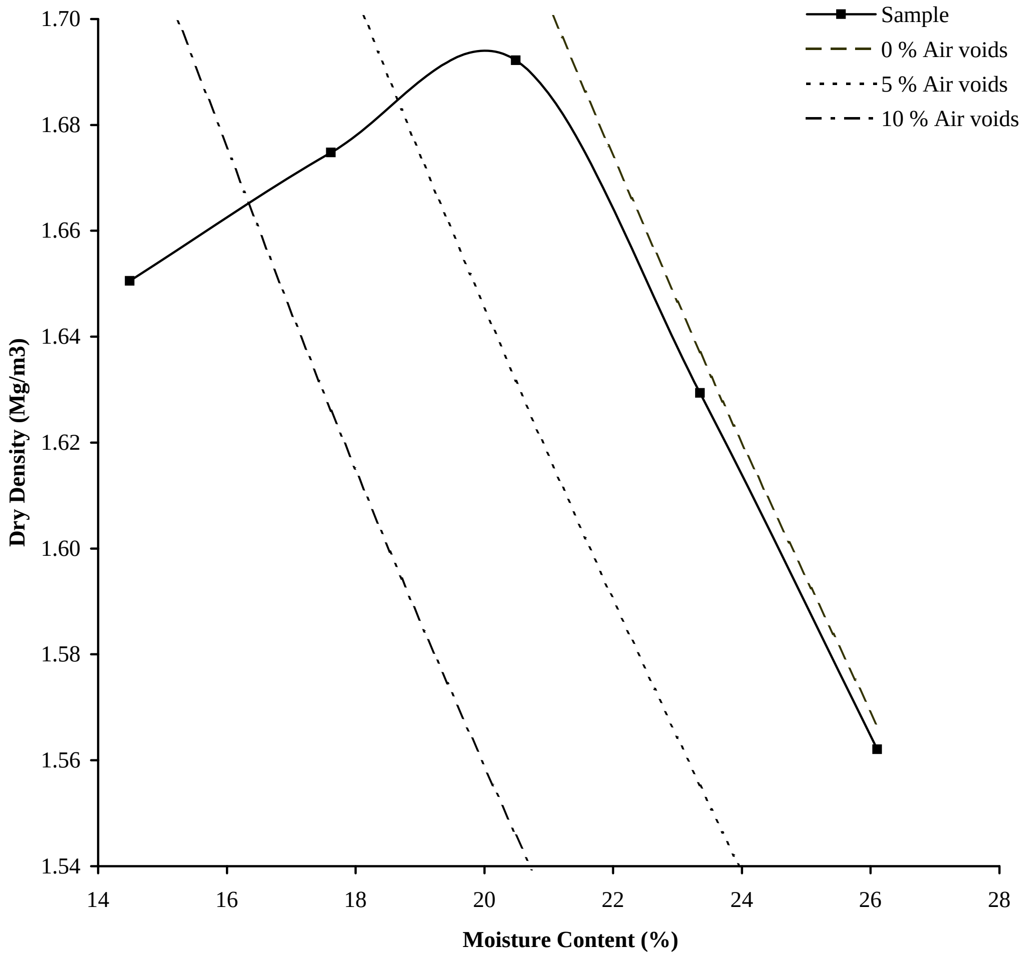
Checked By	Date	Approved By	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No. PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP9**	**Depth (m) :**	**1.00-1.50**
Sample Number:	**BC6**	**Sample Type:**	**B**



Initial Moisture Content:	31	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.69	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		20		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
[signature]	04/03/11	[signature]	04/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

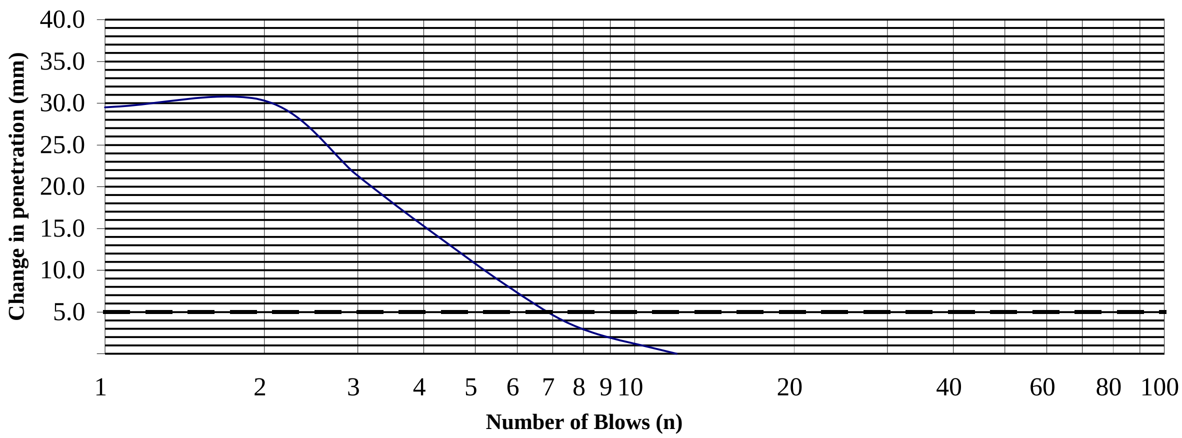
MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number: TP9 **Depth (m):** 1.00-1.50

Sample Number: BC6 **Sample Type:** B

Material Retained on the 20mm BS Test Sieve (%):	0

MCV Determination



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	120.3	29.5
2	108.3	30.3
3	97.0	21.3
4	90.8	15.3
6	82.5	7.3
8	78.0	2.9
12	75.7	
16	75.5	
24	75.2	
32	75.1	
48		
64		
96		
128		
192		
256		

Test Results.

Moisture Content (%).	26.2
MCV	8.4

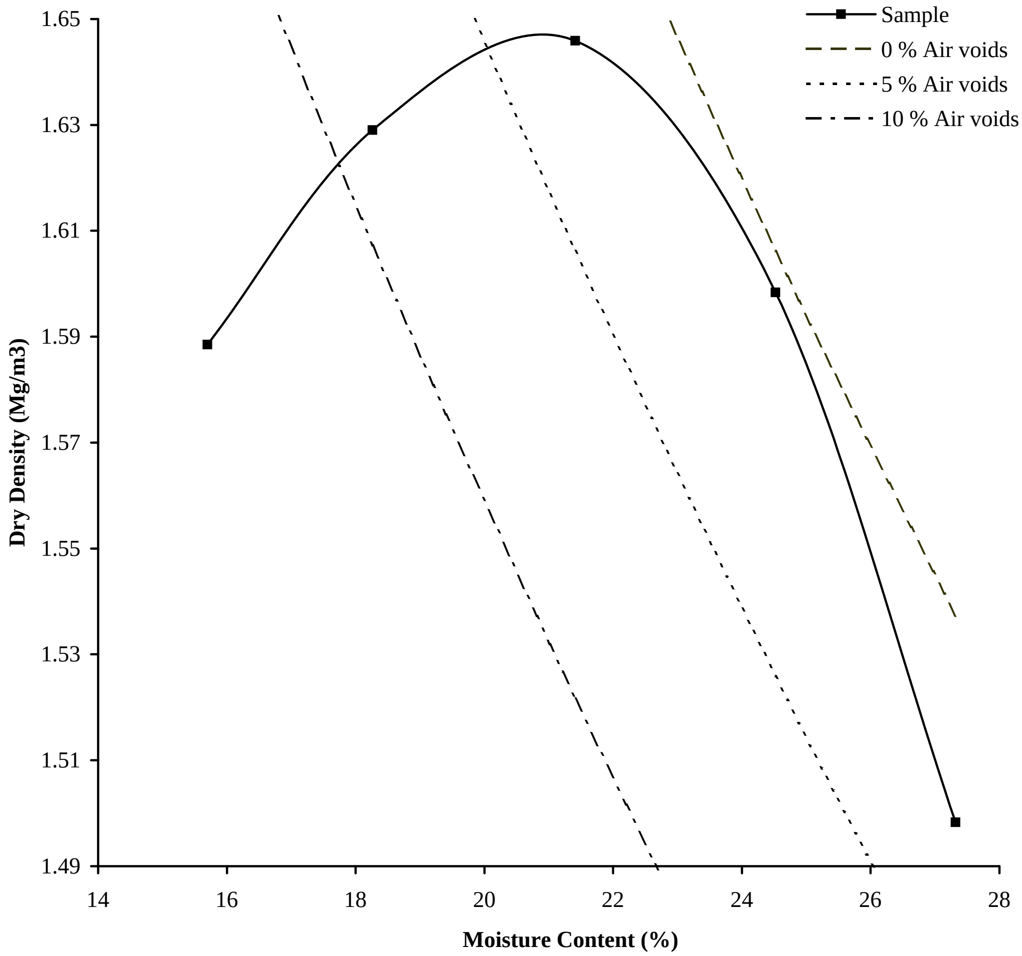
Checked	Date	Approved	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No: PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP10**	**Depth (m) :**	**1.00-1.50**
Sample Number:	**BC7**	**Sample Type:**	**B**



Initial Moisture Content:	35	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.65	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		21		
Remarks	See Summary of Soil Descriptions.			

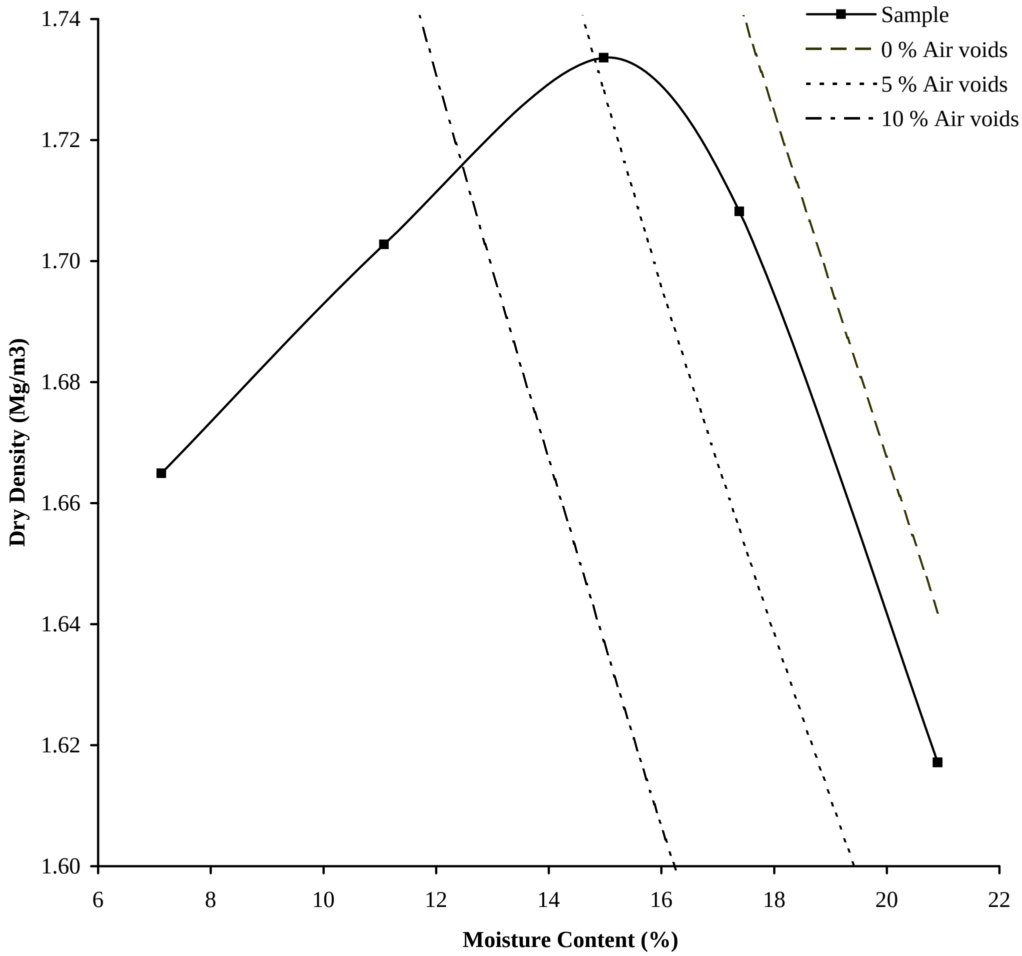
Checked By	Date	Approved By	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP13**	**Depth (m) :**	**1.00-1.50**
Sample Number:	**BC8**	**Sample Type:**	**B**



Initial Moisture Content:	30	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.73	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		15		
Remarks	See Summary of Soil Descriptions.			

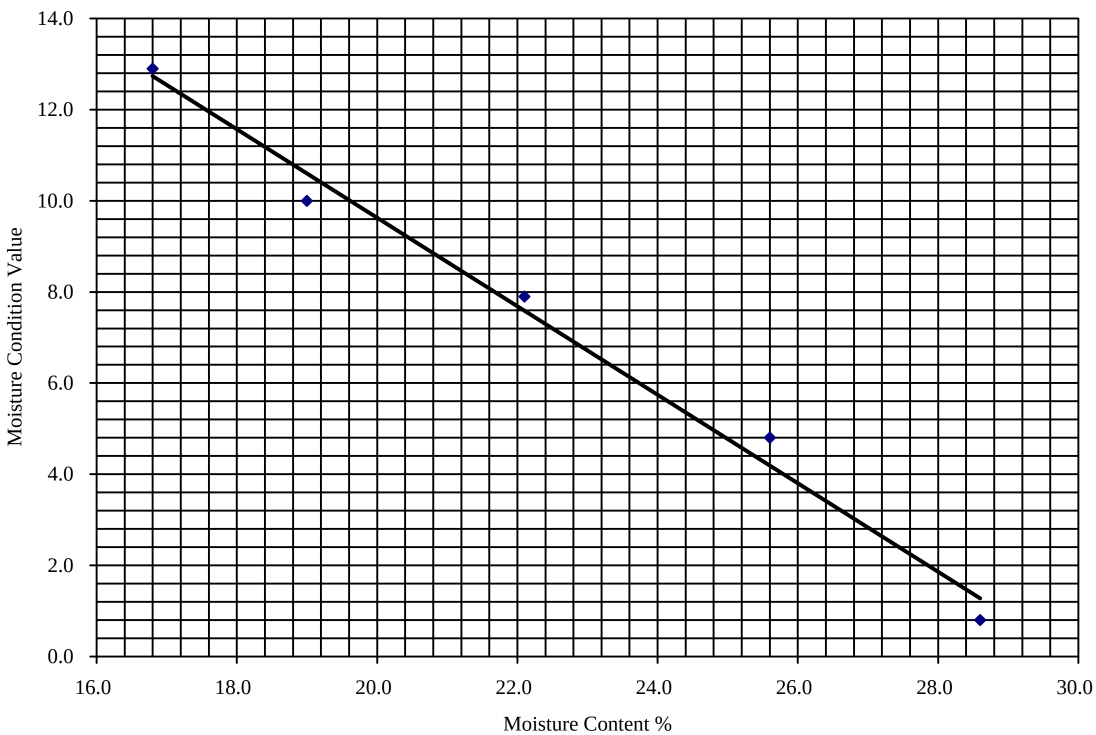
Checked By	Date	Approved By	Date
	07/03/11		07/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

MOISTURE CONDITION VALUE CALIBRATION
BS1377 : Part 4 : 1990.

Hole Number:	**TP13**	**Depth (m):**	**1.00-1.50**
Sample Number:	**BC8**	**Sample Type:**	**B**

Initial Moisture Content (%).:	29
Single/Separate Samples Tested.	Single
Material Retained on the 20mm BS Test Sieve (%).:	0



Test Results.

Test Number	1	2	3	4	5
Moisture Content (%)	16.8	19.0	22.1	25.6	28.6
MCV	12.9	10.0	7.9	4.8	0.8

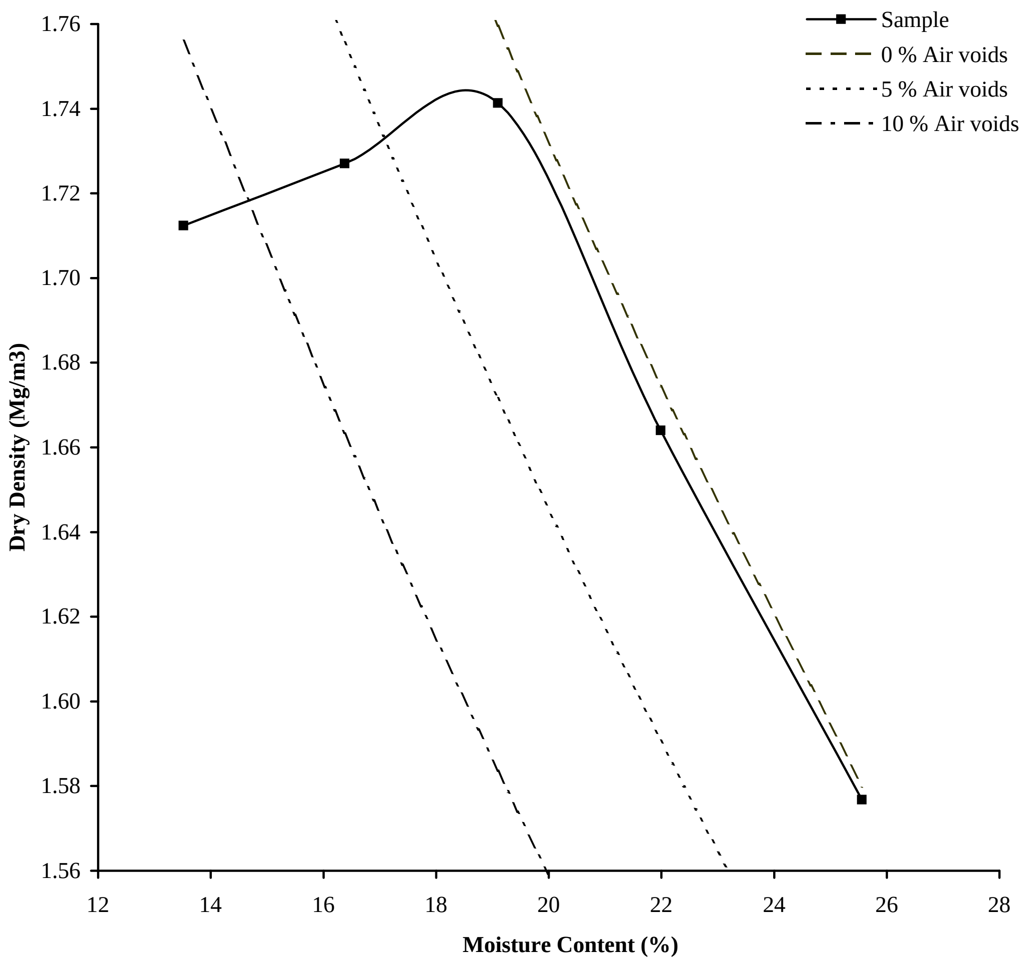
Checked	Date	Approved	Date
	07/03/11		07/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No:** **PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP14**	**Depth (m) :**	**1.00-1.50**
Sample Number:	**BC9**	**Sample Type:**	**B**



Initial Moisture Content:	29	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.74	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		19		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
[signature]	04/03/11	[signature]	04/03/11

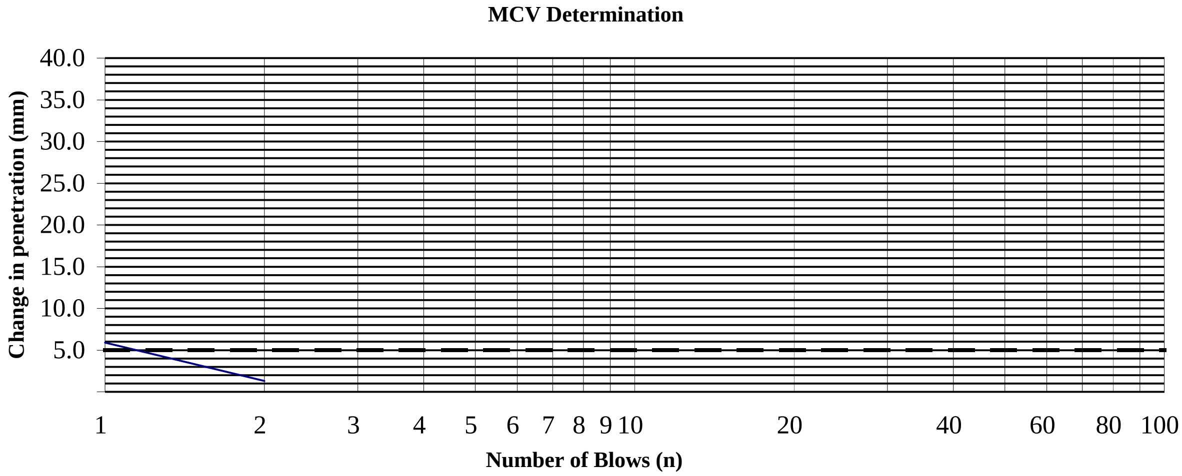
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number: TP2 **Depth (m):** 1.00-1.50

Sample Number: BC2 **Sample Type:** B

Material Retained on the 20mm BS Test Sieve (%):	0



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	82.1	5.9
2	77.0	1.3
3	76.4	
4	76.2	
6	76.0	
8	75.7	
12		
16		
24		
32		
48		
64		
96		
128		
192		
256		

Test Results.

Moisture Content (%).	28.9
MCV	0.6

Checked	Date	Approved	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory

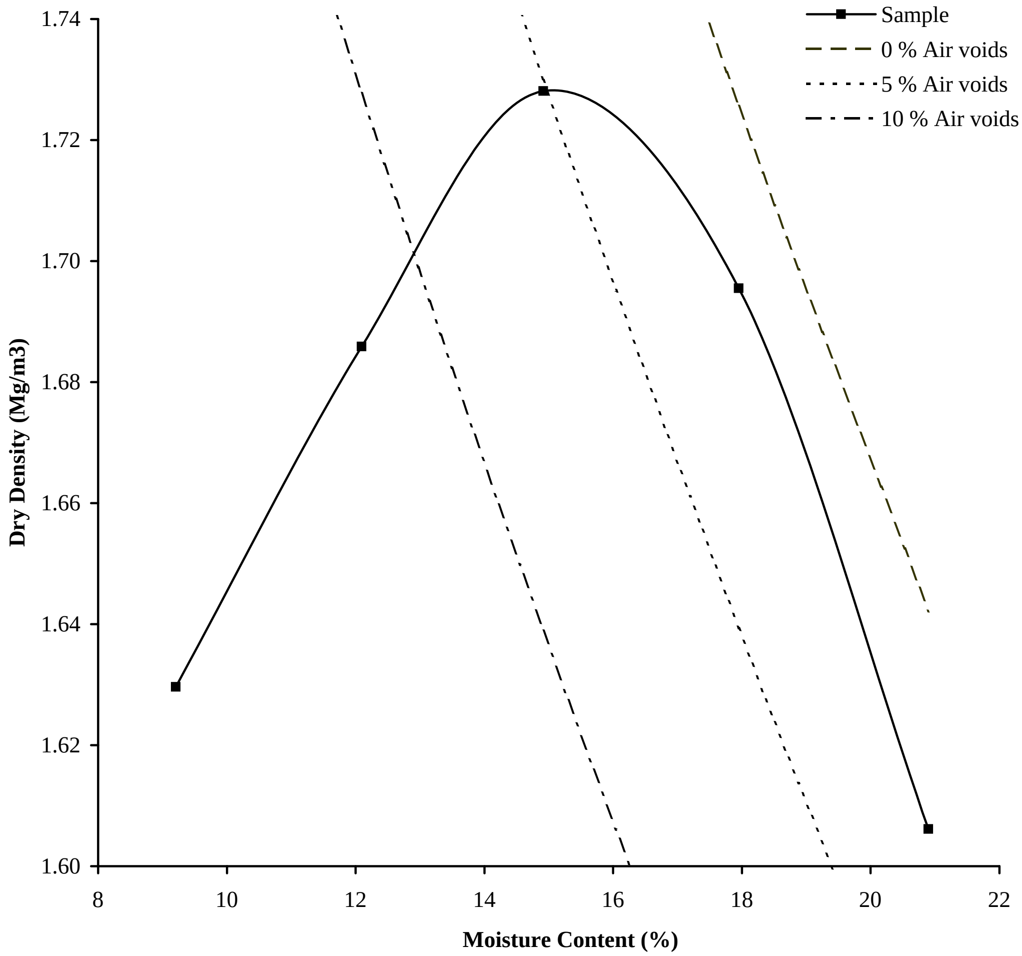
CHERRY COBB (KM034).

Contract No: PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP14**	**Depth (m) :**	**2.00-2.50**
Sample Number:	**GC1**	**Sample Type:**	**B**



Initial Moisture Content:	42	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.73	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		15		
Remarks	See Summary of Soil Descriptions.			

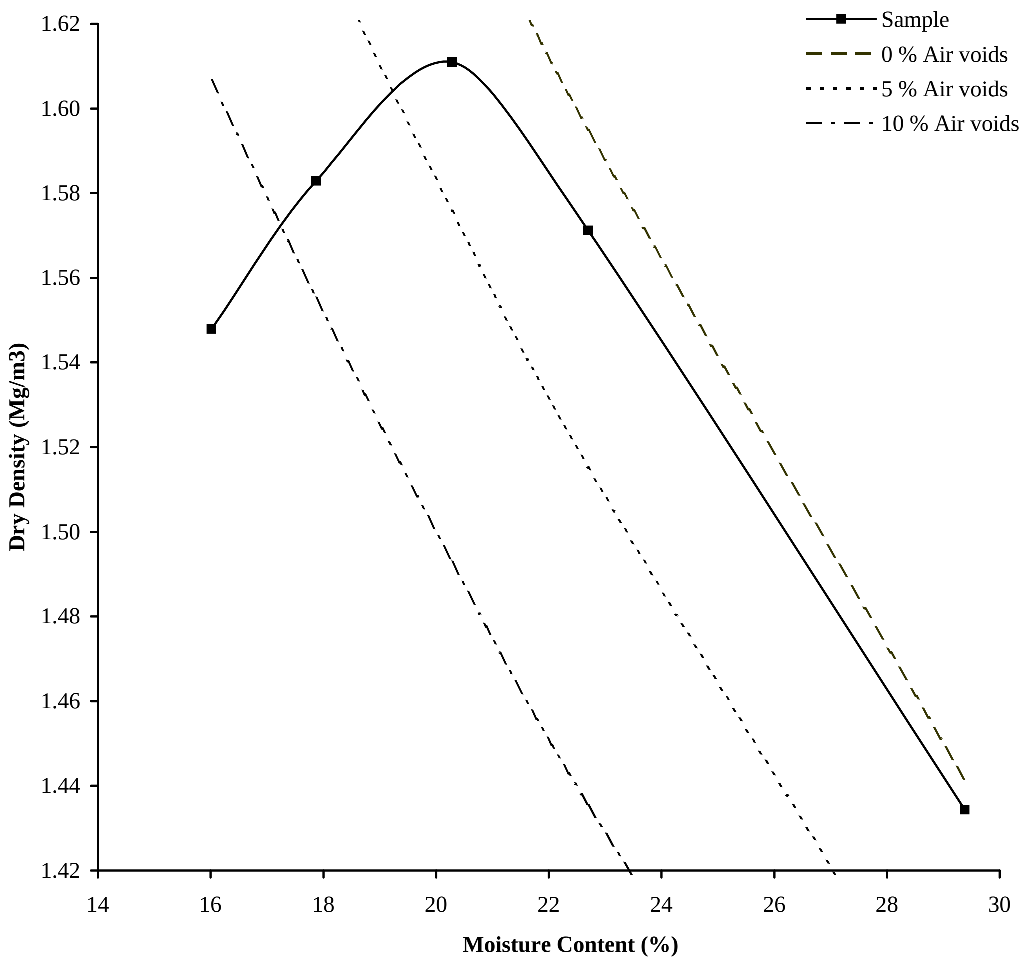
Checked By	Date	Approved By	Date
[signature]	04/03/11	[signature]	04/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP2**	**Depth (m) :**	**3.00-3.50**
Sample Number:	**GS1**	**Sample Type:**	**B**



Initial Moisture Content:	29	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.61	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		20		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

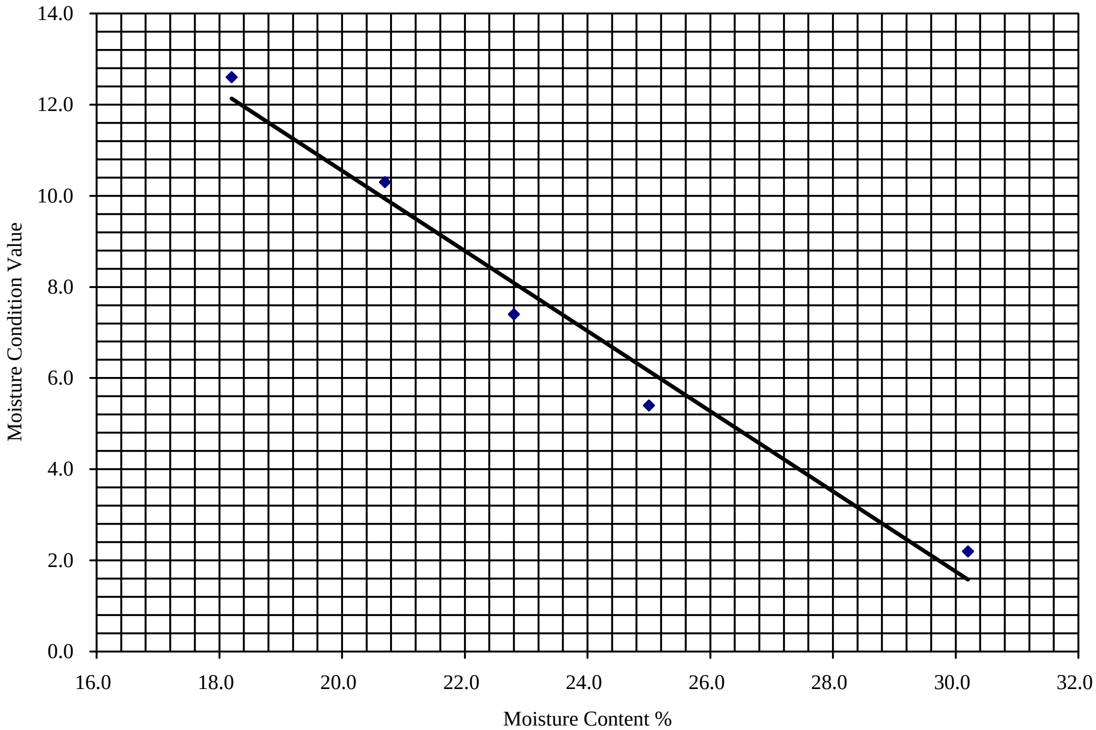
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

MOISTURE CONDITION VALUE CALIBRATION
BS1377 : Part 4 : 1990.

Hole Number: TP2 **Depth (m):** 3.00-3.50

Sample Number: GS1 **Sample Type:** B

Initial Moisture Content (%).:	30
Single/Separate Samples Tested.	Single
Material Retained on the 20mm BS Test Sieve (%).:	0



Test Results.

Test Number	1	2	3	4	5
Moisture Content (%)	18.2	20.7	22.8	25.0	30.2
MCV	12.6	10.3	7.4	5.4	2.2

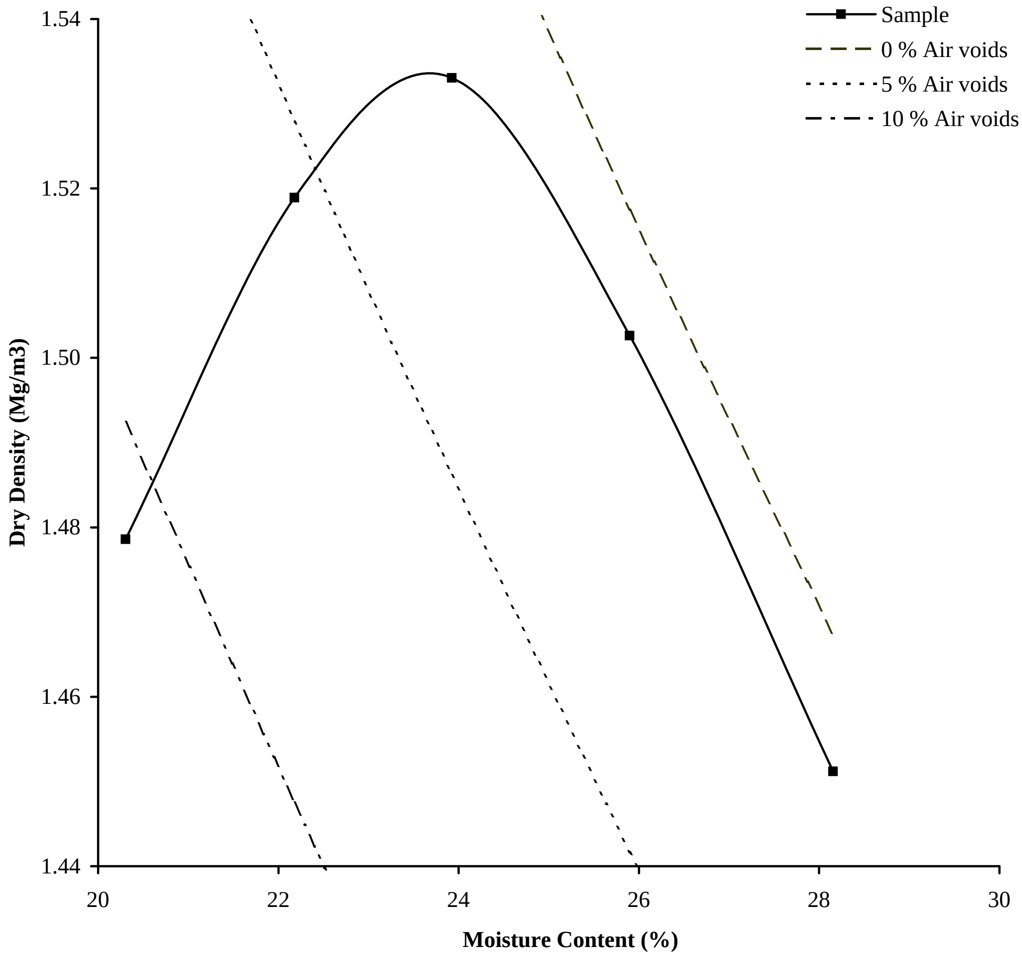
Checked	Date	Approved	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No: PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP4**	**Depth (m) :**	**3.00-3.50**
Sample Number:	**GS2**	**Sample Type:**	**B**



Initial Moisture Content:	28	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.53	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		24		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

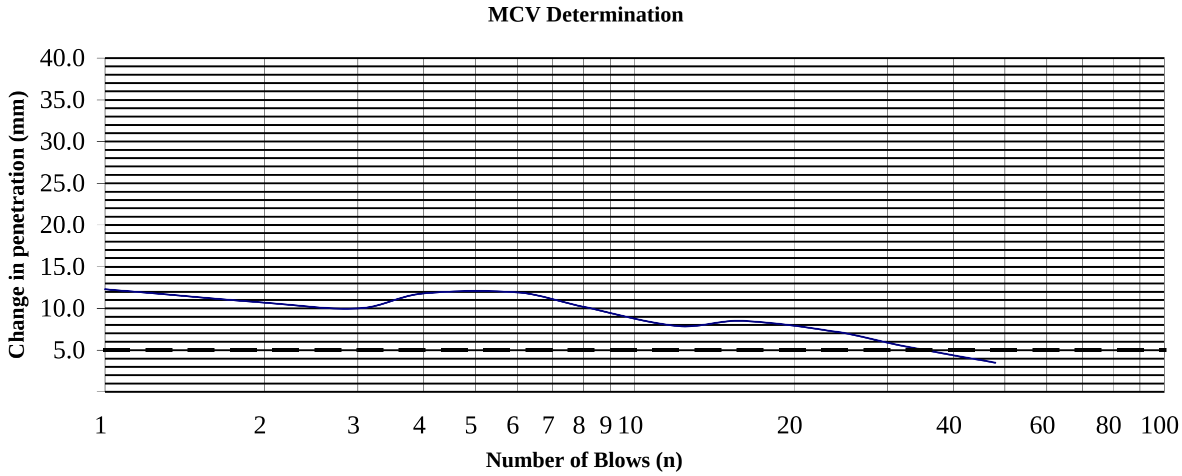
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number: TP4 **Depth (m):** 3.00-3.50

Sample Number: GS2 **Sample Type:** B

Material Retained on the 20mm BS Test Sieve (%):	0



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	89.4	12.3
2	82.1	10.7
3	79.1	10.0
4	77.1	11.8
6	74.2	11.9
8	71.4	10.2
12	69.1	7.9
16	65.3	8.5
24	62.3	7.2
32	61.2	5.5
48	58.3	3.5
64	56.8	
96	55.1	
128	55.7	
192	54.8	
256		

Test Results.

Moisture Content (%).	28.4
MCV	15.4

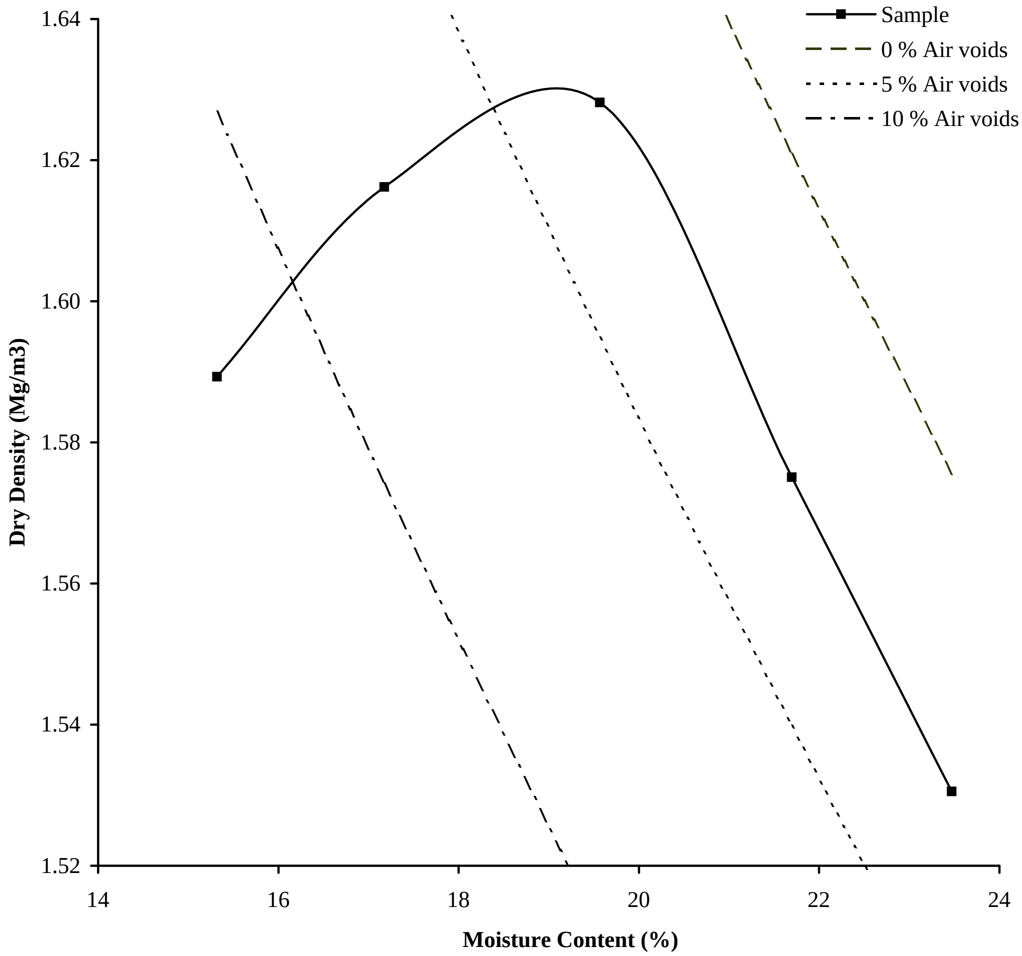
Checked	Date	Approved	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No: PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP5**	**Depth (m) :**	**2.00-2.50**
Sample Number:	**GS3**	**Sample Type:**	**B**



Initial Moisture Content:	37	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.63	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		19		
Remarks	See Summary of Soil Descriptions.			

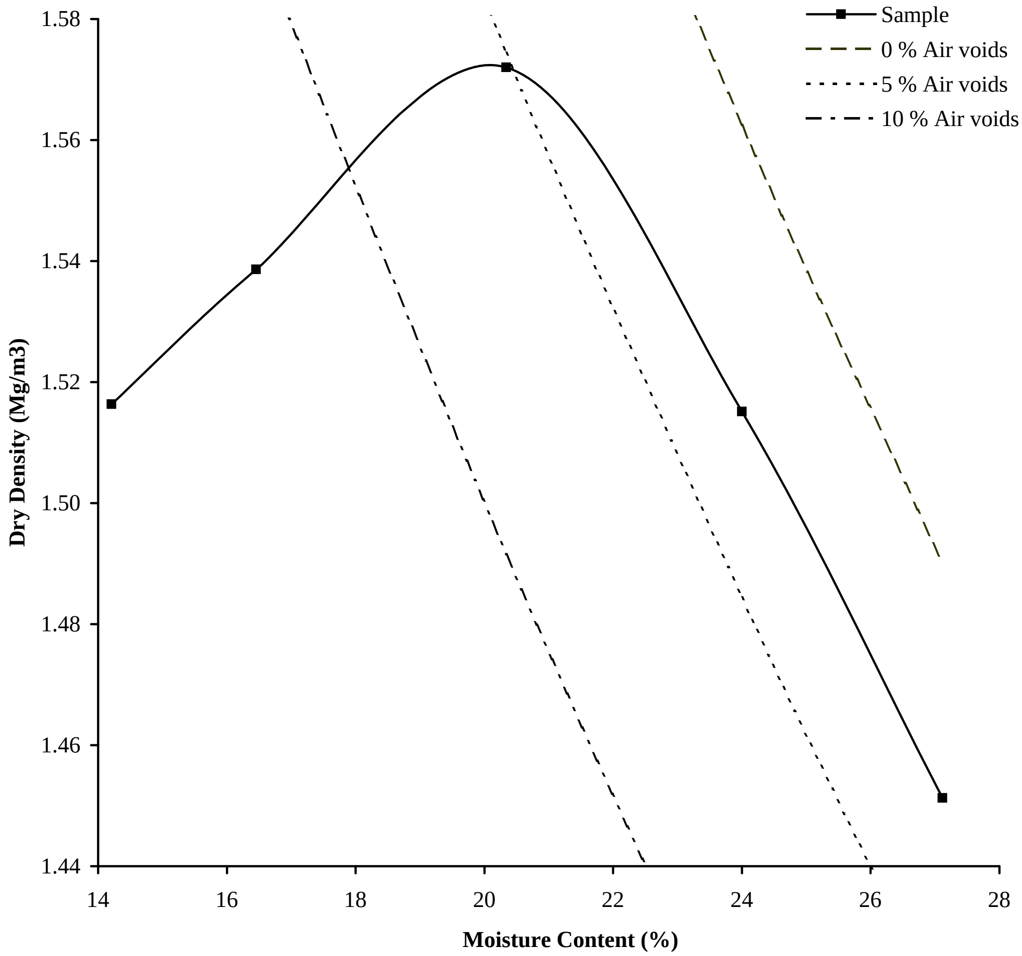
Checked By	Date	Approved By	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP6**	**Depth (m) :**	**2.00-2.50**
Sample Number:	**GS4**	**Sample Type:**	**B**



Initial Moisture Content:	27	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.57	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		20		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date

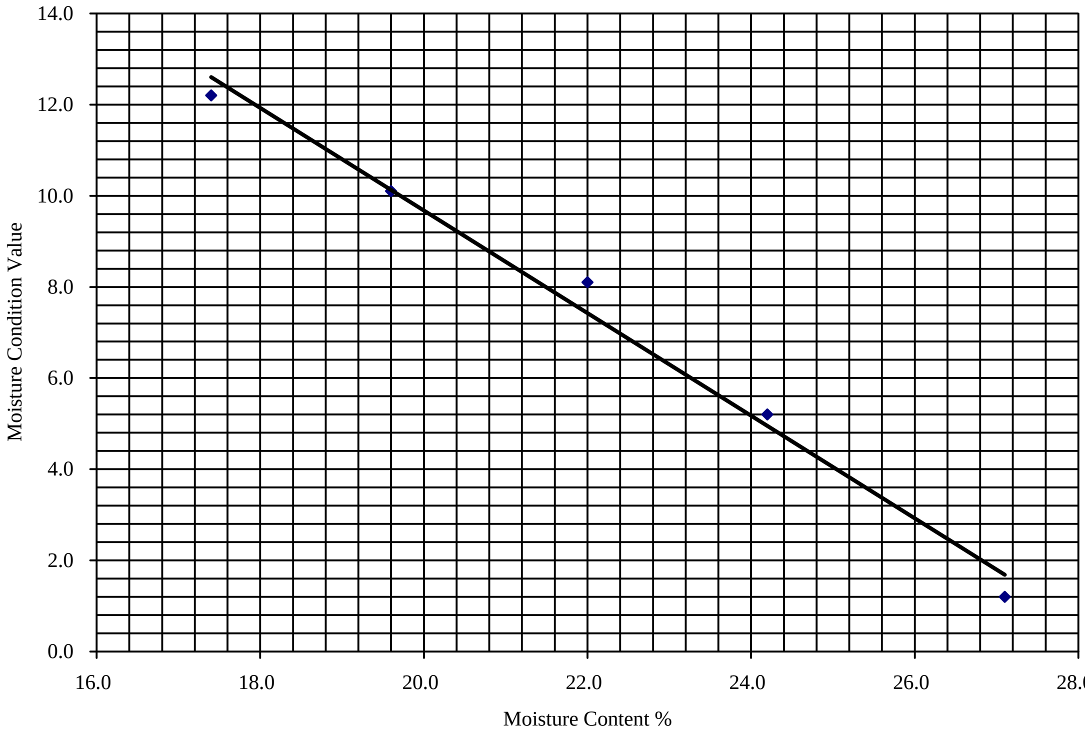
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

MOISTURE CONDITION VALUE CALIBRATION
BS1377 : Part 4 : 1990.

Hole Number: TP6 **Depth (m):** 2.00-2.50

Sample Number: GS4 **Sample Type:** B

Initial Moisture Content (%).:	27
Single/Separate Samples Tested.	Single
Material Retained on the 20mm BS Test Sieve (%).:	0



Test Results.

Test Number	1	2	3	4	5
Moisture Content (%)	17.4	19.6	22.0	24.2	27.1
MCV	12.2	10.1	8.1	5.2	1.2

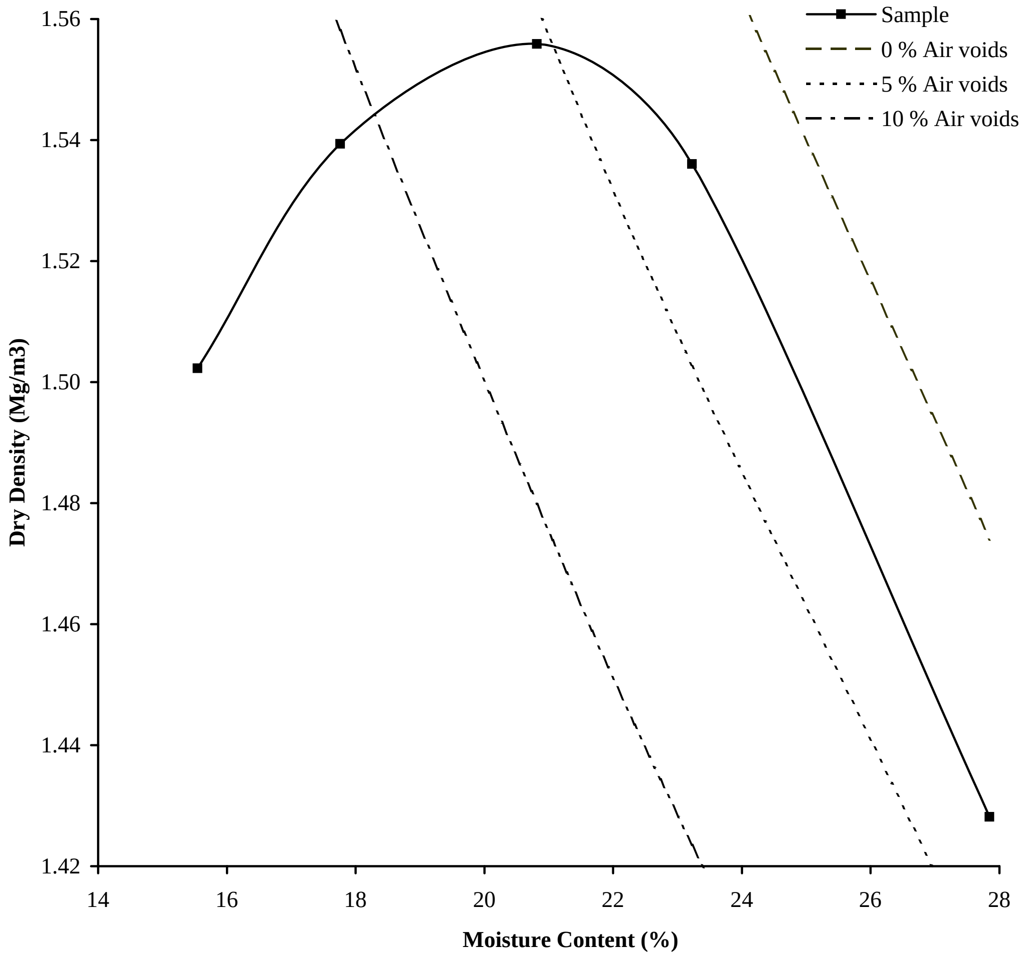
Checked	Date	Approved	Date
RL	04/03/11	RL	04/03/11

PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No: PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP7**	**Depth (m) :**	**2.00-2.50**
Sample Number:	**GS5**	**Sample Type:**	**B**



Initial Moisture Content:	28	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.56	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		21		
Remarks	See Summary of Soil Descriptions.			

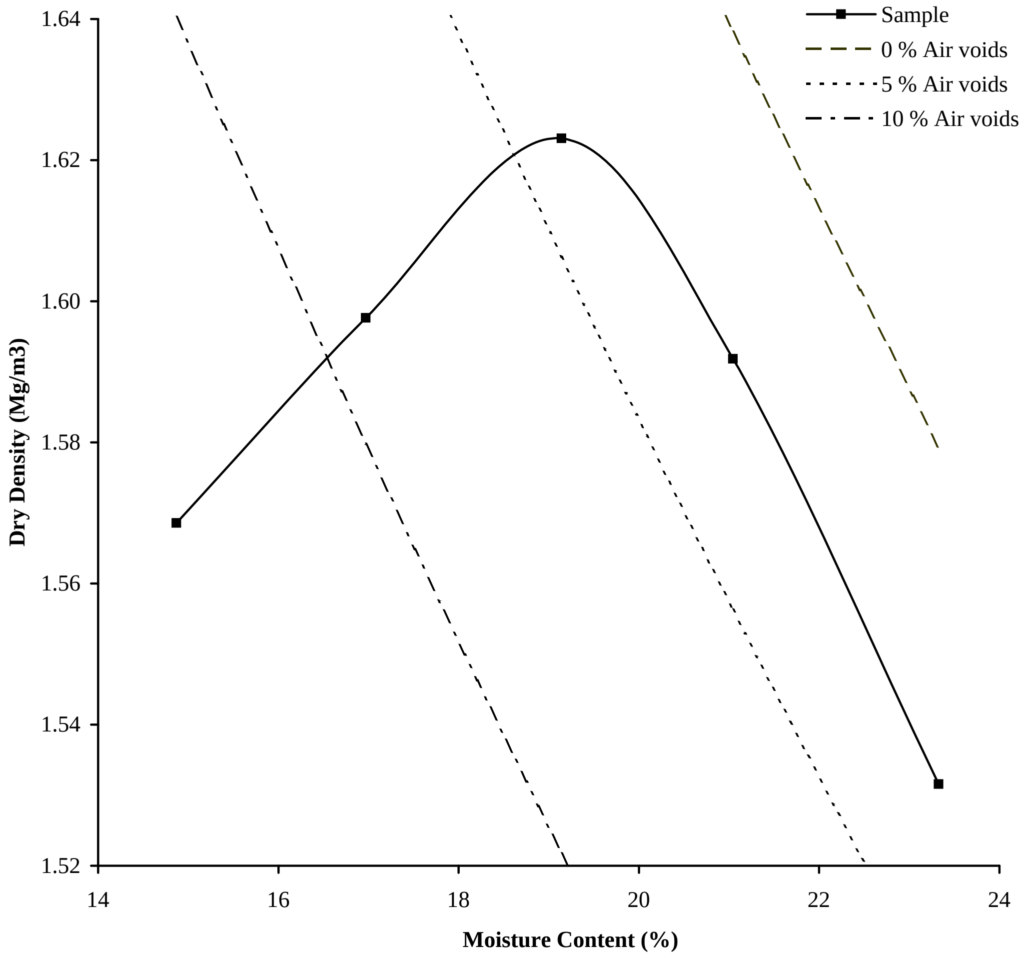
Checked By	Date	Approved By	Date
[signature]	04/03/11	[signature]	04/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP8**	**Depth (m) :**	**3.00-3.50**
Sample Number:	**GS6**	**Sample Type:**	**B**



Initial Moisture Content:	35	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.62	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		19		
Remarks	See Summary of Soil Descriptions.			

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PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

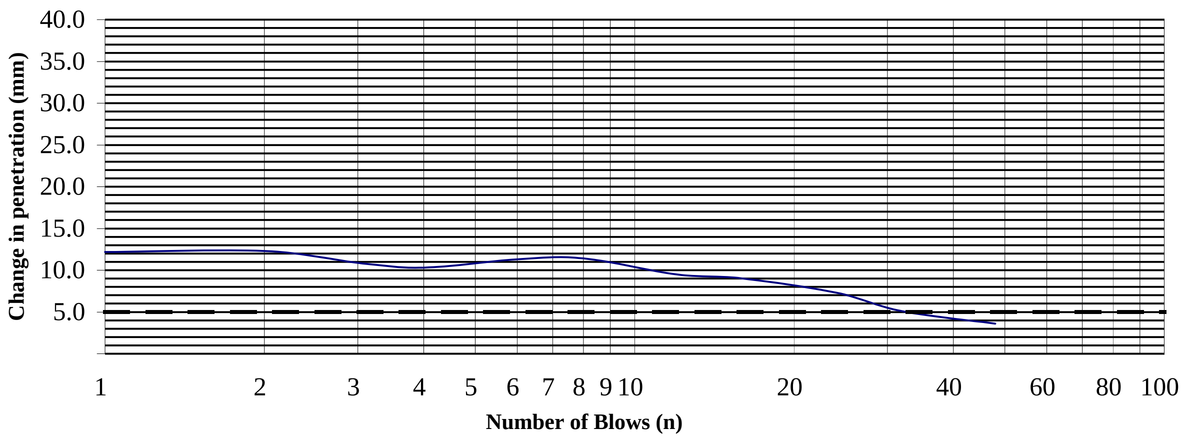
MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number: **TP8** **Depth (m):** **3.00-3.50**

Sample Number: **GS6** **Sample Type:** **B**

Material Retained on the 20mm BS Test Sieve (%):	0

MCV Determination



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	89.0	12.2
2	83.9	12.3
3	80.6	10.9
4	76.8	10.3
6	74.8	11.3
8	71.6	11.4
12	69.7	9.5
16	66.5	9.0
24	63.5	7.3
32	60.2	5.1
48	58.4	3.6
64	57.5	
96	56.2	
128	55.1	
192	54.8	
256		

Test Results.

Moisture Content (%).	35.3
MCV	15.2

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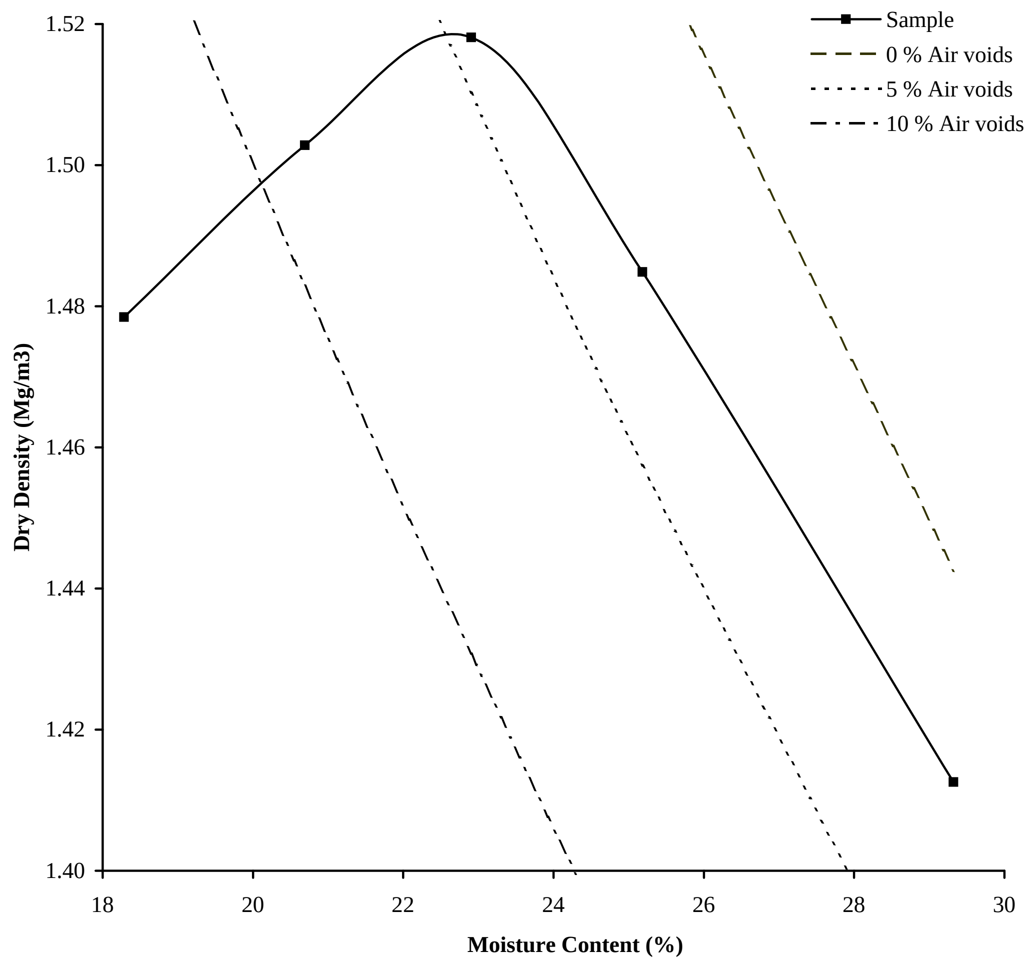
[signature]	04/03/11	[signature]	04/03/11

PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No: PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP9**	**Depth (m) :**	**3.00-3.50**
Sample Number:	**GS7**	**Sample Type:**	**B**



Initial Moisture Content:	29	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.52	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		23		
Remarks	See Summary of Soil Descriptions.			

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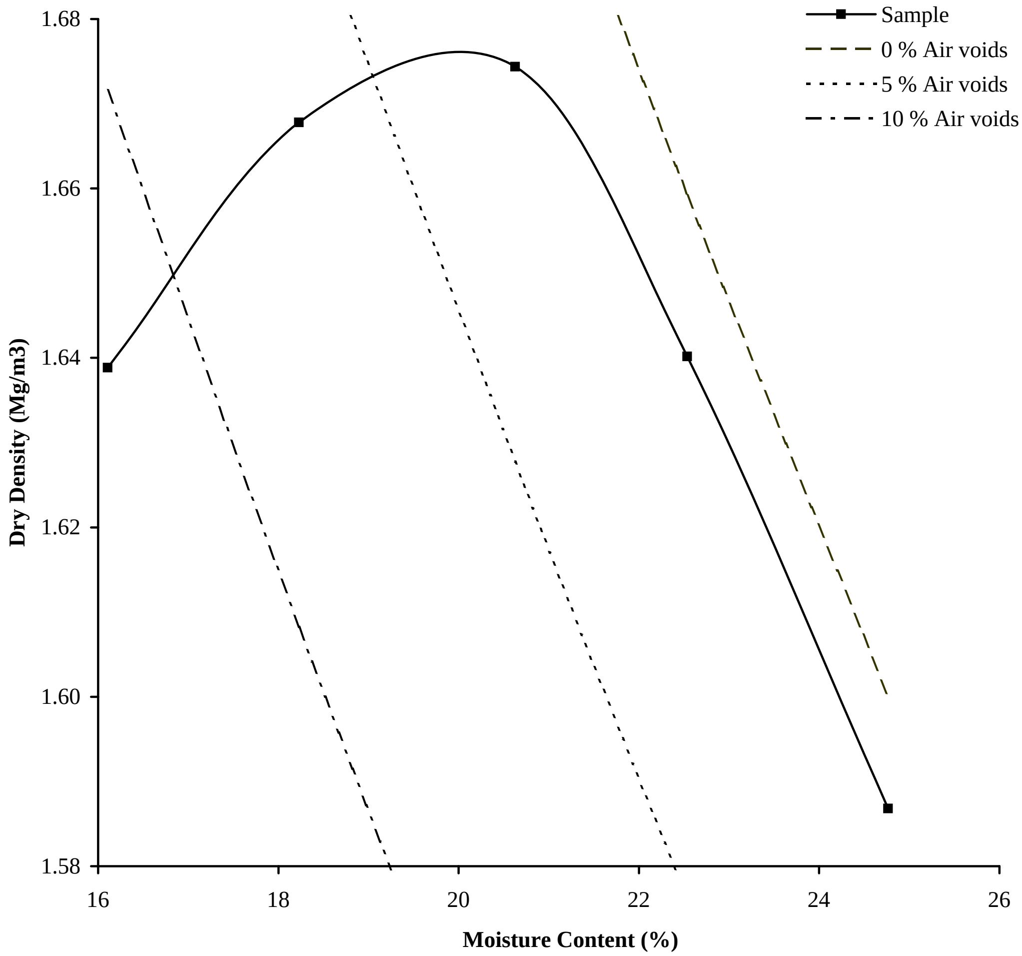
[signature]	04/03/11	[signature]	04/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP10**	**Depth (m) :**	**2.00-2.50**
Sample Number:	**GS8**	**Sample Type:**	**B**



Initial Moisture Content:	35	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.67	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		20		
Remarks	See Summary of Soil Descriptions.			

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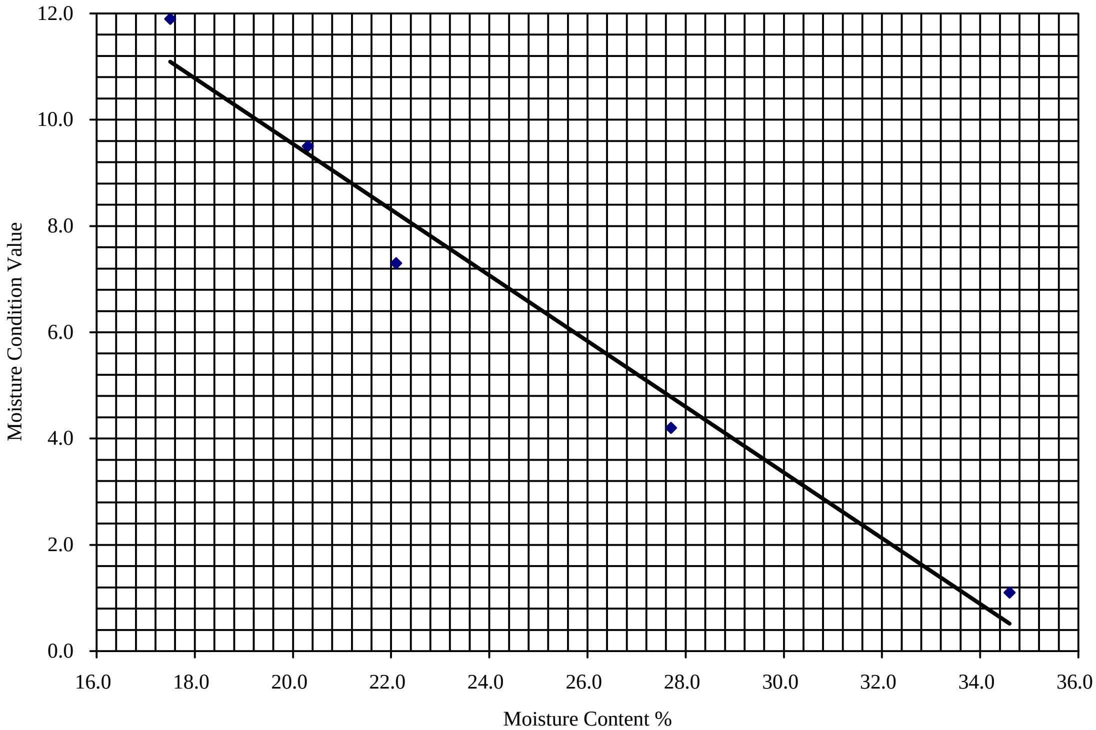
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

MOISTURE CONDITION VALUE CALIBRATION
BS1377 : Part 4 : 1990.

Hole Number:	**TP10**	**Depth (m):**	**2.00-2.50**
Sample Number:	**GS8**	**Sample Type:**	**B**

Initial Moisture Content (%).:	35
Single/Separate Samples Tested.	Single
Material Retained on the 20mm BS Test Sieve (%).:	0



Test Results.

Test Number	**1**	**2**	**3**	**4**	**5**
Moisture Content (%)	17.5	20.3	22.1	27.7	34.6
MCV	11.9	9.5	7.3	4.2	1.1

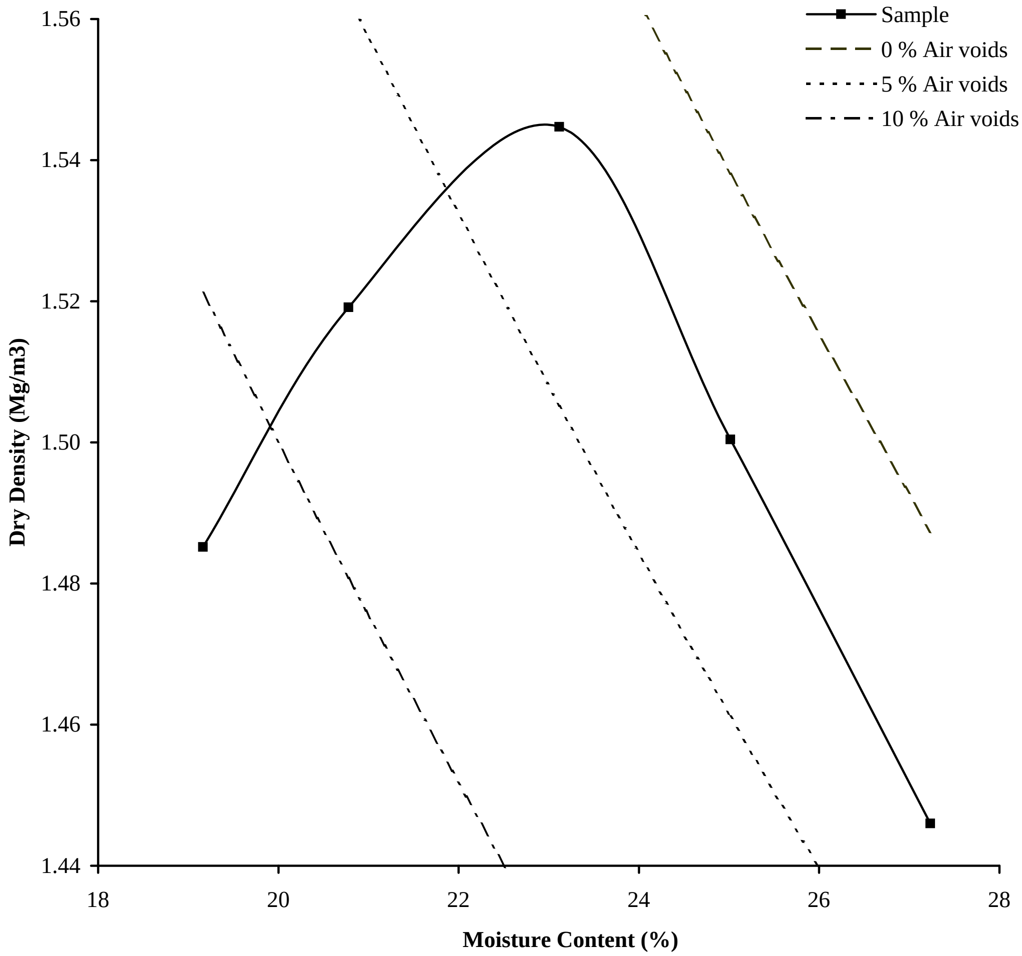
Checked	Date	Approved	Date
[signature]	04/03/11	[signature]	04/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No:** **PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**TP13**	**Depth (m) :**	**3.00-3.50**
Sample Number:	**GS9**	**Sample Type:**	**B**



Initial Moisture Content:	27	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.54	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		23		
Remarks	See Summary of Soil Descriptions.			

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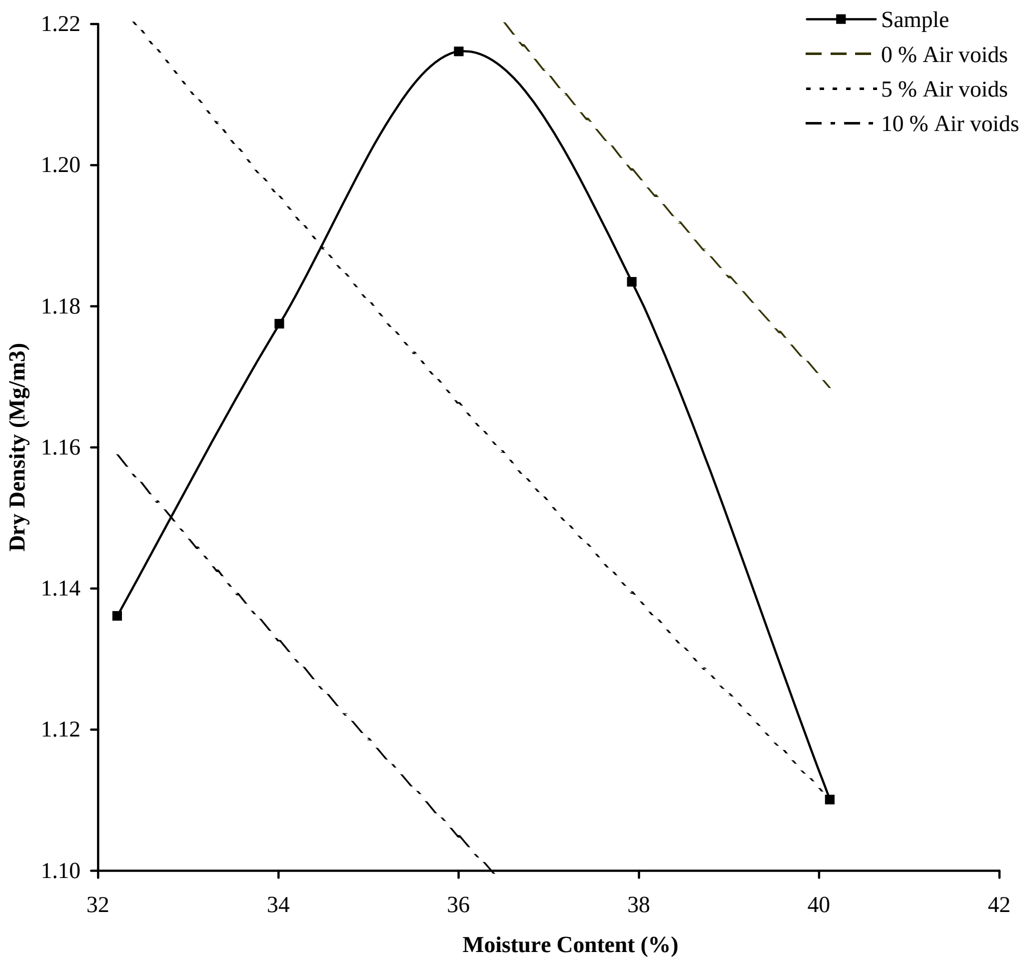
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number:	**MG1**	**Depth (m) :**	
Sample Number:		**Sample Type:**	**B**



Initial Moisture Content:	36	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.20	Assumed	Material Retained on 37.5 mm Test Sieve (%):	15
Maximum Dry Density (mg/m3):		1.22	Material Retained on 20.0 mm Test Sieve (%):	7
Optimum Moisture Content (%):		36		
Remarks	See Summary of Soil Descriptions.			

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PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

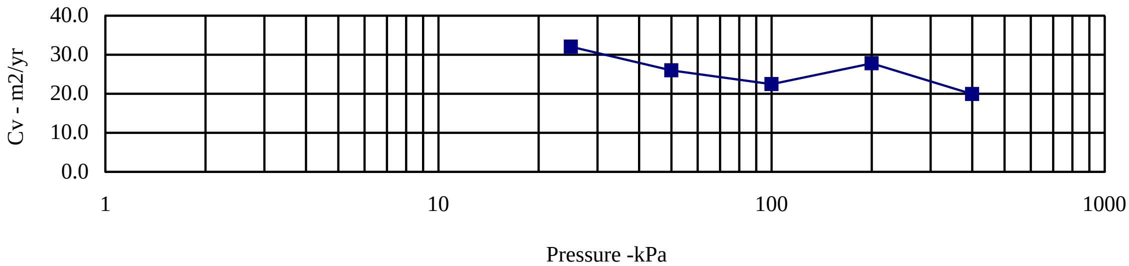
One Dimensional Consolidation Properties

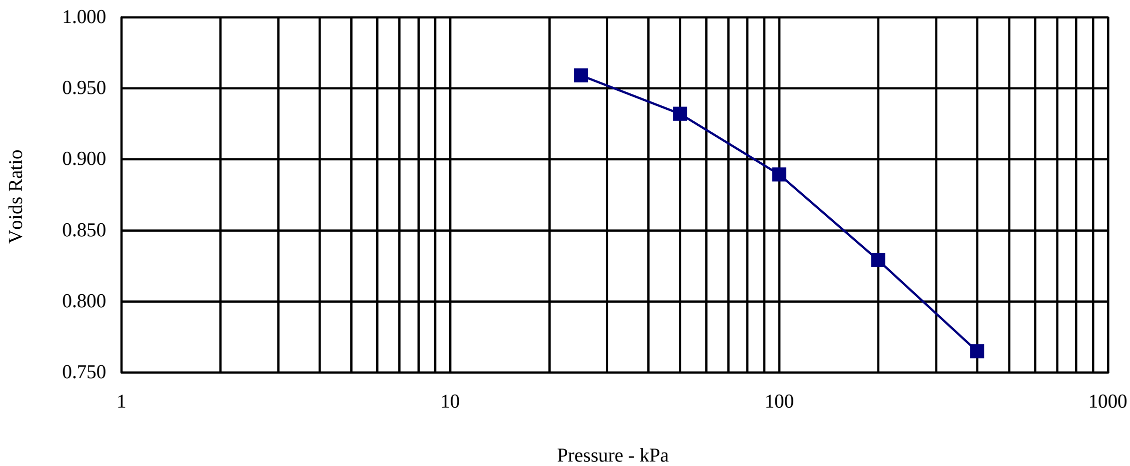
BS 1377: Part 5: 1990

Hole Number: BH1 **Depth (m): 9.30**

Sample Number: **Sample Type: P**

Initial Conditions		Pressure Range kPa			Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	37							
Bulk Density (Mg/m3):	1.80	0	-	25	1.238	32.051	Method used to determine CV:	t90
Dry Density (Mg/m3):	1.31	25	-	50	0.548	25.987		
Voids Ratio:	1.0215	50	-	100	0.443	22.478	Nominal temperature during test ' C:	20
Degree of saturation:	96.0	100	-	200	0.320	27.771		
Height (mm):	20.42	200	-	400	0.176	19.878	Remarks: See summary of soils description.	
Diameter (mm)	75.22							
Particle Density (Mg/m3): Assumed	2.65							





Checked by	Date	Approved by	Date
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PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No.** **PSL11/0404** Page of

LABORATORY REPORT

4043

Contract Number: PSL11/0484

Client's Reference: Report Date: 14 March 2011

Client Name: Delta-Simons Environmental Consultants
The Lawn
Union Road
Lincoln

LN1 3BL

For the attention of: Kevin McGee

Contract Title: Cherry Cobb Sands

Date Received: 03-March-11
Date Commenced: 03-March-11
Date Completed: 14-March-11

Notes: **Observations and Interpretations are outside the UKAS Accreditation**

Checked and Approved Signatories:

R Gunson	A Watkins	M Beastall
(Director)	(Director)	(Laboratory Manager)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
BH1		D	1.20	Brown slightly gravelly slightly sandy CLAY.
BH1		U	2.00	Brown clayey silty SAND.
BH1		D	5.00	Brown silty SAND.
TP1		D	1.00	Brown sandy silty CLAY.
TP1		D	2.00	Brown sandy silty CLAY.
TP2		D	2.00	Brown silty SAND.
TP3		D	2.00	Brown sandy silty CLAY.
TP3		D	4.00	Brown silty SAND.
TP4		D	1.00	Brown silty SAND.
TP4		D	3.00	Brown silty SAND.
TP5		D	1.00	Brown sandy very silty CLAY.
TP5		D	2.00	Brown silty SAND.
TP6		D	2.00	Brown silty SAND.
TP7		D	1.00	Brown silty SAND.
TP7		D	2.00	Brown silty SAND.
TP8		D	2.00	Brown silty SAND.
TP9		D	1.00	Brown silty SAND.
TP9		D	2.00	Brown silty SAND.
TP10		D	1.00	Brown silty SAND.

PSL Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		14/03/11		14/03/11		14/03/11
	CHERRY COBB SANDS.				Contract No:	PSL11/0484
					Client Ref:	

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Depth m	Description of Sample
TP10		D	2.00	Brown silty SAND.
TP13		D	2.00	Brown silty SAND.
TP13		D	3.00	Brown silty SAND.
TP14		D	1.00	Brown sandy very silty CLAY.
TP14		D	2.00	Brown sandy very silty CLAY.
TP14		D	4.00	Brown sandy very silty CLAY.

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Professional Soils Laboratory

Compiled by	Date	Checked by	Date	Approved by	Date
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CHERRY COBB SANDS.

Contract No: PSL11/0484

Client Ref:

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m^3 Clause 7.2	Dry Density Mg/m^3 Clause 7.2	Particle Density Mg/m^3 Clause 8.	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.	Plasticity Index % Clause 6.	% Passing .425mm	Remarks
BH1		D	1.20	23				56	26	30	98	High plasticity CH.
BH1		U	2.00	26					NP			
BH1		D	5.00	30					NP			
TP1		D	1.00	32				45	25	20	100	Intermediate plasticity CI.
TP1		D	2.00	42				46	27	19	100	Intermediate plasticity CI.
TP2		D	2.00	36					NP			
TP3		D	2.00	38				39	25	14	100	Intermediate plasticity CI.
TP3		D	4.00	29					NP			
TP4		D	1.00	29					NP			
TP4		D	3.00	29					NP			
TP5		D	1.00	28				35	23	12	100	Intermediate plasticity CI.
TP5		D	2.00	31					NP			
TP6		D	2.00	29					NP			
TP7		D	1.00	27					NP			
TP7		D	2.00	27					NP			
TP8		D	2.00	29					NP			
TP9		D	1.00	28					NP			
TP9		D	2.00	29					NP			
TP10		D	1.00	29					NP			

SYMBOLS : NP : Non Plastic *** : Liquid Limit and Plastic Limit Wet Sieved.**

PSL Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
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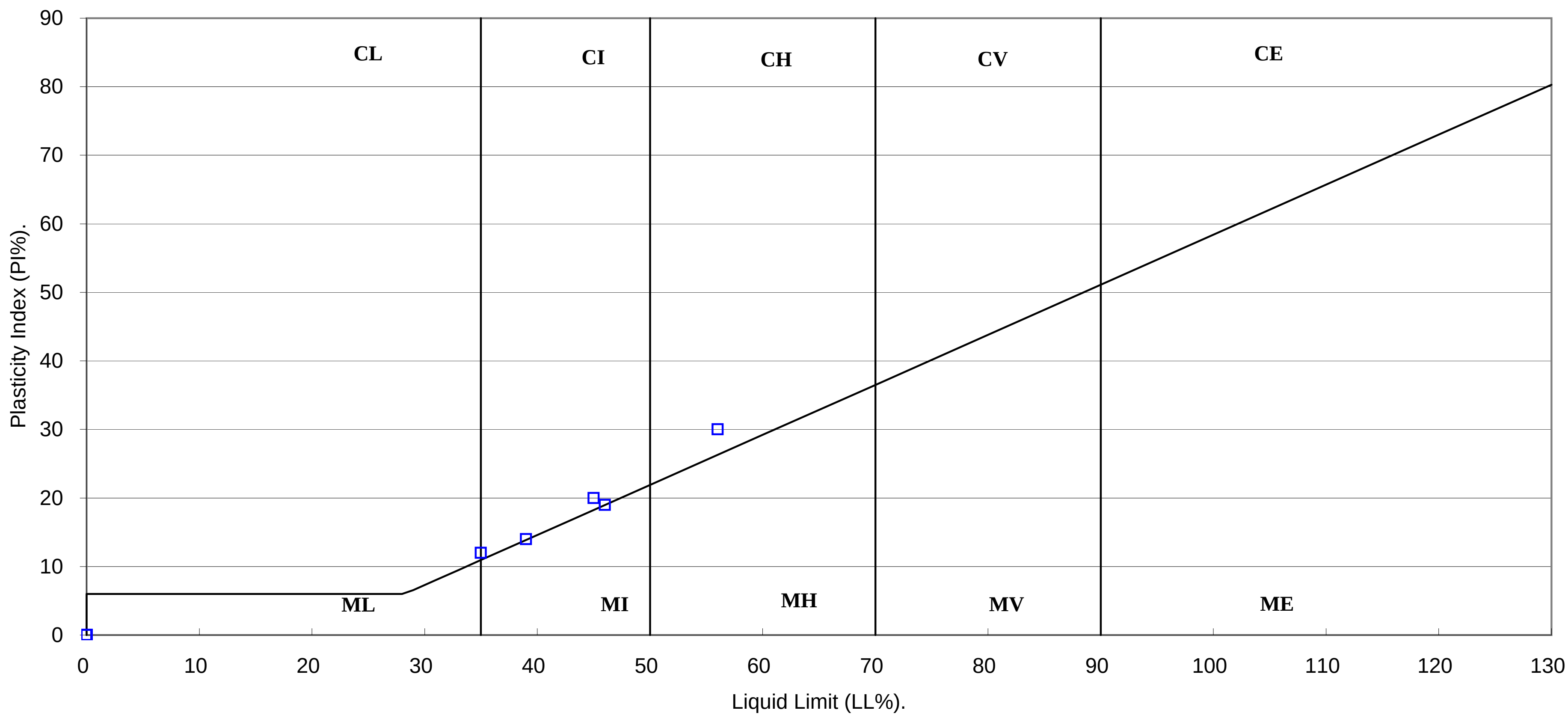
	CHERRY COBB SANDS.				Contract No:	PSL11/0484
					Client Ref:	

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



PSL Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		14/03/11		14/03/11		14/03/11
	CHERRY COBB SANDS.				Contract No:	PSL11/0484
					Client Ref:	

SUMMARY OF SOIL CLASSIFICATION TESTS

(B.S. 1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Depth m	Moisture Content % Clause 3.2	Bulk Density Mg/m^3 Clause 7.2	Dry Density Mg/m^3 Clause 7.2	Particle Density Mg/m^3 Clause 8.	Liquid Limit % Clause 4.3/4.4	Plastic Limit % Clause 5.	Plasticity Index % Clause 6.	% Passing .425mm	Remarks
TP10		D	2.00	30					NP			
TP13		D	2.00	31					NP			
TP13		D	3.00	30					NP			
TP14		D	1.00	29				33	22	11	100	Low plasticity CL.
TP14		D	2.00	37				39	21	18	100	Intermediate plasticity CI.
TP14		D	4.00	41				42	22	20	100	Intermediate plasticity CI.

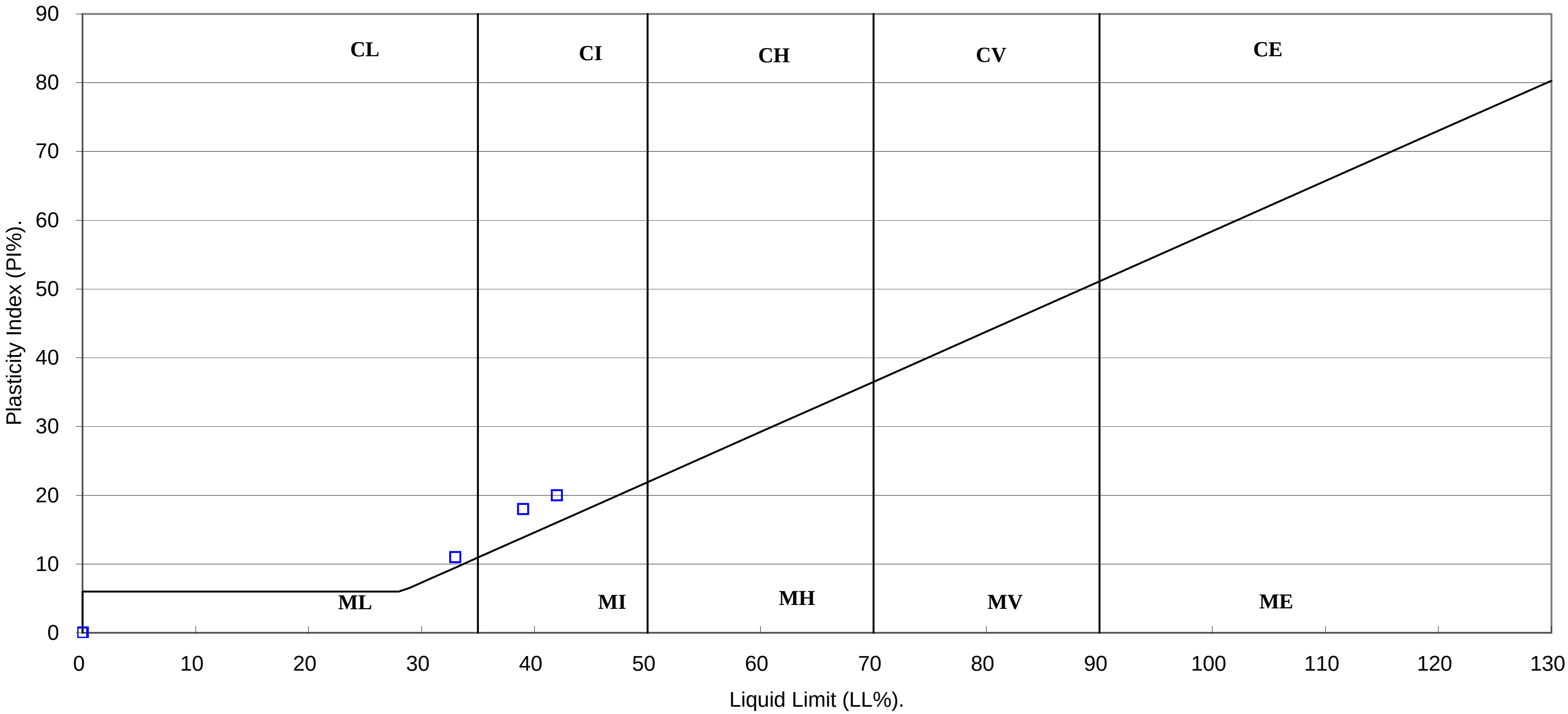
SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

PSL Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		14/03/11		14/03/11		14/03/11
	CHERRY COBB SANDS.				Contract No:	PSL11/0484
					Client Ref:	

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(B.S.5930 : 1999)



PSL Professional Soils Laboratory	Compiled by	Date	Checked by	Date	Approved by	Date
		14/03/11		14/03/11		14/03/11
	CHERRY COBB SANDS.				Contract No:	PSL11/0484
					Client Ref:	

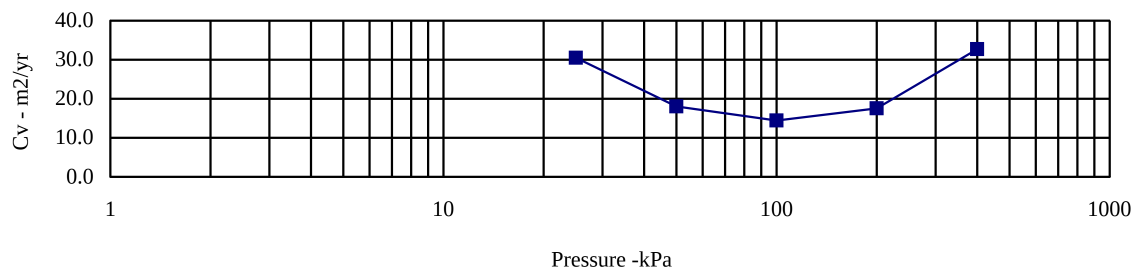
One Dimensional Consolidation Properties

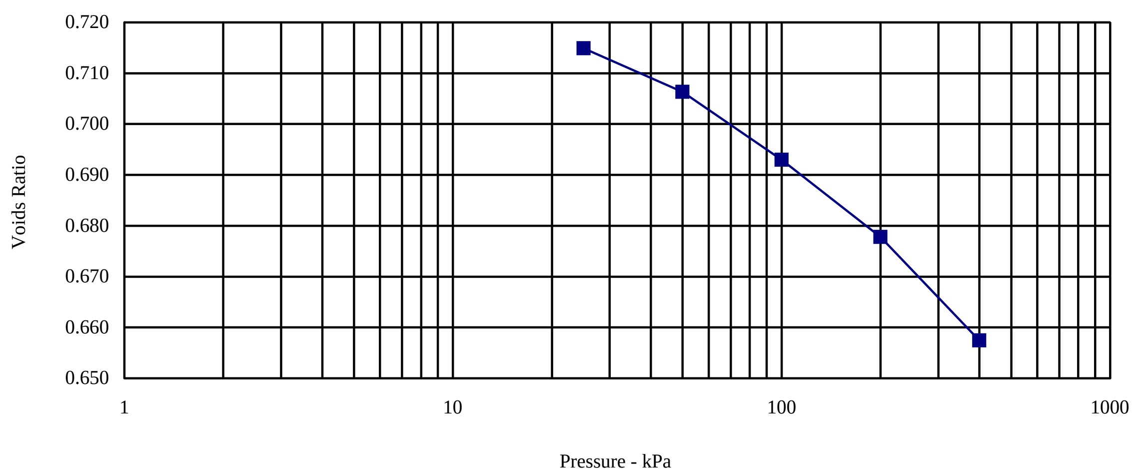
BS 1377: Part 5: 1990

Hole Number: BH1 **Depth (m): 2.00**

Sample Number: **Sample Type: U**

Initial Conditions		Pressure Range			Mv	Cv	Specimen location	
Moisture Content (%):	26	kPa			m2/MN	m2/yr	within tube:	Top
Bulk Density (Mg/m3):	1.93	0	-	25	0.579	30.474	Method used to	
Dry Density (Mg/m3):	1.52	25	-	50	0.199	18.004	determine CV:	t90
Voids Ratio:	0.7401	50	-	100	0.157	14.400	Nominal temperature	
Degree of saturation:	94.6	100	-	200	0.090	17.550	during test ' C:	20
Height (mm):	20.03	200	-	400	0.061	32.715	Remarks:	
Diameter (mm)	75.2						See summary of soils description.	
Particle Density (Mg/m3):	2.65							
Assumed								





Checked by	Date	Approved by	Date
	14/03/11		14/03/11

PSL Professional Soils Laboratory	**CHERRY COBB SANDS.**	**Contract No.** **PSL11/0484** Page of

Appendix **VII**

delta-simons
environmental consultants

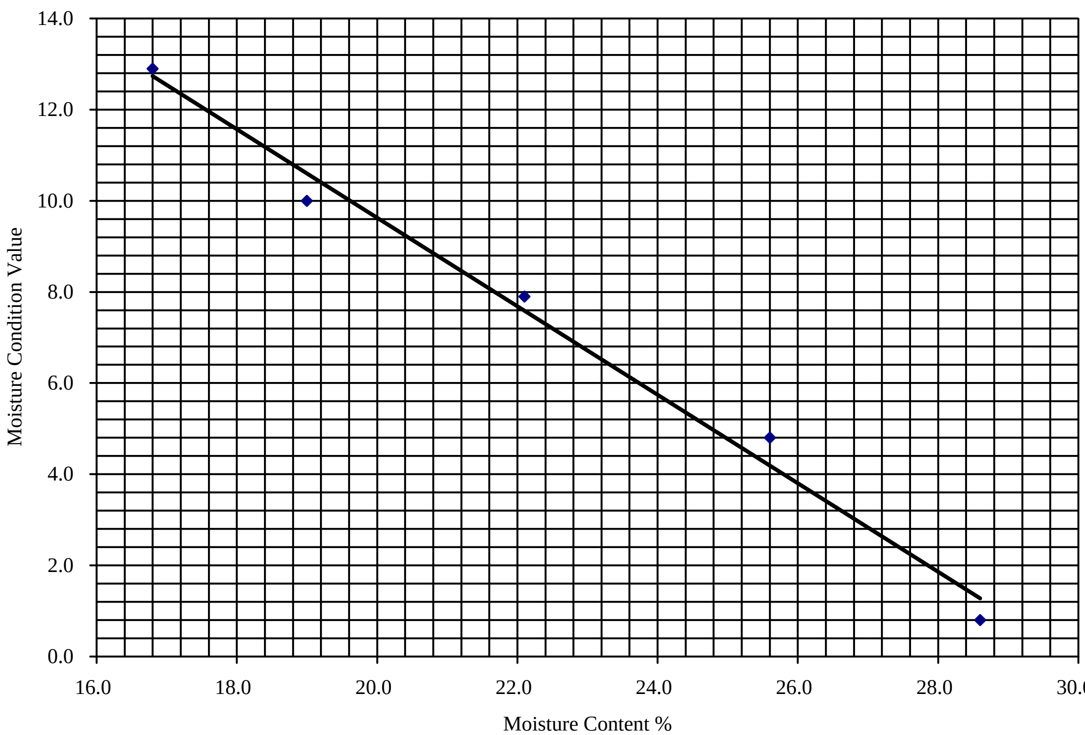
A different perspective

MOISTURE CONDITION VALUE CALIBRATION
BS1377 : Part 4 : 1990.

Hole Number: **BC8** **Depth (m):**

Sample Number: **Sample Type:** **B**

Initial Moisture Content (%).:	29
Single/Separate Samples Tested.	Single
Material Retained on the 20mm BS Test Sieve (%).:	0



Test Results.

Test Number	**1**	**2**	**3**	**4**	**5**
Moisture Content (%)	16.8	19.0	22.1	25.6	28.6
MCV	12.9	10.0	7.9	4.8	0.8

Checked	Date	Approved	Date
[signature]	07/03/11	[signature]	07/03/11

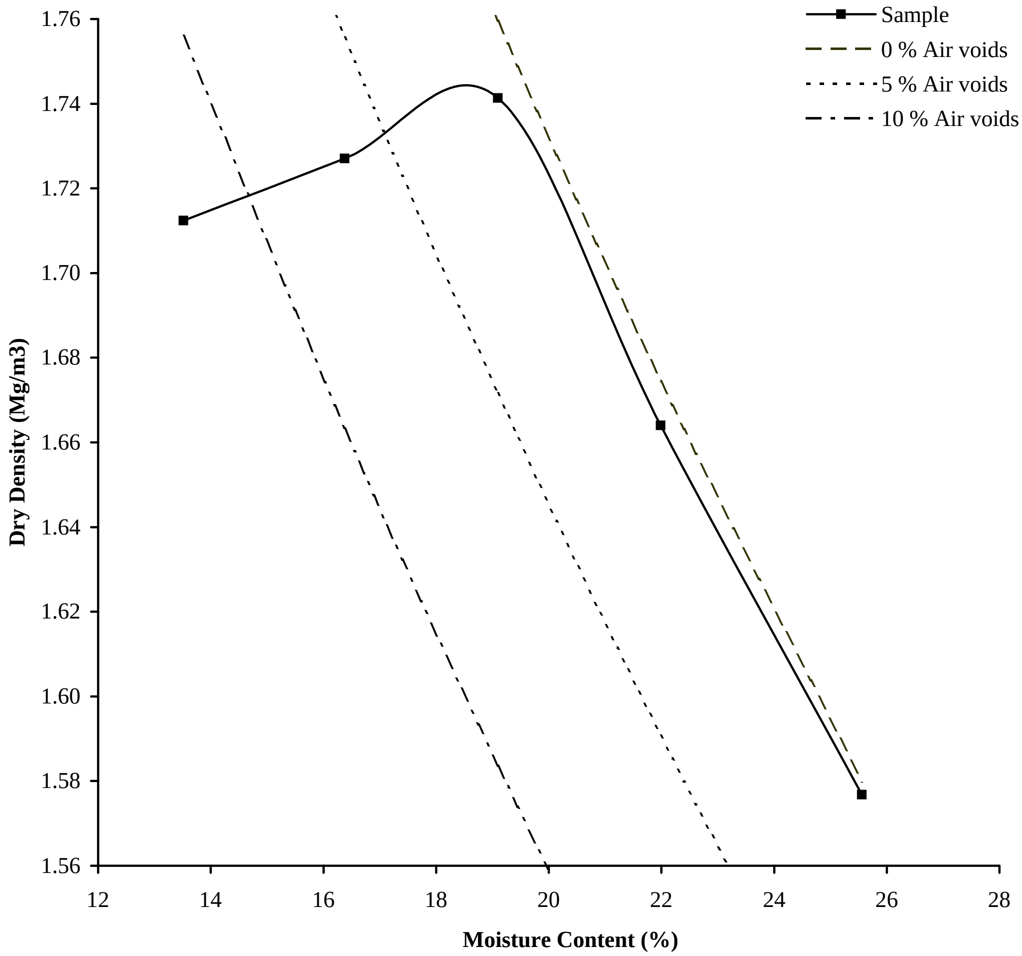
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No:** **PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: **BC9** **Depth (m) :**

Sample Number: **Sample Type:** **B**



Initial Moisture Content:	29	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.74	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		19		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

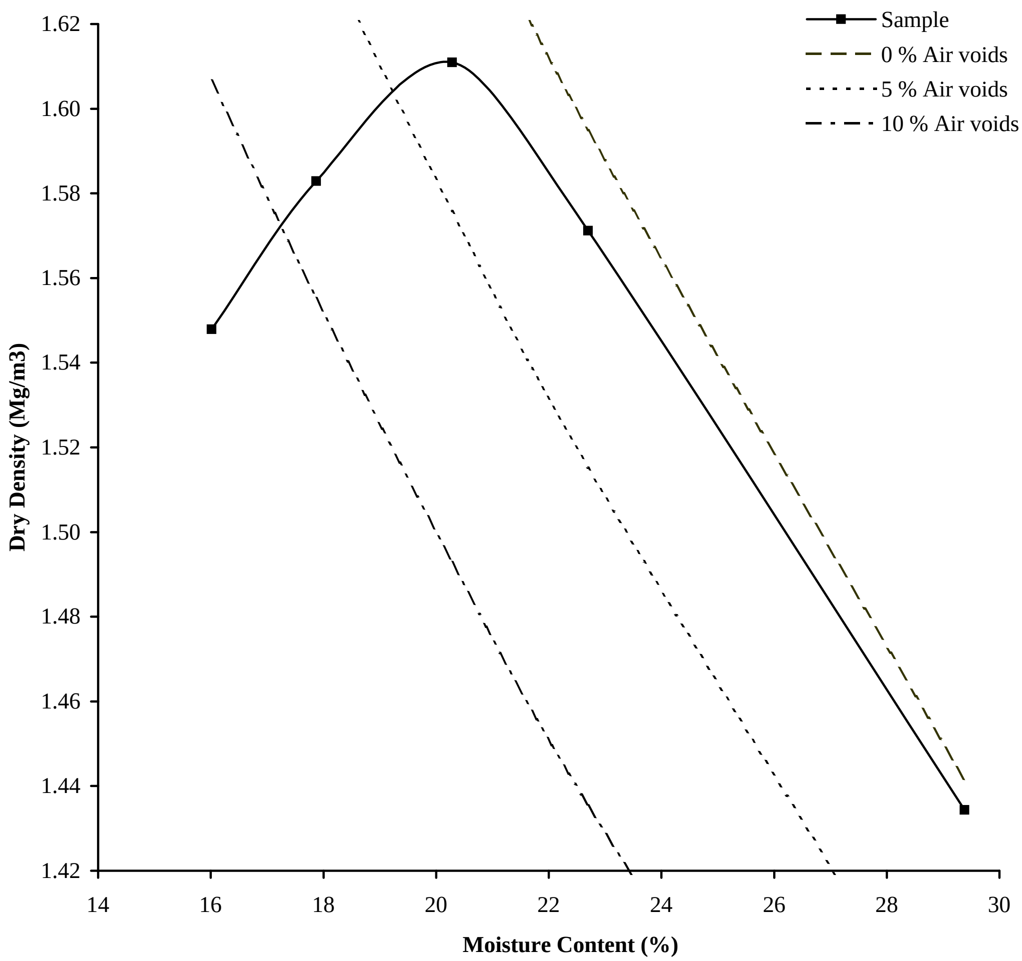
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: GS1 **Depth (m) :**

Sample Number: **Sample Type:** B



Initial Moisture Content:	29	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.61	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		20		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

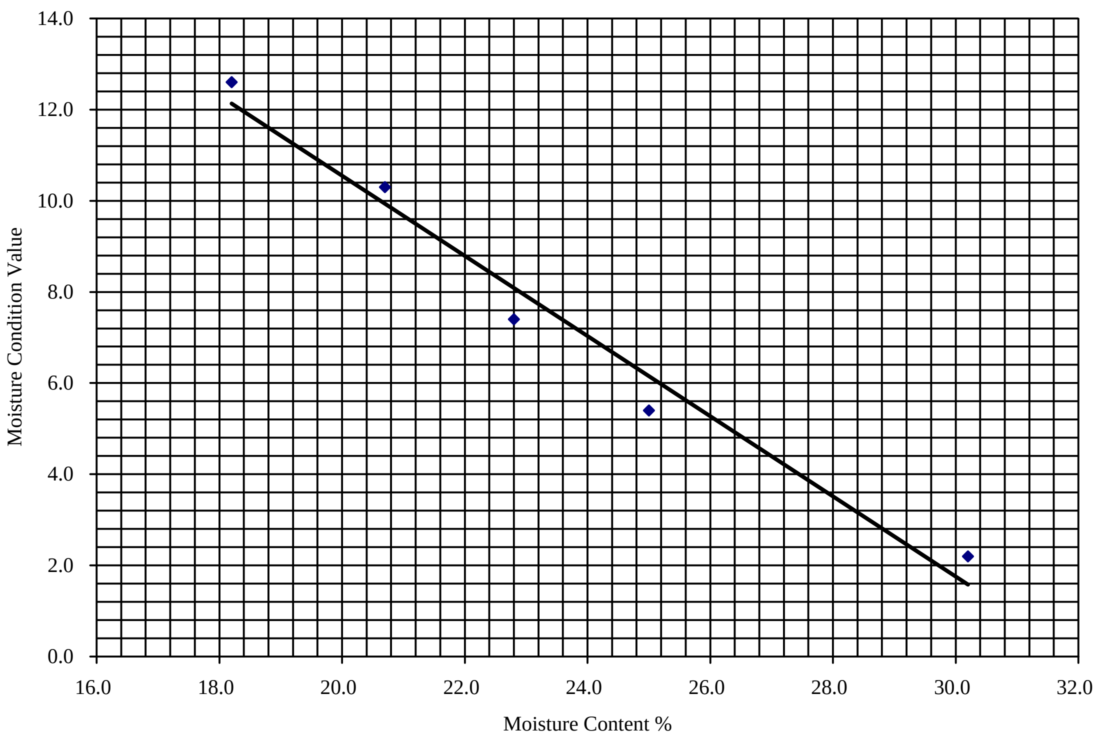
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

MOISTURE CONDITION VALUE CALIBRATION
BS1377 : Part 4 : 1990.

Hole Number: GS1 **Depth (m):**

Sample Number: **Sample Type:** B

Initial Moisture Content (%).:	30
Single/Separate Samples Tested.	Single
Material Retained on the 20mm BS Test Sieve (%).:	0



Test Results.

Test Number	1	2	3	4	5
Moisture Content (%)	18.2	20.7	22.8	25.0	30.2
MCV	12.6	10.3	7.4	5.4	2.2

Checked	Date	Approved	Date
	04/03/11		04/03/11

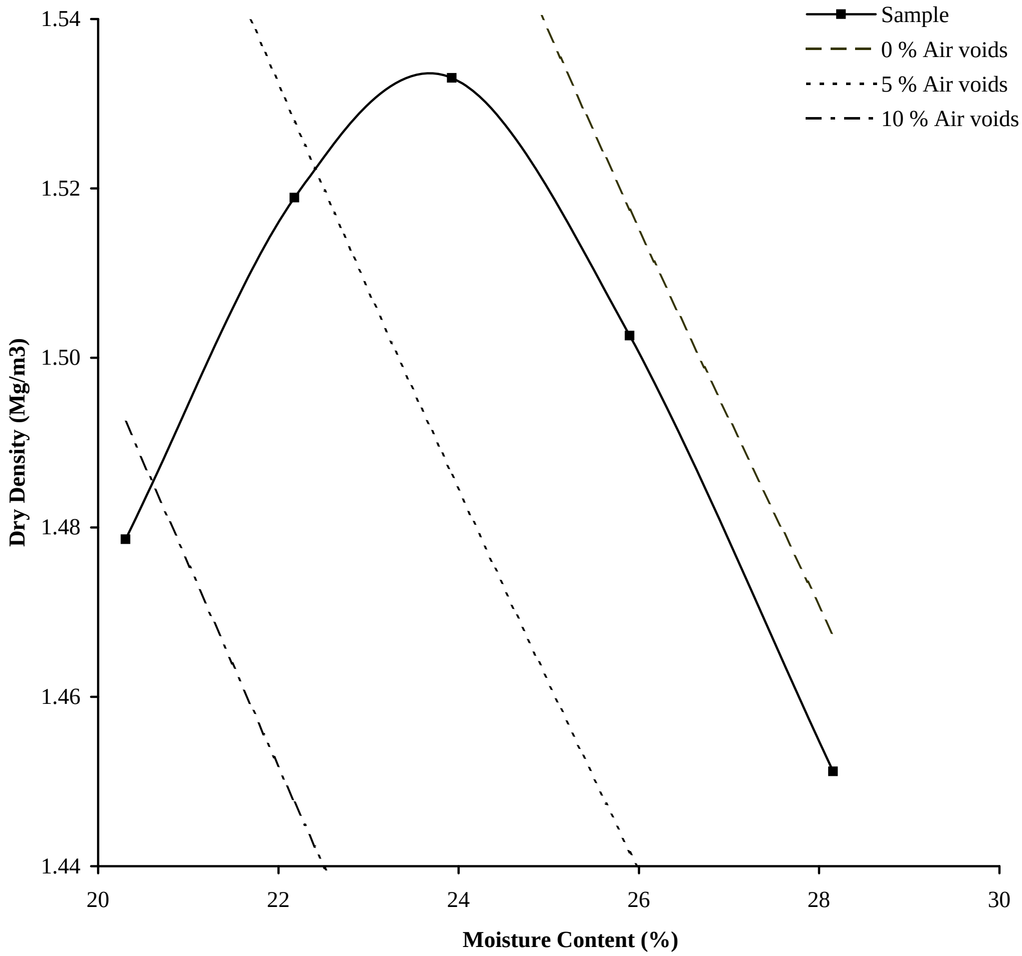
PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No: PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: GS2 **Depth (m) :**

Sample Number: **Sample Type:** B



Initial Moisture Content:	28	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.53	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		24		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No. PSL11/0404

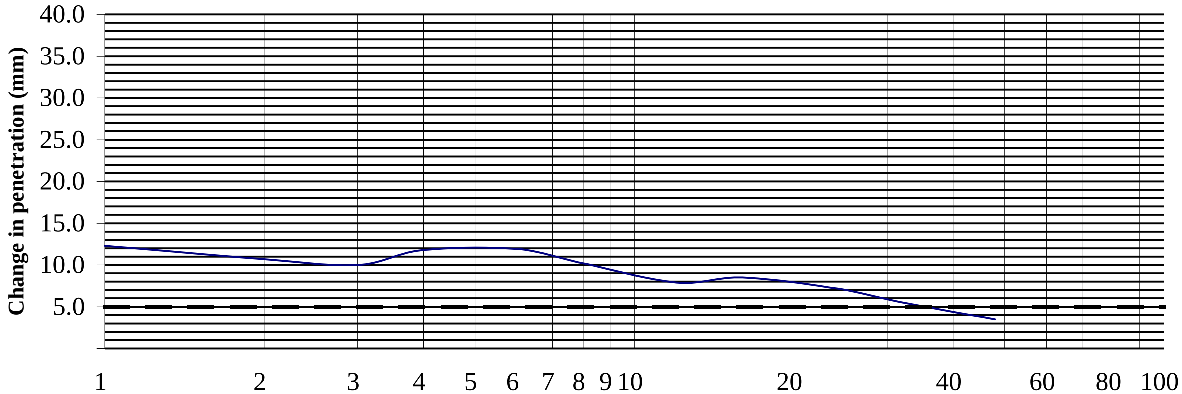
MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number: GS2 **Depth (m):**

Sample Number: **Sample Type:** B

Material Retained on the 20mm BS Test Sieve (%):	0

MCV Determination



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	89.4	12.3
2	82.1	10.7
3	79.1	10.0
4	77.1	11.8
6	74.2	11.9
8	71.4	10.2
12	69.1	7.9
16	65.3	8.5
24	62.3	7.2
32	61.2	5.5
48	58.3	3.5
64	56.8	
96	55.1	
128	55.7	
192	54.8	
256		

Test Results.

Moisture Content (%).	28.4
MCV	15.4

Checked	Date	Approved	Date
	04/03/11		04/03/11

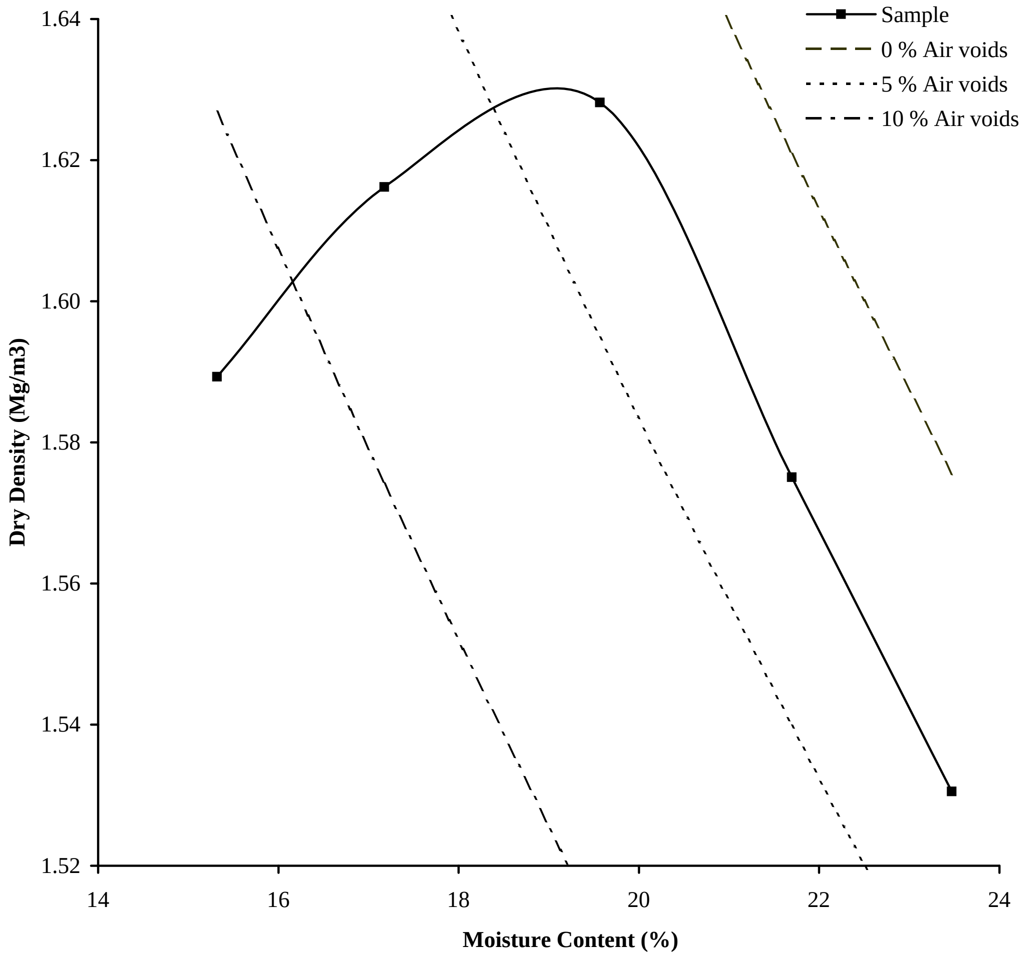
PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No: PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: **GS3** **Depth (m) :**

Sample Number: **Sample Type:** **B**



Initial Moisture Content:	37	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.63	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		19		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

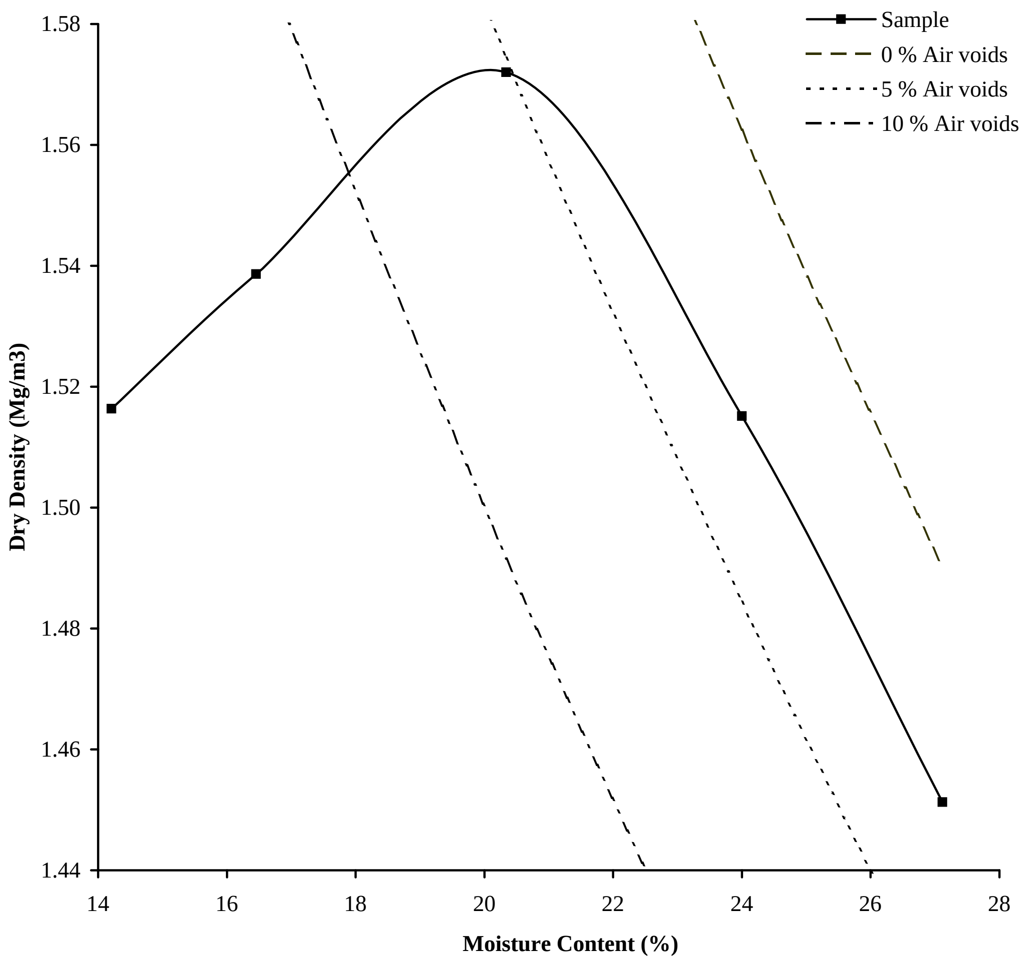
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: GS4 **Depth (m) :**

Sample Number: **Sample Type:** B



Initial Moisture Content:	27	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.57	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		20		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date

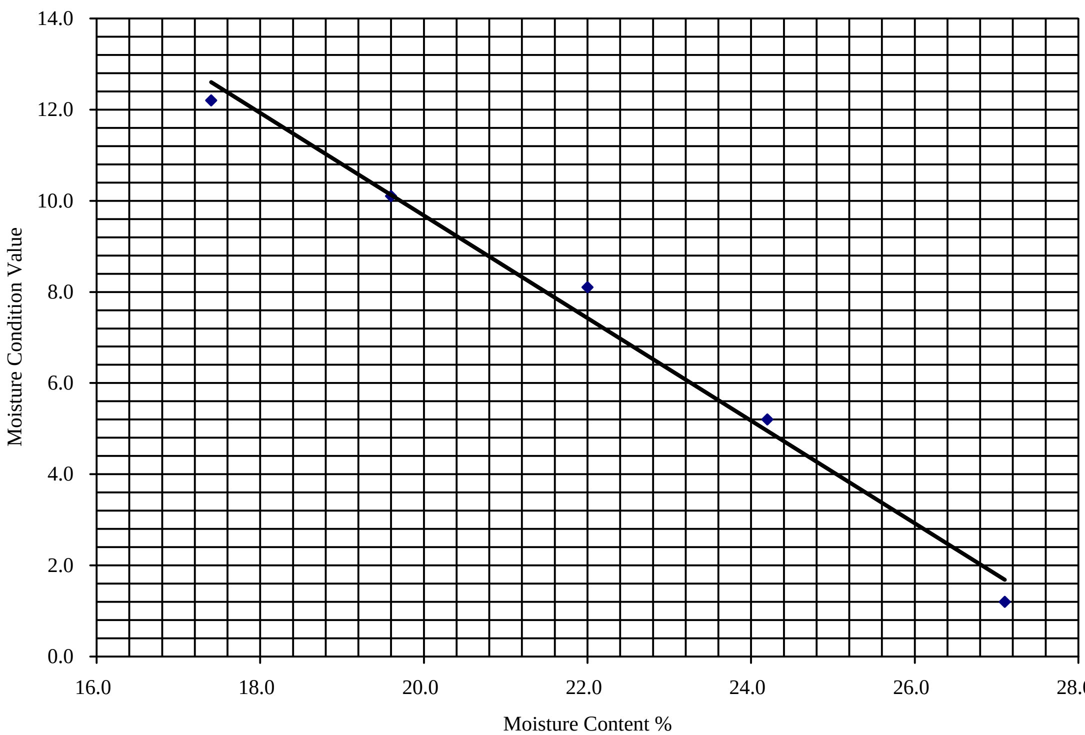
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

MOISTURE CONDITION VALUE CALIBRATION
BS1377 : Part 4 : 1990.

Hole Number: GS4 **Depth (m):**

Sample Number: **Sample Type:** B

Initial Moisture Content (%).:	27
Single/Separate Samples Tested.	Single
Material Retained on the 20mm BS Test Sieve (%).:	0



Test Results.

Test Number	**1**	**2**	**3**	**4**	**5**
Moisture Content (%)	17.4	19.6	22.0	24.2	27.1
MCV	12.2	10.1	8.1	5.2	1.2

Checked	Date	Approved	Date
[signature]	04/03/11	[signature]	04/03/11

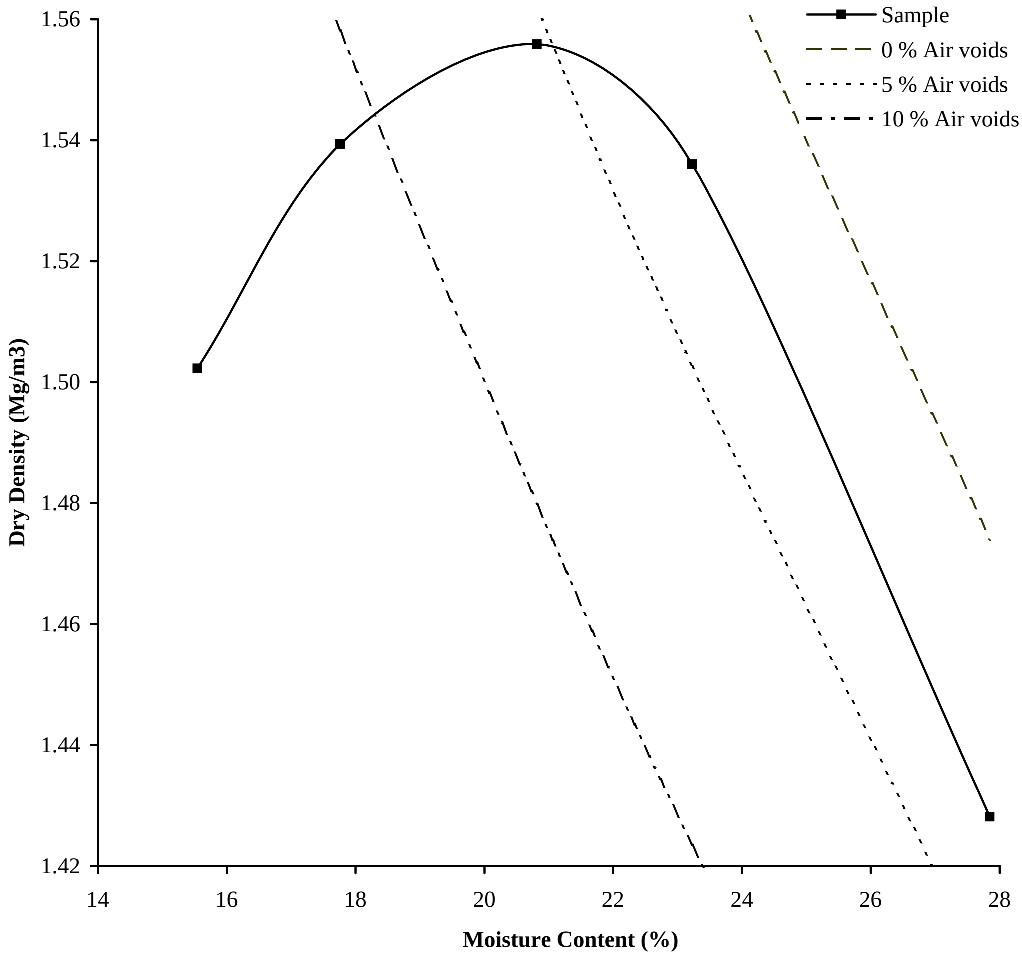
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No:** **PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: GS5 **Depth (m) :**

Sample Number: **Sample Type:** B



Initial Moisture Content:	28	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.56	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		21		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
[signature]	04/03/11	[signature]	04/03/11

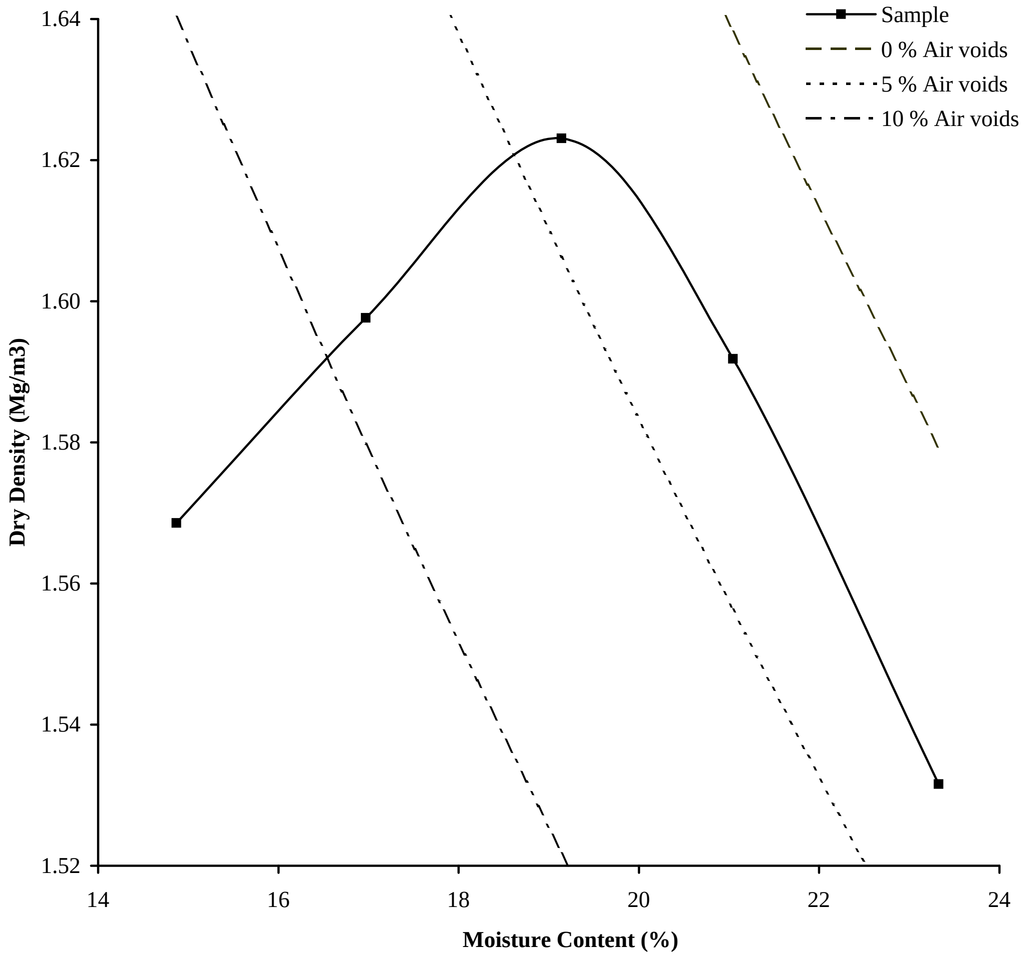
PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No. PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: **GS6** **Depth (m) :**

Sample Number: **Sample Type:** **B**



Initial Moisture Content:	35	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.62	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		19		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

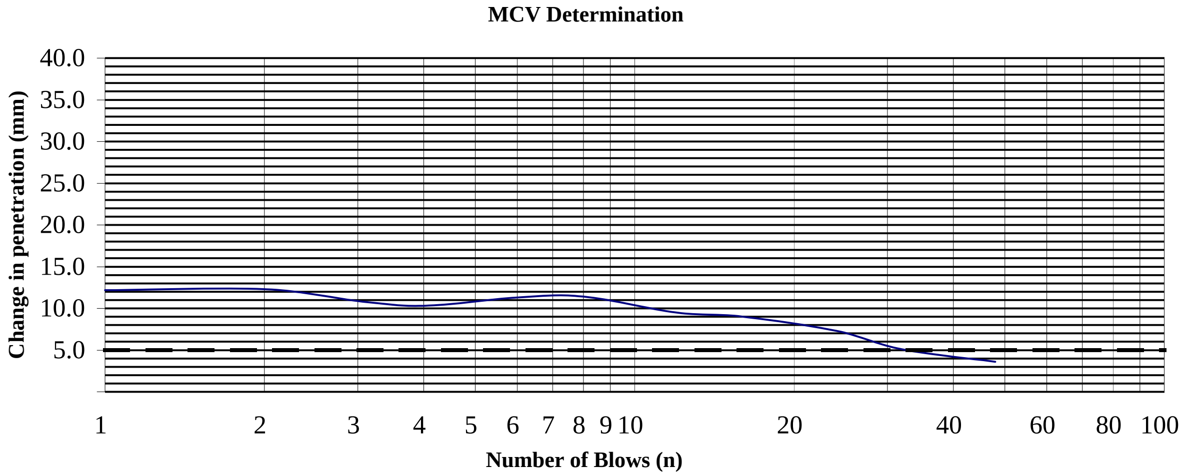
PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No. PSL11/0404

MOISTURE CONDITION VALUE
BS1377 : Part 4 : 1990.

Hole Number: GS6 **Depth (m):**

Sample Number: **Sample Type:** B

Material Retained on the 20mm BS Test Sieve (%):	0



Blows (N)	Penetration (mm)	n to 4 n (mm)
1	89.0	12.2
2	83.9	12.3
3	80.6	10.9
4	76.8	10.3
6	74.8	11.3
8	71.6	11.4
12	69.7	9.5
16	66.5	9.0
24	63.5	7.3
32	60.2	5.1
48	58.4	3.6
64	57.5	
96	56.2	
128	55.1	
192	54.8	
256		

Test Results.

Moisture Content (%).	35.3
MCV	15.2

Checked	Date	Approved	Date
	04/03/11		04/03/11

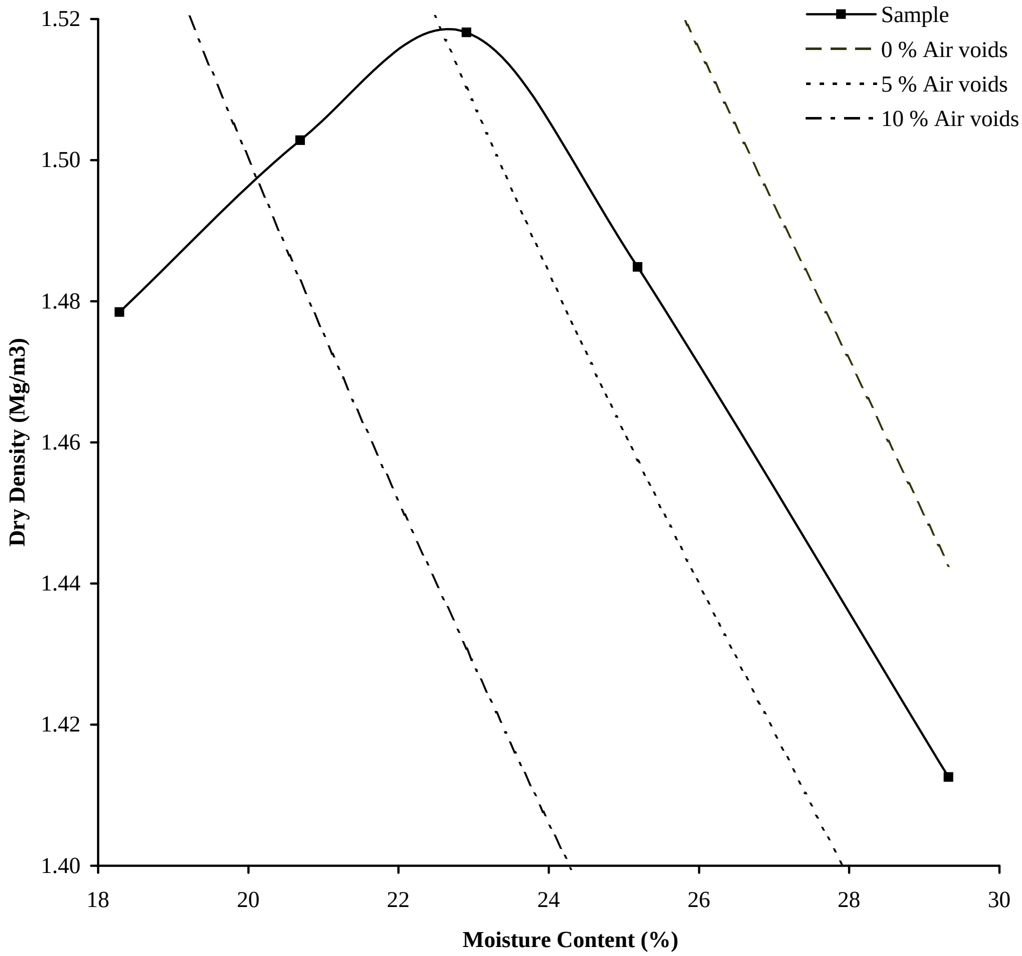
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No: PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: GS7 **Depth (m) :**

Sample Number: **Sample Type:** B



Initial Moisture Content:	29	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.52	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		23		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

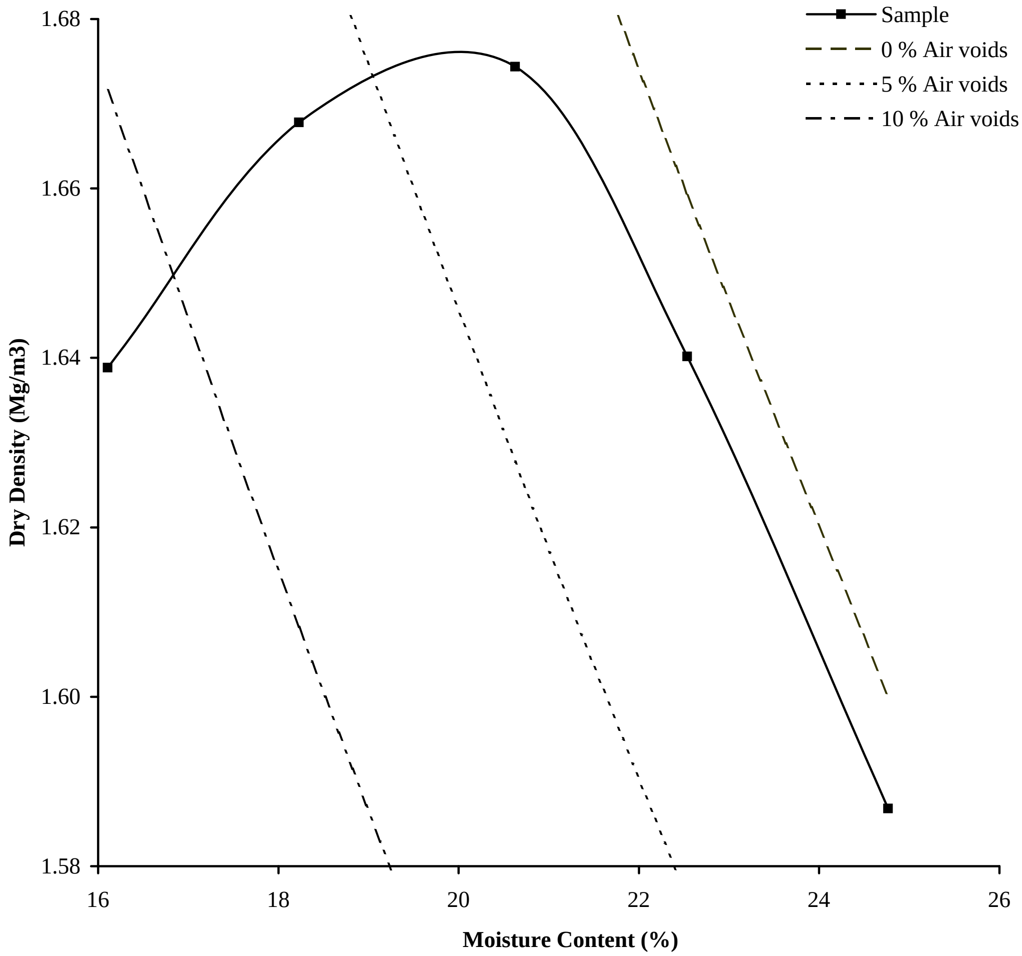
PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No. PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: **GS8** **Depth (m) :**

Sample Number: **Sample Type:** **B**



Initial Moisture Content:	35	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.67	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		20		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

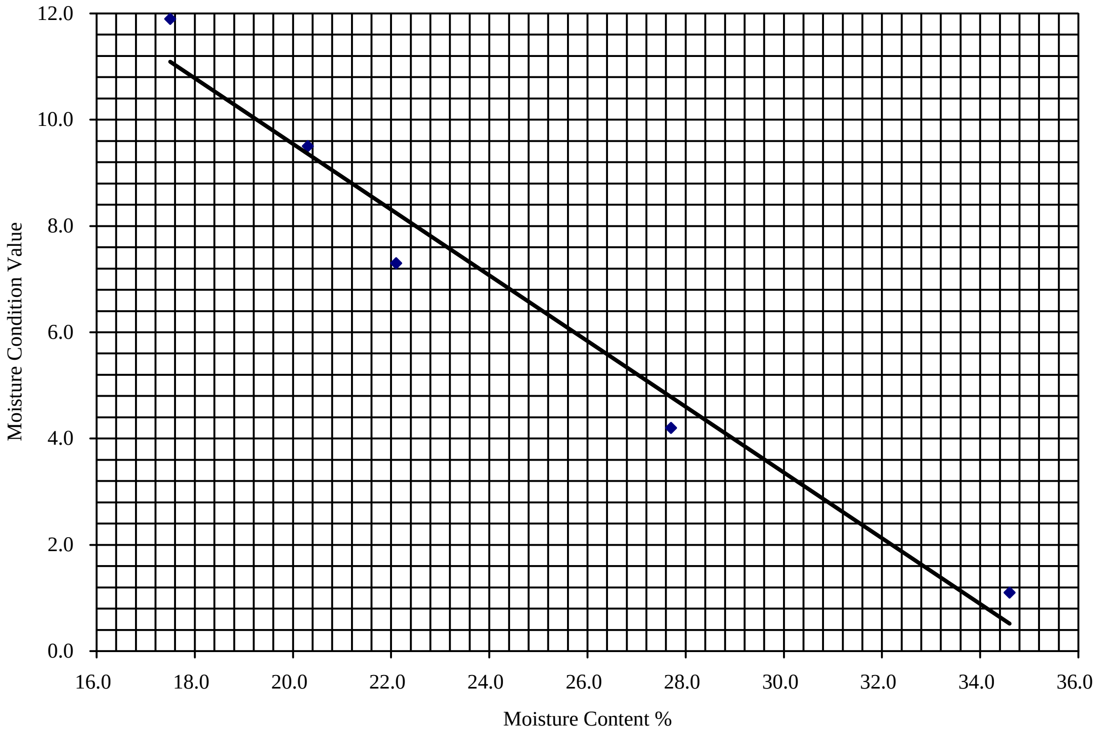
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

MOISTURE CONDITION VALUE CALIBRATION
BS1377 : Part 4 : 1990.

Hole Number: **GS8** **Depth (m):**

Sample Number: **Sample Type:** **B**

Initial Moisture Content (%).:	35
Single/Separate Samples Tested.	Single
Material Retained on the 20mm BS Test Sieve (%).:	0



Test Results.

Test Number	1	2	3	4	5
Moisture Content (%)	17.5	20.3	22.1	27.7	34.6
MCV	11.9	9.5	7.3	4.2	1.1

Checked	Date	Approved	Date
[signature]	04/03/11	[signature]	04/03/11

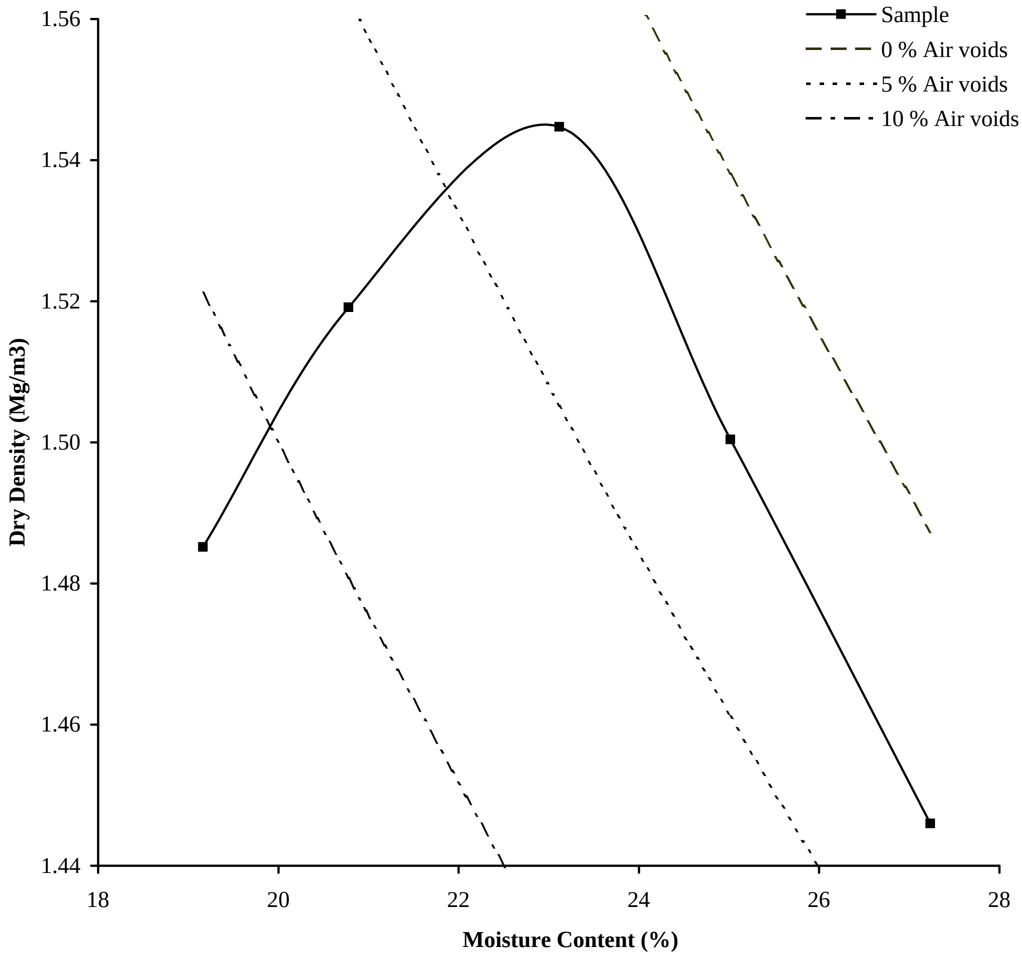
PSL Professional Soils Laboratory	CHERRY COBB (KM034).	Contract No: PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: GS9 **Depth (m) :**

Sample Number: **Sample Type:** B



Initial Moisture Content:	27	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.54	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		23		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory

CHERRY COBB (KM034).

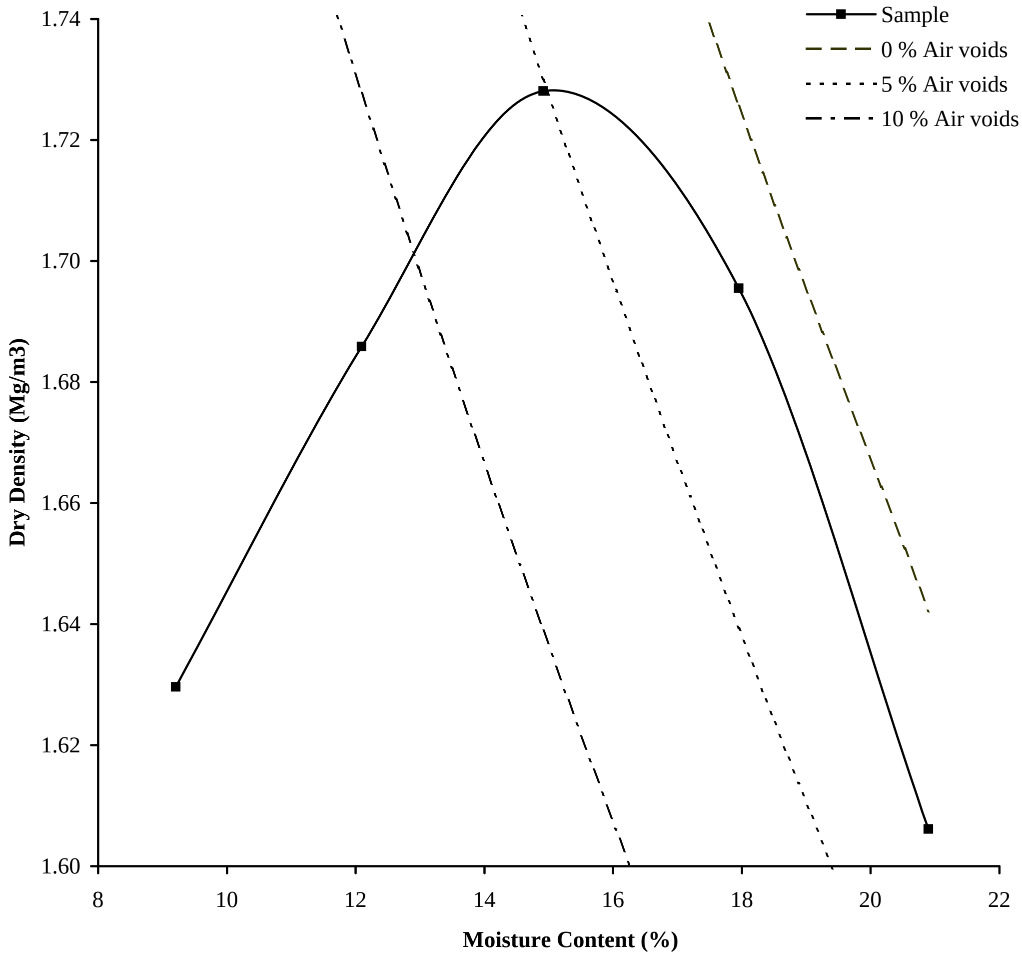
Contract No. PSL11/0404

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: GC1 **Depth (m) :**

Sample Number: **Sample Type:** B



Initial Moisture Content:	42	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.50	Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m3):		1.73	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):		15		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

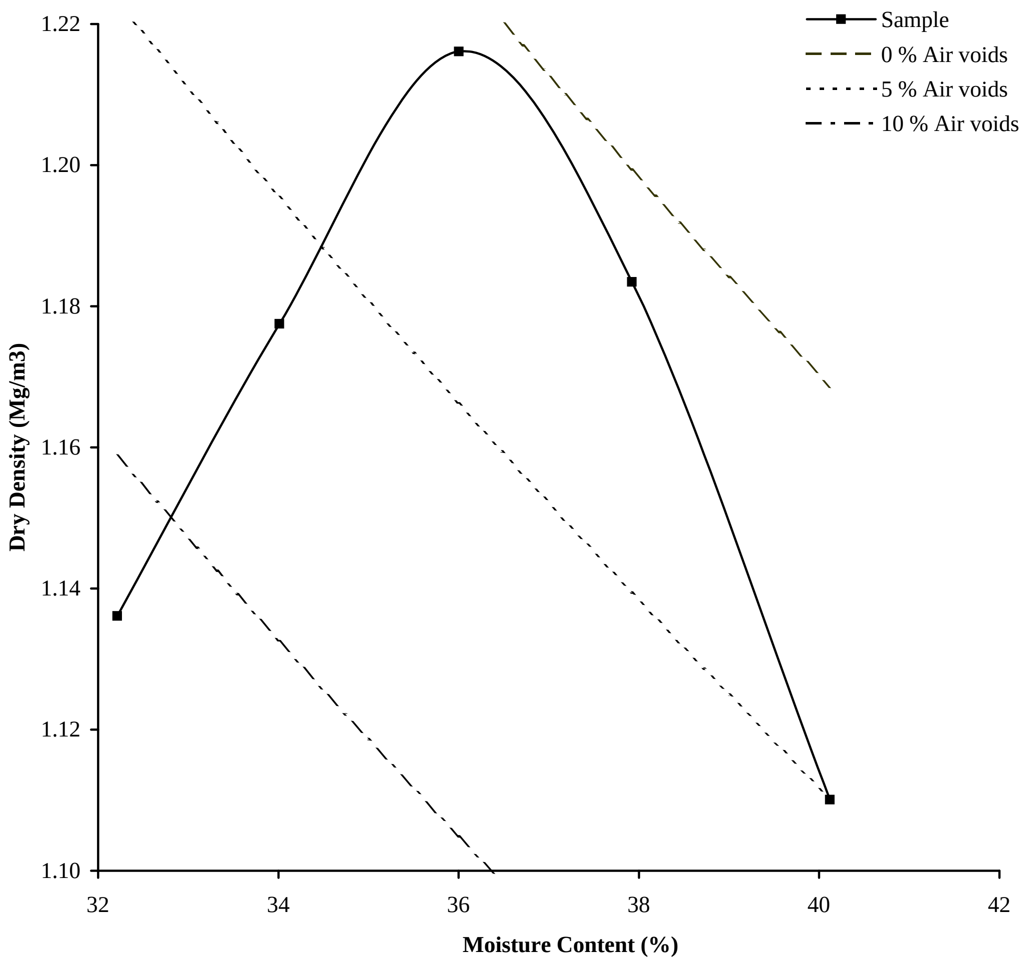
PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

Dry Density/Moisture Content Relationship Test

BS 1377 : Part 4 : 1990

Hole Number: **MG1** **Depth (m) :**

Sample Number: **Sample Type:** **B**



Initial Moisture Content:	36	Method of Compaction	2.5kg / Separate Sample	
Particle Density (Mg/m3):	2.20	Assumed	Material Retained on 37.5 mm Test Sieve (%):	15
Maximum Dry Density (mg/m3):		1.22	Material Retained on 20.0 mm Test Sieve (%):	7
Optimum Moisture Content (%):		36		
Remarks	See Summary of Soil Descriptions.			

Checked By	Date	Approved By	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory	**CHERRY COBB (KM034).**	**Contract No. PSL11/0404**

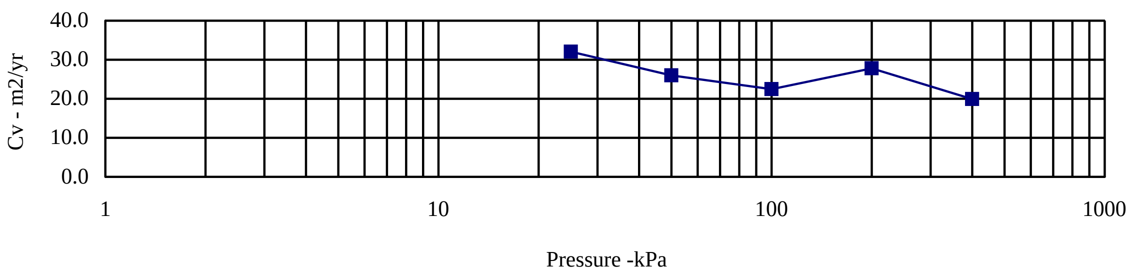
One Dimensional Consolidation Properties

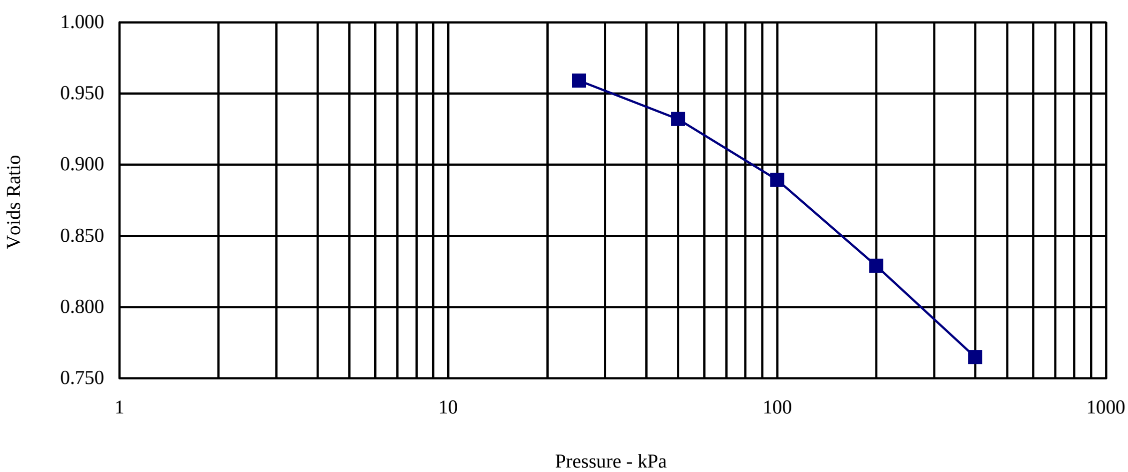
BS 1377: Part 5: 1990

Hole Number: BH1 **Depth (m): 9.30**

Sample Number: 0 **Sample Type: P**

Initial Conditions		Pressure Range kPa			Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	37							
Bulk Density (Mg/m3):	1.80	0	-	25	1.238	32.051	Method used to determine CV:	t90
Dry Density (Mg/m3):	1.31	25	-	50	0.548	25.987		
Voids Ratio:	1.0215	50	-	100	0.443	22.478	Nominal temperature during test ' C:	20
Degree of saturation:	96.0	100	-	200	0.320	27.771		
Height (mm):	20.42	200	-	400	0.176	19.878	Remarks: See summary of soils description.	
Diameter (mm)	75.22							
Particle Density (Mg/m3): Assumed	2.65							





Checked by	Date	Approved by	Date
	04/03/11		04/03/11

PSL Professional Soils Laboratory

CHERRY COBB (KM034).

Contract No.

PSL11/0404

Page of

Chemtest
The right chemistry to deliver results

Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

FAO Kevin McGee
02 March 2011

Dear Kevin McGee

Test Report Number **116311**
Your Project Reference **Cherry Cobb Sands**

Please find enclosed the results of analysis for the samples received 25 February 2011.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

Authorised Signatory

□ Darrell Hall	Director
☑ Phil Hellier	Director
□ Keith Jones	Technical Manager
□ John Crawford	Quality Manager
□ Malcolm Avis	Director

UKAS TESTING
2183

ISO 14001
sira
UKAS ENVIRONMENTAL MANAGEMENT

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

FAO Kevin McGee

LABORATORY TEST REPORT

Results of analysis of 1 sample
received 25 February 2011

Cherry Cobb Sands

Chemtest
The right chemistry to deliver results

Report Date
02 March 2011

SOP↓	Determinand↓	CAS No↓	Units↓	*	
	Login Batch No				**116311**
	Chemtest LIMS ID				AF79131
	Sample ID				TP12
	Sample No				S3
	Sampling Date				24/02/2011
	Depth				1.2m
	Matrix				*ASBESTOS*
2185	Actinolite	77536664		U	Not detected
	Amosite	12172735		U	Not detected
	Anthophyllite	77536675		U	Not detected
	Chrysotile	12001295		U	Detected
	Crocidolite	12001284		U	Not detected
	Tremolite	77536686		U	Not detected
	Material			N	cement

All tests undertaken between 28/02/2011 and 28/02/2011

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

LIMS sample ID range AF79131 to AF79131

Chemtest
The right chemistry to deliver results

Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

FAO Kevin McGee
02 March 2011

Dear Kevin McGee

Test Report Number **122567**
Your Project Reference **Cherry Cobb Sands**

Please find enclosed the results of analysis for the samples received 22 February 2011.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

Authorised Signatory

□ Darrell Hall	Director
☑ Phil Hellier	Director
□ Keith Jones	Technical Manager
□ John Crawford	Quality Manager
□ Malcolm Avis	Director

UKAS TESTING 2183

MCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

ISO 14001 Registered Company sira UKAS ENVIRONMENTAL MANAGEMENT 011

Notes to accompany report:

- *The sign < means 'less than'*
- *Tests marked 'U' hold UKAS accreditation*
- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
- *n/e means 'not evaluated'*
- *i/s means 'insufficient sample'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are outside of the scope of UKAS accreditation*
- *The results relate only to the items tested*
- *Stones represent the quantity of material removed prior to analysis*
- *All results are expressed on a dry weight basis*
- *The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, phenols*
- *For all other tests the samples were dried at < 37°C prior to analysis*
- *Uncertainties of measurement for the determinands tested are available upon request*
- *Soil descriptions, including colour and texture, are beyond the scope of MCertS accreditation*
- *None of the test results included in this report have been recovery corrected*

Test Report 122567 Cover Sheet

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

FAO Kevin McGee

LABORATORY TEST REPORT

Chemtest

Report Date
02 March 2011

Results of analysis of 14 samples
received 22 February 2011

Cherry Cobb Sands

Login Batch No					**122567**							
Chemtest LIMS ID					AF77705	AF77706	AF77707	AF77708	AF77709	AF77710	AF77711	AF77712
Sample ID					TP2	TP3	TP6	TP8	TP11	TP11	TP11	TP12
Sample No					S1	S2	S1	S2	S1	S2	S3	S3
Sampling Date					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
Depth					0m - 0.3m	1m	0m - 0.3m	1m	0.2m	0.5m	1.5m	1.2m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*								
2300	Cyanide (total)	57125	mg kg^{-1}	M	0.90	0.90	< 0.5	<0.50	< 0.5	< 0.5	< 0.5	< 0.5
	Thiocyanate	302045	mg kg^{-1}	M	<5.0	<5.0	< 5.0	<5.0	< 5.0	< 5.0	< 5.0	< 5.0
2625	Total Organic Carbon		%	M	2.2	1.1	2.5	1.1	4.5	4.9	23	6.8
2120	Boron (hot water soluble)	7440428	mg kg^{-1}	M	1.2	1.2	1.8	1.7	1.4	0.9	0.8	1.1
2490	Chromium (hexavalent)	18540299	mg kg^{-1}	N	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2450	Arsenic	7440382	mg kg^{-1}	M	17	13	15	12	28	23	19	20
	Cadmium	7440439	mg kg^{-1}	M	0.23	0.11	0.24	0.11	1.9	0.40	1.3	1.4
	Chromium	7440473	mg kg^{-1}	M	32	21	25	17	44	36	41	46
	Copper	7440508	mg kg^{-1}	M	17	12	15	9.0	1000	140	320	360
	Mercury	7439976	mg kg^{-1}	M	1.3	0.81	1.6	0.40	11	1.00	2.6	3.9
	Nickel	7440020	mg kg^{-1}	M	31	23	25	19	89	35	47	50
	Lead	7439921	mg kg^{-1}	M	62	34	49	31	1000	230	290	270
	Selenium	7782492	mg kg^{-1}	M	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
	Zinc	7440666	mg kg^{-1}	M	91	51	76	45	1900	350	540	850
2670	TPH >C6-C10		mg kg^{-1}	N	< 1	< 1	< 1	< 1				
	TPH >C10-C21		mg kg^{-1}	N	3.6	3.9	3.6	< 1				
	TPH >C21-C40		mg kg^{-1}	N	3.6	4.7	3.8	4.8				
	Total Petroleum Hydrocarbons		mg kg^{-1}	M	< 10	< 10	< 10	< 10				
2675	TPH aliphatic >C5-C6		mg kg^{-1}	N					< 0.1	< 0.1	< 0.1	< 0.1
	TPH aliphatic >C6-C8		mg kg^{-1}	N					< 0.1	< 0.1	< 0.1	< 0.1
	TPH aliphatic >C8-C10		mg kg^{-1}	N					< 0.1	< 0.1	73	< 0.1
	TPH aliphatic >C10-C12		mg kg^{-1}	N					< 0.1	< 0.1	580	< 0.1
	TPH aliphatic >C12-C16		mg kg^{-1}	N					< 0.1	< 0.1	440	< 0.1
	TPH aliphatic >C16-C21		mg kg^{-1}	N					< 0.1	< 0.1	860	< 0.1
	TPH aliphatic >C21-C35		mg kg^{-1}	N					< 0.1	< 0.1	5200	< 0.1
	TPH aliphatic >C35-C44		mg kg^{-1}	N					< 0.1	< 0.1	12	< 0.1
	TPH aromatic >C5-C7		mg kg^{-1}	N					< 0.1	< 0.1	< 0.1	< 0.1
	TPH aromatic >C7-C8		mg kg^{-1}	N					< 0.1	< 0.1	< 0.1	< 0.1
	TPH aromatic >C8-C10		mg kg^{-1}	N					< 0.1	< 0.1	170	< 0.1

All tests undertaken between 23-Feb-2011 and 2-Mar-2011

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

LABORATORY TEST REPORT

Chemtest

Results of analysis of 14 samples
received 22 February 2011

Report Date
02 March 2011

FAO Kevin McGee

Cherry Cobb Sands

Login Batch No					**122567**					
Chemtest LIMS ID					AF77713	AF77714	AF77715	AF77716	AF77717	AF77721
Sample ID					TP12	TP14	TP1	TP7	TP13	TP12
Sample No					S4	S1	S1	S1	S1	B1
Sampling Date					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
Depth					1.9m	0.3m	0.3m	0.3m	0.3m	0.5m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓							
2300	Cyanide (total)	57125	$mg\ kg^{-1}$	M	< 0.5	< 0.5				
	Thiocyanate	302045	$mg\ kg^{-1}$	M	< 5.0	< 5.0				
2625	Total Organic Carbon		%	M	9.5	2.2				
2120	Boron (hot water soluble)	7440428	$mg\ kg^{-1}$	M	4.0	0.9				
2490	Chromium (hexavalent)	18540299	$mg\ kg^{-1}$	N	<0.5	<0.5				
2450	Arsenic	7440382	$mg\ kg^{-1}$	M	18	22				
	Cadmium	7440439	$mg\ kg^{-1}$	M	0.71	0.35				
	Chromium	7440473	$mg\ kg^{-1}$	M	26	40				
	Copper	7440508	$mg\ kg^{-1}$	M	200	28				
	Mercury	7439976	$mg\ kg^{-1}$	M	5.5	0.74				
	Nickel	7440020	$mg\ kg^{-1}$	M	32	40				
	Lead	7439921	$mg\ kg^{-1}$	M	310	81				
	Selenium	7782492	$mg\ kg^{-1}$	M	<0.20	<0.20				
	Zinc	7440666	$mg\ kg^{-1}$	M	430	120				
2670	TPH >C6-C10		$mg\ kg^{-1}$	N	< 1	< 1				
	TPH >C10-C21		$mg\ kg^{-1}$	N	310	4.9				
	TPH >C21-C40		$mg\ kg^{-1}$	N	2500	17				
	Total Petroleum Hydrocarbons		$mg\ kg^{-1}$	M	2800	22				
2675	TPH aliphatic >C5-C6		$mg\ kg^{-1}$	N						< 0.1
	TPH aliphatic >C6-C8		$mg\ kg^{-1}$	N						< 0.1
	TPH aliphatic >C8-C10		$mg\ kg^{-1}$	N						< 0.1
	TPH aliphatic >C10-C12		$mg\ kg^{-1}$	N						< 0.1
	TPH aliphatic >C12-C16		$mg\ kg^{-1}$	N						< 0.1
	TPH aliphatic >C16-C21		$mg\ kg^{-1}$	N						< 0.1
	TPH aliphatic >C21-C35		$mg\ kg^{-1}$	N						< 0.1
	TPH aliphatic >C35-C44		$mg\ kg^{-1}$	N						< 0.1
	TPH aromatic >C5-C7		$mg\ kg^{-1}$	N						< 0.1
	TPH aromatic >C7-C8		$mg\ kg^{-1}$	N						< 0.1
	TPH aromatic >C8-C10		$mg\ kg^{-1}$	N						< 0.1

All tests undertaken between 23-Feb-2011 and 2-Mar-2011

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FAO Kevin McGee

LABORATORY TEST REPORT

Results of analysis of 14 samples received 22 February 2011

Cherry Cobb Sands

Report Date 02 March 2011

					122567							
					AF77705	AF77706	AF77707	AF77708	AF77709	AF77710	AF77711	AF77712
					TP2	TP3	TP6	TP8	TP11	TP11	TP11	TP12
					S1	S2	S1	S2	S1	S2	S3	S3
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					0m - 0.3m	1m	0m - 0.3m	1m	0.2m	0.5m	1.5m	1.2m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2675	TPH aromatic >C10-C12		mg kg^{-1}	N					< 0.1	< 0.1	140	< 0.1
	TPH aromatic >C12-C16		mg kg^{-1}	N					0.55	0.63	430	< 0.1
	TPH aromatic >C16-C21		mg kg^{-1}	N					1.8	1.2	560	< 0.1
	TPH aromatic >C21-C35		mg kg^{-1}	N					11	3.6	1700	< 0.1
	TPH aromatic >C35-C44		mg kg^{-1}	N					< 0.1	< 0.1	3.2	< 0.1
	Total Petroleum Hydrocarbons		mg kg^{-1}	N					13	6	10000	< 2
2700	Naphthalene	91203	mg kg^{-1}	M	0.2	< 0.1	0.8	< 0.1	1.4	0.2		< 0.1
	Acenaphthylene	208968	mg kg^{-1}	M	< 0.1	< 0.1	0.28	< 0.1	0.16	0.11		< 0.1
	Acenaphthene	83329	mg kg^{-1}	M	0.11	< 0.1	0.43	< 0.1	0.32	0.22		< 0.1
	Fluorene	86737	mg kg^{-1}	M	< 0.1	< 0.1	0.16	< 0.1	0.14	0.12		< 0.1
	Phenanthrene	85018	mg kg^{-1}	M	0.2	0.2	0.57	< 0.1	0.68	1.4		< 0.1
	Anthracene	120127	mg kg^{-1}	M	< 0.1	< 0.1	0.16	< 0.1	0.24	0.39		< 0.1
	Fluoranthene	206440	mg kg^{-1}	M	0.22	0.17	0.79	< 0.1	1.1	2.6		< 0.1
	Pyrene	129000	mg kg^{-1}	M	0.39	0.33	0.7	< 0.1	1.1	2.2		< 0.1
	Benzo[a]anthracene	56553	mg kg^{-1}	M	0.25	< 0.1	0.36	< 0.1	0.56	1.4		< 0.1
	Chrysene	218019	mg kg^{-1}	M	0.19	< 0.1	0.37	< 0.1	0.65	1.7		< 0.1
	Benzo[b]fluoranthene	205992	mg kg^{-1}	M	0.11	< 0.1	0.27	< 0.1	0.59	1.5		< 0.1
	Benzo[k]fluoranthene	207089	mg kg^{-1}	M	< 0.1	< 0.1	0.11	< 0.1	0.25	0.4		< 0.1
	Benzo[a]pyrene	50328	mg kg^{-1}	M	< 0.1	< 0.1	0.21	< 0.1	0.4	1		< 0.1
	Dibenzo[a,h]anthracene	53703	mg kg^{-1}	M	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.16		< 0.1
	Indeno[1,2,3-cd]pyrene	193395	mg kg^{-1}	M	< 0.1	< 0.1	0.26	< 0.1	0.54	0.96		< 0.1
	Benzo[g,h,i]perylene	191242	mg kg^{-1}	M	< 0.1	< 0.1	0.42	< 0.1	0.46	1		< 0.1
	Total (of 16) PAHs		mg kg^{-1}	M	< 2	< 2	5.9	< 2	8.7	15		< 2
2760	Methyl tert-butyl ether	1634044	µg kg^{-1}	N					<1.0	<1.0	<1.0	<1.0
	Dichlorodifluoromethane	75718	µg kg^{-1}	U					<1.0	<1.0	<1.0	<1.0
	Chloromethane	74873	µg kg^{-1}	M					<1.0	<1.0	<1.0	<1.0
	Vinyl chloride	75014	µg kg^{-1}	M					<1.0	<1.0	<1.0	<1.0
	Bromomethane	74839	µg kg^{-1}	U					<20	<20	<20	<20
	Chloroethane	75003	µg kg^{-1}	U					<2.0	<2.0	<2.0	<2.0
	Trichlorofluoromethane	75694	µg kg^{-1}	U					<1.0	<1.0	<1.0	<1.0

All tests undertaken between 23-Feb-2011 and 2-Mar-2011

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Delta Simons
The Lawn
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Lincoln
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FAO Kevin McGee

LABORATORY TEST REPORT

Chemtest

Results of analysis of 14 samples
received 22 February 2011

Report Date
02 March 2011

Cherry Cobb Sands

					122567					
					AF77713	AF77714	AF77715	AF77716	AF77717	AF77721
					TP12	TP14	TP1	TP7	TP13	TP12
					S4	S1	S1	S1	S1	B1
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					1.9m	0.3m	0.3m	0.3m	0.3m	0.5m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2675	TPH aromatic >C10-C12		mg kg-¹	N						< 0.1
	TPH aromatic >C12-C16		mg kg-¹	N						0.46
	TPH aromatic >C16-C21		mg kg-¹	N						1.4
	TPH aromatic >C21-C35		mg kg-¹	N						3.0
	TPH aromatic >C35-C44		mg kg-¹	N						< 0.1
	Total Petroleum Hydrocarbons		mg kg-¹	N						5
2700	Naphthalene	91203	mg kg-¹	M	0.26	0.16				
	Acenaphthylene	208968	mg kg-¹	M	< 0.1	< 0.1				
	Acenaphthene	83329	mg kg-¹	M	0.22	0.1				
	Fluorene	86737	mg kg-¹	M	< 0.1	< 0.1				
	Phenanthrene	85018	mg kg-¹	M	0.78	0.14				
	Anthracene	120127	mg kg-¹	M	0.17	< 0.1				
	Fluoranthene	206440	mg kg-¹	M	1.8	0.12				
	Pyrene	129000	mg kg-¹	M	1.6	0.11				
	Benzo[a]anthracene	56553	mg kg-¹	M	< 0.1	< 0.1				
	Chrysene	218019	mg kg-¹	M	1.2	< 0.1				
	Benzo[b]fluoranthene	205992	mg kg-¹	M	0.9	< 0.1				
	Benzo[k]fluoranthene	207089	mg kg-¹	M	0.77	< 0.1				
	Benzo[a]pyrene	50328	mg kg-¹	M	< 0.1	< 0.1				
	Dibenzo[a,h]anthracene	53703	mg kg-¹	M	< 0.1	< 0.1				
	Indeno[1,2,3-cd]pyrene	193395	mg kg-¹	M	0.28	< 0.1				
	Benzo[g,h,i]perylene	191242	mg kg-¹	M	0.24	< 0.1				
	Total (of 16) PAHs		mg kg-¹	M	8.2	< 2				
2760	Methyl tert-butyl ether	1634044	µg kg-¹	N						<1.0
	Dichlorodifluoromethane	75718	µg kg-¹	U						<1.0
	Chloromethane	74873	µg kg-¹	M						<1.0
	Vinyl chloride	75014	µg kg-¹	M						<1.0
	Bromomethane	74839	µg kg-¹	U						<20
	Chloroethane	75003	µg kg-¹	U						<2.0
	Trichlorofluoromethane	75694	µg kg-¹	U						<1.0

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LABORATORY TEST REPORT

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Cherry Cobb Sands

Report Date
02 March 2011

					122567							
					AF77705	AF77706	AF77707	AF77708	AF77709	AF77710	AF77711	AF77712
					TP2	TP3	TP6	TP8	TP11	TP11	TP11	TP12
					S1	S2	S1	S2	S1	S2	S3	S3
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					0m - 0.3m	1m	0m - 0.3m	1m	0.2m	0.5m	1.5m	1.2m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2760	1,1-Dichloroethene	75354	µg kg-¹	U					<1.0	<1.0	<1.0	<1.0
	Dichloromethane	75092	µg kg-¹	N					ne	ne	ne	ne
	trans-1,2-Dichloroethene	156605	µg kg-¹	U					<1.0	<1.0	<1.0	<1.0
	1,1-Dichloroethane	75343	µg kg-¹	M					<1.0	<1.0	<1.0	<1.0
	cis-1,2-Dichloroethene	156592	µg kg-¹	M					<1.0	<1.0	<1.0	<1.0
	Bromochloromethane	74975	µg kg-¹	U					<1.0	<1.0	<1.0	<1.0
	Trichloromethane	67663	µg kg-¹	M					<1.0	<1.0	<1.0	<1.0
	1,1,1-Trichloroethane	71556	µg kg-¹	M					<1.0	<1.0	<1.0	<1.0
	Tetrachloromethane	56235	µg kg-¹	M					<1.0	<1.0	<1.0	<1.0
	1,1-Dichloropropene	563586	µg kg-¹	U					<1.0	<1.0	<1.0	<1.0
	Benzene	71432	µg kg-¹	M					<1.0	<1.0	140	<1.0
	1,2-Dichloroethane	107062	µg kg-¹	U					<2.0	<2.0	<2.0	<2.0
	Trichloroethene	79016	µg kg-¹	U					<1.0	<1.0	2.9	<1.0
	1,2-Dichloropropane	78875	µg kg-¹	U					<1.0	<1.0	<1.0	<1.0
	Dibromomethane	74953	µg kg-¹	U					<10	<10	<10	<10
	Bromodichloromethane	75274	µg kg-¹	U					<5.0	<5.0	<5.0	<5.0
	cis-1,3-Dichloropropene	10061015	µg kg-¹	N					<10	<10	<10	<10
	Toluene	108883	µg kg-¹	M					<1.0	<1.0	200	<1.0
	trans-1,3-Dichloropropene	10061026	µg kg-¹	N					<10	<10	<10	<10
	1,1,2-Trichloroethane	79005	µg kg-¹	U					<10	<10	<10	<10
	Tetrachloroethene	127184	µg kg-¹	M					<1.0	<1.0	1.1	<1.0
	1,3-Dichloropropane	142289	µg kg-¹	U					<2.0	<2.0	<2.0	<2.0
	Dibromochloromethane	124481	µg kg-¹	U					<10	<10	<10	<10
	1,2-Dibromoethane	106934	µg kg-¹	U					<5.0	<5.0	<5.0	<5.0
	Chlorobenzene	108907	µg kg-¹	M					<1.0	<1.0	<1.0	<1.0
	1,1,1,2-Tetrachloroethane	630206	µg kg-¹	M					<2.0	<2.0	<2.0	<2.0
	Ethylbenzene	100414	µg kg-¹	M					<1.0	<1.0	370	<1.0
	m- & p-Xylene	1330207	µg kg-¹	U					<1.0	<1.0	580	<1.0
	o-Xylene	95476	µg kg-¹	U					<1.0	<1.0	1400	<1.0
	Styrene	100425	µg kg-¹	U					<1.0	<1.0	<1.0	<1.0

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LABORATORY TEST REPORT

Chemtest

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Cherry Cobb Sands

					122567					
					AF77713	AF77714	AF77715	AF77716	AF77717	AF77721
					TP12	TP14	TP1	TP7	TP13	TP12
					S4	S1	S1	S1	S1	B1
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					1.9m	0.3m	0.3m	0.3m	0.3m	0.5m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2760	1,1-Dichloroethene	75354	µg kg-1	U						<1.0
	Dichloromethane	75092	µg kg-1	N						ne
	trans-1,2-Dichloroethene	156605	µg kg-1	U						<1.0
	1,1-Dichloroethane	75343	µg kg-1	M						<1.0
	cis-1,2-Dichloroethene	156592	µg kg-1	M						<1.0
	Bromochloromethane	74975	µg kg-1	U						<1.0
	Trichloromethane	67663	µg kg-1	M						<1.0
	1,1,1-Trichloroethane	71556	µg kg-1	M						<1.0
	Tetrachloromethane	56235	µg kg-1	M						<1.0
	1,1-Dichloropropene	563586	µg kg-1	U						<1.0
	Benzene	71432	µg kg-1	M						<1.0
	1,2-Dichloroethane	107062	µg kg-1	U						<2.0
	Trichloroethene	79016	µg kg-1	U						<1.0
	1,2-Dichloropropane	78875	µg kg-1	U						<1.0
	Dibromomethane	74953	µg kg-1	U						<10
	Bromodichloromethane	75274	µg kg-1	U						<5.0
	cis-1,3-Dichloropropene	10061015	µg kg-1	N						<10
	Toluene	108883	µg kg-1	M						<1.0
	trans-1,3-Dichloropropene	10061026	µg kg-1	N						<10
	1,1,2-Trichloroethane	79005	µg kg-1	U						<10
	Tetrachloroethene	127184	µg kg-1	M						<1.0
	1,3-Dichloropropane	142289	µg kg-1	U						<2.0
	Dibromochloromethane	124481	µg kg-1	U						<10
	1,2-Dibromoethane	106934	µg kg-1	U						<5.0
	Chlorobenzene	108907	µg kg-1	M						<1.0
	1,1,1,2-Tetrachloroethane	630206	µg kg-1	M						<2.0
	Ethylbenzene	100414	µg kg-1	M						<1.0
	m- & p-Xylene	1330207	µg kg-1	U						<1.0
	o-Xylene	95476	µg kg-1	U						<1.0
	Styrene	100425	µg kg-1	U						<1.0

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Cherry Cobb Sands

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					122567							
					AF77705	AF77706	AF77707	AF77708	AF77709	AF77710	AF77711	AF77712
					TP2	TP3	TP6	TP8	TP11	TP11	TP11	TP12
					S1	S2	S1	S2	S1	S2	S3	S3
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					0m - 0.3m	1m	0m - 0.3m	1m	0.2m	0.5m	1.5m	1.2m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2760	Tribromomethane	75252	μg kg-1	U					<10	<10	<10	<10
	Isopropylbenzene	98828	μg kg-1	U					<1.0	<1.0	3.2	<1.0
	Bromobenzene	108861	μg kg-1	U					<1.0	<1.0	<1.0	<1.0
	1,2,3-Trichloropropane	96184	μg kg-1	N					<50	<50	<50	<50
	n-Propylbenzene	103651	μg kg-1	U					<1.0	<1.0	16	<1.0
	2-Chlorotoluene	95498	μg kg-1	M					<1.0	<1.0	<1.0	<1.0
	1,2,4-Trimethylbenzene	95636	μg kg-1	U					<1.0	<1.0	61	<1.0
	4-Chlorotoluene	106434	μg kg-1	U					<1.0	<1.0	<1.0	<1.0
	tert-Butylbenzene	98066	μg kg-1	U					<1.0	<1.0	<1.0	<1.0
	1,3,5-Trimethylbenzene	108678	μg kg-1	U					<1.0	<1.0	19	<1.0
	sec-Butylbenzene	135988	μg kg-1	U					<1.0	<1.0	13	<1.0
	1,3-Dichlorobenzene	541731	μg kg-1	U					<1.0	<1.0	<1.0	<1.0
	4-Isopropyltoluene	99876	μg kg-1	U					<1.0	<1.0	<1.0	<1.0
	1,4-Dichlorobenzene	106467	μg kg-1	U					<1.0	<1.0	<1.0	<1.0
	n-Butylbenzene	104518	μg kg-1	U					<1.0	<1.0	<1.0	<1.0
	1,2-Dichlorobenzene	95501	μg kg-1	U					<1.0	<1.0	<1.0	<1.0
	1,2-Dibromo-3-chloropropane	96128	μg kg-1	U					<50	<50	<50	<50
	1,2,4-Trichlorobenzene	120821	μg kg-1	U					<1.0	<1.0	<1.0	<1.0
	Hexachlorobutadiene	87683	μg kg-1	U					<1.0	<1.0	<1.0	<1.0
	1,2,3-Trichlorobenzene	87616	μg kg-1	U					<2.0	<2.0	<2.0	<2.0
2790	Acenaphthene	83329	mg kg-1	N					<0.50	<0.50	<0.50	<0.50
	Acenaphthylene	208968	mg kg-1	N					<0.50	<0.50	<0.50	<0.50
	Anthracene	120127	mg kg-1	N					<0.50	<0.50	<0.50	<0.50
	Azobenzene	103333	mg kg-1	N					<0.50	<0.50	<0.50	<0.50
	Benzo[a]anthracene	56553	mg kg-1	N					<0.50	<0.50	<0.50	<0.50
	Benzo[a]pyrene	50328	mg kg-1	N					<0.50	<0.50	<0.50	<0.50
	Benzo[b]fluoranthene	205992	mg kg-1	N					<0.50	<0.50	<0.50	<0.50
	Benzo[g,h,i]perylene	191242	mg kg-1	N					<0.50	<0.50	<0.50	<0.50
	Benzo[k]fluoranthene	207089	mg kg-1	N					<0.50	<0.50	<0.50	<0.50
	bis(2-Chloroethoxy)methane	111911	mg kg-1	N					<0.50	<0.50	<0.50	<0.50

All tests undertaken between 23-Feb-2011 and 2-Mar-2011

* Accreditation status

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Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

LABORATORY TEST REPORT

Chemtest

Results of analysis of 14 samples
received 22 February 2011

Report Date
02 March 2011

FAO Kevin McGee

Cherry Cobb Sands

					122567					
					AF77713	AF77714	AF77715	AF77716	AF77717	AF77721
					TP12	TP14	TP1	TP7	TP13	TP12
					S4	S1	S1	S1	S1	B1
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					1.9m	0.3m	0.3m	0.3m	0.3m	0.5m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2760	Tribromomethane	75252	µg kg-¹	U						<10
	Isopropylbenzene	98828	µg kg-¹	U						<1.0
	Bromobenzene	108861	µg kg-¹	U						<1.0
	1,2,3-Trichloropropane	96184	µg kg-¹	N						<50
	n-Propylbenzene	103651	µg kg-¹	U						<1.0
	2-Chlorotoluene	95498	µg kg-¹	M						<1.0
	1,2,4-Trimethylbenzene	95636	µg kg-¹	U						<1.0
	4-Chlorotoluene	106434	µg kg-¹	U						<1.0
	tert-Butylbenzene	98066	µg kg-¹	U						<1.0
	1,3,5-Trimethylbenzene	108678	µg kg-¹	U						<1.0
	sec-Butylbenzene	135988	µg kg-¹	U						<1.0
	1,3-Dichlorobenzene	541731	µg kg-¹	U						<1.0
	4-Isopropyltoluene	99876	µg kg-¹	U						<1.0
	1,4-Dichlorobenzene	106467	µg kg-¹	U						<1.0
	n-Butylbenzene	104518	µg kg-¹	U						<1.0
	1,2-Dichlorobenzene	95501	µg kg-¹	U						<1.0
	1,2-Dibromo-3-chloropropane	96128	µg kg-¹	U						<50
	1,2,4-Trichlorobenzene	120821	µg kg-¹	U						<1.0
	Hexachlorobutadiene	87683	µg kg-¹	U						<1.0
	1,2,3-Trichlorobenzene	87616	µg kg-¹	U						<2.0
2790	Acenaphthene	83329	mg kg-¹	N						<0.50
	Acenaphthylene	208968	mg kg-¹	N						<0.50
	Anthracene	120127	mg kg-¹	N						<0.50
	Azobenzene	103333	mg kg-¹	N						<0.50
	Benzo[a]anthracene	56553	mg kg-¹	N						<0.50
	Benzo[a]pyrene	50328	mg kg-¹	N						<0.50
	Benzo[b]fluoranthene	205992	mg kg-¹	N						<0.50
	Benzo[g,h,i]perylene	191242	mg kg-¹	N						<0.50
	Benzo[k]fluoranthene	207089	mg kg-¹	N						<0.50
	bis(2-Chloroethoxy)methane	111911	mg kg-¹	N						<0.50

All tests undertaken between 23-Feb-2011 and 2-Mar-2011

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FAO Kevin McGee

LABORATORY TEST REPORT

Chemtest

Report Date
02 March 2011

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received 22 February 2011

Cherry Cobb Sands

					122567							
					AF77705	AF77706	AF77707	AF77708	AF77709	AF77710	AF77711	AF77712
					TP2	TP3	TP6	TP8	TP11	TP11	TP11	TP12
					S1	S2	S1	S2	S1	S2	S3	S3
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					0m - 0.3m	1m	0m - 0.3m	1m	0.2m	0.5m	1.5m	1.2m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2790	bis(2-Chloroethyl)ether	111444	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	bis(2-Chloroisopropyl)ether	108601	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	bis(2-Ethylhexyl)phthalate	117817	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Butylbenzylphthalate	85687	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Carbazole	86748	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Chrysene	218019	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Di-n-butylphthalate	84742	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Di-n-octylphthalate	117840	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Dibenzo[a,h]anthracene	53703	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Dibenzofuran	132649	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Diethylphthalate	84662	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Dimethylphthalate	131113	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Fluoranthene	206440	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Fluorene	86737	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Hexachlorobenzene	118741	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Hexachlorobutadiene	87683	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Hexachlorocyclopentadiene	77474	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Hexachloroethane	67721	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Indeno[1,2,3-cd]pyrene	193395	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Isophorone	78591	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	N-Nitrosodi-n-propylamine	621647	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	N-Nitrosodimethylamine	62759	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Naphthalene	91203	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Nitrobenzene	98953	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Pentachlorophenol	87865	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Phenanthrene	85018	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Phenol	108952	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	Pyrene	129000	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	1,2-Dichlorobenzene	95501	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50
	1,2,4-Trichlorobenzene	120821	mg kg-¹	N					<0.50	<0.50	<0.50	<0.50

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LN1 3BL

FAO Kevin McGee

LABORATORY TEST REPORT

Chemtest

Report Date
02 March 2011

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received 22 February 2011

Cherry Cobb Sands

					122567					
					AF77713	AF77714	AF77715	AF77716	AF77717	AF77721
					TP12	TP14	TP1	TP7	TP13	TP12
					S4	S1	S1	S1	S1	B1
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					1.9m	0.3m	0.3m	0.3m	0.3m	0.5m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2790	bis(2-Chloroethyl)ether	111444	mg kg-¹	N						<0.50
	bis(2-Chloroisopropyl)ether	108601	mg kg-¹	N						<0.50
	bis(2-Ethylhexyl)phthalate	117817	mg kg-¹	N						<0.50
	Butylbenzylphthalate	85687	mg kg-¹	N						<0.50
	Carbazole	86748	mg kg-¹	N						<0.50
	Chrysene	218019	mg kg-¹	N						<0.50
	Di-n-butylphthalate	84742	mg kg-¹	N						<0.50
	Di-n-octylphthalate	117840	mg kg-¹	N						<0.50
	Dibenzo[a,h]anthracene	53703	mg kg-¹	N						<0.50
	Dibenzofuran	132649	mg kg-¹	N						<0.50
	Diethylphthalate	84662	mg kg-¹	N						<0.50
	Dimethylphthalate	131113	mg kg-¹	N						<0.50
	Fluoranthene	206440	mg kg-¹	N						<0.50
	Fluorene	86737	mg kg-¹	N						<0.50
	Hexachlorobenzene	118741	mg kg-¹	N						<0.50
	Hexachlorobutadiene	87683	mg kg-¹	N						<0.50
	Hexachlorocyclopentadiene	77474	mg kg-¹	N						<0.50
	Hexachloroethane	67721	mg kg-¹	N						<0.50
	Indeno[1,2,3-cd]pyrene	193395	mg kg-¹	N						<0.50
	Isophorone	78591	mg kg-¹	N						<0.50
	N-Nitrosodi-n-propylamine	621647	mg kg-¹	N						<0.50
	N-Nitrosodimethylamine	62759	mg kg-¹	N						<0.50
	Naphthalene	91203	mg kg-¹	N						<0.50
	Nitrobenzene	98953	mg kg-¹	N						<0.50
	Pentachlorophenol	87865	mg kg-¹	N						<0.50
	Phenanthrene	85018	mg kg-¹	N						<0.50
	Phenol	108952	mg kg-¹	N						<0.50
	Pyrene	129000	mg kg-¹	N						<0.50
	1,2-Dichlorobenzene	95501	mg kg-¹	N						<0.50
	1,2,4-Trichlorobenzene	120821	mg kg-¹	N						<0.50

All tests undertaken between 23-Feb-2011 and 2-Mar-2011

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The Lawn
Union Road
Lincoln
LN1 3BL

FAO Kevin McGee

LABORATORY TEST REPORT

Chemtest

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received 22 February 2011

Cherry Cobb Sands

					122567							
					AF77705	AF77706	AF77707	AF77708	AF77709	AF77710	AF77711	AF77712
					TP2	TP3	TP6	TP8	TP11	TP11	TP11	TP12
					S1	S2	S1	S2	S1	S2	S3	S3
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					0m - 0.3m	1m	0m - 0.3m	1m	0.2m	0.5m	1.5m	1.2m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2790	1,3-Dichlorobenzene	541731	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	1,4-Dichlorobenzene	106467	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2-Chloronaphthalene	91587	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2-Chlorophenol	95578	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2-Methyl-4,6-dinitrophenol	534521	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2-Methylnaphthalene	91576	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2-Methylphenol	95487	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2-Nitroaniline	88744	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2-Nitrophenol	88755	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2,4-Dichlorophenol	120832	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2,4-Dimethylphenol	105679	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2,4-Dinitrotoluene	121142	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2,4,5-Trichlorophenol	95954	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2,4,6-Trichlorophenol	88062	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	2,6-Dinitrotoluene	606202	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	3-Nitroaniline	99092	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	4-Bromophenylphenylether	101553	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	4-Chloro-3-methylphenol	59507	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	4-Chloroaniline	106478	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	4-Chlorophenylphenylether	7005724	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	4-Methylphenol	106445	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
	4-Nitroaniline	100016	mg kg^{-1}	N					<0.50	<0.50	<0.50	<0.50
2800	Naphthalene	91203	mg kg^{-1}	M							0.5	
	Acenaphthylene	208968	mg kg^{-1}	N							0.6	
	Acenaphthene	83329	mg kg^{-1}	M							0.8	
	Fluorene	86737	mg kg^{-1}	M							<0.1	
	Phenanthrene	85018	mg kg^{-1}	M							1.8	
	Anthracene	120127	mg kg^{-1}	M							0.1	
	Fluoranthene	206440	mg kg^{-1}	M							1.5	
	Pyrene	129000	mg kg^{-1}	M							1.6	

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LABORATORY TEST REPORT

Chemtest

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Cherry Cobb Sands

					122567					
					AF77713	AF77714	AF77715	AF77716	AF77717	AF77721
					TP12	TP14	TP1	TP7	TP13	TP12
					S4	S1	S1	S1	S1	B1
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					1.9m	0.3m	0.3m	0.3m	0.3m	0.5m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2790	1,3-Dichlorobenzene	541731	mg kg-¹	N						<0.50
	1,4-Dichlorobenzene	106467	mg kg-¹	N						<0.50
	2-Chloronaphthalene	91587	mg kg-¹	N						<0.50
	2-Chlorophenol	95578	mg kg-¹	N						<0.50
	2-Methyl-4,6-dinitrophenol	534521	mg kg-¹	N						<0.50
	2-Methylnaphthalene	91576	mg kg-¹	N						<0.50
	2-Methylphenol	95487	mg kg-¹	N						<0.50
	2-Nitroaniline	88744	mg kg-¹	N						<0.50
	2-Nitrophenol	88755	mg kg-¹	N						<0.50
	2,4-Dichlorophenol	120832	mg kg-¹	N						<0.50
	2,4-Dimethylphenol	105679	mg kg-¹	N						<0.50
	2,4-Dinitrotoluene	121142	mg kg-¹	N						<0.50
	2,4,5-Trichlorophenol	95954	mg kg-¹	N						<0.50
	2,4,6-Trichlorophenol	88062	mg kg-¹	N						<0.50
	2,6-Dinitrotoluene	606202	mg kg-¹	N						<0.50
	3-Nitroaniline	99092	mg kg-¹	N						<0.50
	4-Bromophenylphenylether	101553	mg kg-¹	N						<0.50
	4-Chloro-3-methylphenol	59507	mg kg-¹	N						<0.50
	4-Chloroaniline	106478	mg kg-¹	N						<0.50
	4-Chlorophenylphenylether	7005724	mg kg-¹	N						<0.50
	4-Methylphenol	106445	mg kg-¹	N						<0.50
	4-Nitroaniline	100016	mg kg-¹	N						<0.50
2800	Naphthalene	91203	mg kg-¹	M						
	Acenaphthylene	208968	mg kg-¹	N						
	Acenaphthene	83329	mg kg-¹	M						
	Fluorene	86737	mg kg-¹	M						
	Phenanthrene	85018	mg kg-¹	M						
	Anthracene	120127	mg kg-¹	M						
	Fluoranthene	206440	mg kg-¹	M						
	Pyrene	129000	mg kg-¹	M						

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Cherry Cobb Sands

					122567							
					AF77705	AF77706	AF77707	AF77708	AF77709	AF77710	AF77711	AF77712
					TP2	TP3	TP6	TP8	TP11	TP11	TP11	TP12
					S1	S2	S1	S2	S1	S2	S3	S3
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					0m - 0.3m	1m	0m - 0.3m	1m	0.2m	0.5m	1.5m	1.2m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2800	Benzo[a]anthracene	56553	mg kg-1	M							0.9	
	Chrysene	218019	mg kg-1	M							<0.1	
	Benzo[b]fluoranthene	205992	mg kg-1	M							<0.1	
	Benzo[k]fluoranthene	207089	mg kg-1	N							0.1	
	Benzo[a]pyrene	50328	mg kg-1	M							<0.1	
	Dibenzo[a,h]anthracene	53703	mg kg-1	N							<0.1	
	Indeno[1,2,3-cd]pyrene	193395	mg kg-1	M							<0.1	
	Benzo[g,h,i]perylene	191242	mg kg-1	M							<0.1	
	Total (of 16) PAHs		mg kg-1	N							8	
2820	Azinphos methyl	86500	mg kg-1	N								
	Coumaphos	56724	mg kg-1	N								
	Demeton (O+S)	8065483	mg kg-1	N								
	Disulfoton	298044	mg kg-1	N								
	Fensulfothion	115902	mg kg-1	N								
	Fenthion	55389	mg kg-1	N								
	Phorate	298022	mg kg-1	N								
	Prothiophos	34643464	mg kg-1	N								
	Sulprofos	35400432	mg kg-1	N								
	Trichloronate	327980	mg kg-1	N								
2840	alpha-HCH	319846	mg kg-1	N								
	gamma-HCH	58899	mg kg-1	N								
	beta-HCH	319857	mg kg-1	N								
	Heptachlor	76448	mg kg-1	N								
	delta-HCH	319868	mg kg-1	N								
	Aldrin	309002	mg kg-1	N								
	Heptachlor epoxide	1024573	mg kg-1	N								
	gamma-Chlordane	5103742	mg kg-1	N								
	alpha-Chlordane	5103719	mg kg-1	N								
	Endosulfan I	959988	mg kg-1	N								
	4,4'-DDE	72559	mg kg-1	N								

All tests undertaken between 23-Feb-2011 and 2-Mar-2011

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

FAO Kevin McGee

LABORATORY TEST REPORT

Chemtest

Report Date
02 March 2011

Results of analysis of 14 samples
received 22 February 2011

Cherry Cobb Sands

					122567					
					AF77713	AF77714	AF77715	AF77716	AF77717	AF77721
					TP12	TP14	TP1	TP7	TP13	TP12
					S4	S1	S1	S1	S1	B1
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					1.9m	0.3m	0.3m	0.3m	0.3m	0.5m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2800	Benzo[a]anthracene	56553	mg kg-¹	M						
	Chrysene	218019	mg kg-¹	M						
	Benzo[b]fluoranthene	205992	mg kg-¹	M						
	Benzo[k]fluoranthene	207089	mg kg-¹	N						
	Benzo[a]pyrene	50328	mg kg-¹	M						
	Dibenzo[a,h]anthracene	53703	mg kg-¹	N						
	Indeno[1,2,3-cd]pyrene	193395	mg kg-¹	M						
	Benzo[g,h,i]perylene	191242	mg kg-¹	M						
	Total (of 16) PAHs		mg kg-¹	N						
2820	Azinphos methyl	86500	mg kg-¹	N			<0.20	<0.20	<0.20	
	Coumaphos	56724	mg kg-¹	N			<0.20	<0.20	<0.20	
	Demeton (O+S)	8065483	mg kg-¹	N			<0.20	<0.20	<0.20	
	Disulfoton	298044	mg kg-¹	N			<0.20	<0.20	<0.20	
	Fensulfothion	115902	mg kg-¹	N			<0.20	<0.20	<0.20	
	Fenthion	55389	mg kg-¹	N			<0.20	<0.20	<0.20	
	Phorate	298022	mg kg-¹	N			<0.20	<0.20	<0.20	
	Prothiophos	34643464	mg kg-¹	N			<0.20	<0.20	<0.20	
	Sulprofos	35400432	mg kg-¹	N			<0.20	<0.20	<0.20	
	Trichloronate	327980	mg kg-¹	N			<0.20	<0.20	<0.20	
2840	alpha-HCH	319846	mg kg-¹	N			<0.20	<0.20	<0.20	
	gamma-HCH	58899	mg kg-¹	N			<0.20	<0.20	<0.20	
	beta-HCH	319857	mg kg-¹	N			<0.20	<0.20	<0.20	
	Heptachlor	76448	mg kg-¹	N			<0.20	<0.20	<0.20	
	delta-HCH	319868	mg kg-¹	N			<0.20	<0.20	<0.20	
	Aldrin	309002	mg kg-¹	N			<0.20	<0.20	<0.20	
	Heptachlor epoxide	1024573	mg kg-¹	N			<0.20	<0.20	<0.20	
	gamma-Chlordane	5103742	mg kg-¹	N			<0.20	<0.20	<0.20	
	alpha-Chlordane	5103719	mg kg-¹	N			<0.20	<0.20	<0.20	
	Endosulfan I	959988	mg kg-¹	N			<0.20	<0.20	<0.20	
	4,4¹-DDE	72559	mg kg-¹	N			<0.20	<0.20	<0.20	

All tests undertaken between 23-Feb-2011 and 2-Mar-2011

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Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

FAO Kevin McGee

LABORATORY TEST REPORT

Chemtest

Results of analysis of 14 samples
received 22 February 2011

Report Date
02 March 2011

Cherry Cobb Sands

					122567							
					AF77705	AF77706	AF77707	AF77708	AF77709	AF77710	AF77711	AF77712
					TP2	TP3	TP6	TP8	TP11	TP11	TP11	TP12
					S1	S2	S1	S2	S1	S2	S3	S3
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					0m - 0.3m	1m	0m - 0.3m	1m	0.2m	0.5m	1.5m	1.2m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2840	Dieldrin	60571	mg kg^{-1}	N								
	Endrin	72208	mg kg^{-1}	N								
	4,4'-DDD	72548	mg kg^{-1}	N								
	Endosulfan II	33213659	mg kg^{-1}	N								
	4,4'-DDT	50293	mg kg^{-1}	N								
	Endrin aldehyde	7421934	mg kg^{-1}	N								
	Endosulfan sulfate	1031078	mg kg^{-1}	N								
	Methoxychlor	72435	mg kg^{-1}	N								
	Endrin ketone	53494705	mg kg^{-1}	N								
	Hexachlorobutadiene	87683	mg kg^{-1}	N								
2920	Phenols (total)		mg kg^{-1}	N	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	2.7	0.3
2010	pH			M	8.3	8.4	8.0	8.4	8.0	8.4	8.4	7.9
2030	Moisture		%	n/a	19.8	22.1	18.5	24.6	19.4	28.7	46.5	0.00
	Stones content (>50mm)		%	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2140	Soil colour			n/a	brown	brown	brown	brown	brown	brown	brown	brown
	Soil texture			n/a	sand	sand	sand	clay	sand	clay	sand	clay
	Other material			n/a	stones	stones	stones	stones	stones	stones	stones	stones
2186	Asbestos Containing Material			U					not found	not found	not found	presumed
2610	Loss on ignition		%	N	5.93	3.03	4.52	3.03	7	10.4	28.5	8.5

All tests undertaken between 23-Feb-2011 and 2-Mar-2011

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

LABORATORY TEST REPORT

Chemtest

Report Date
02 March 2011

Results of analysis of 14 samples
received 22 February 2011

FAO Kevin McGee

Cherry Cobb Sands

					122567					
					AF77713	AF77714	AF77715	AF77716	AF77717	AF77721
					TP12	TP14	TP1	TP7	TP13	TP12
					S4	S1	S1	S1	S1	B1
					16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011	16/2/2011
					1.9m	0.3m	0.3m	0.3m	0.3m	0.5m
					SOIL	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
2840	Dieldrin	60571	mg kg-¹	N			<0.20	<0.20	<0.20	
	Endrin	72208	mg kg-¹	N			<0.20	<0.20	<0.20	
	4,4¹-DDD	72548	mg kg-¹	N			<0.20	<0.20	<0.20	
	Endosulfan II	33213659	mg kg-¹	N			<0.20	<0.20	<0.20	
	4,4¹-DDT	50293	mg kg-¹	N			<0.20	<0.20	<0.20	
	Endrin aldehyde	7421934	mg kg-¹	N			<0.20	<0.20	<0.20	
	Endosulfan sulfate	1031078	mg kg-¹	N			<0.20	<0.20	<0.20	
	Methoxychlor	72435	mg kg-¹	N			<0.20	<0.20	<0.20	
	Endrin ketone	53494705	mg kg-¹	N			<0.20	<0.20	<0.20	
	Hexachlorobutadiene	87683	mg kg-¹	N			<0.20	<0.20	<0.20	
2920	Phenols (total)		mg kg-¹	N	0.3	<0.3				
2010	pH			M	7.7	8.3				
2030	Moisture		%	n/a	68	21.9	21.7	22.3	21.2	56.8
	Stones content (>50mm)		%	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2140	Soil colour			n/a	blue	brown	brown	brown	brown	brown
	Soil texture			n/a	sand	sand	sand	sand	sand	sand
	Other material			n/a	stones	stones	stones	stones	stones	stones
2186	Asbestos Containing Material			U						not found
2610	Loss on ignition		%	N	20.5	6.56				

All tests undertaken between 23-Feb-2011 and 2-Mar-2011

This report should be interpreted in conjunction with the notes on the accompanying cover page

Chemtest
The right chemistry to deliver results

Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

FAO Kevin McGee
03 March 2011

Dear Kevin McGee

Test Report Number **122568**
Your Project Reference **Cherry Cobb Sands**

Please find enclosed the results of analysis for the samples received 22 February 2011.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

Authorised Signatory

☑ Darrell Hall	Director
□ Phil Hellier	Director
□ Keith Jones	Technical Manager
□ John Crawford	Quality Manager
□ Malcolm Avis	Director

UKAS TESTING
2183

ISO 14001 sira UKAS ENVIRONMENTAL MANAGEMENT

Notes to accompany report:

- *The sign < means 'less than'*
- *Tests marked 'U' hold UKAS accreditation*
- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
- *n/e means 'not evaluated'*
- *i/s means 'insufficient sample'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

Test Report 122568 Cover Sheet

LABORATORY TEST REPORT

Waste Acceptance Criteria Waste Parameters

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL
FAO Kevin McGee

Results of analysis of 2 samples
received 22 February 2011
Cherry Cobb Sands

Report Date
03 March 2011

Login Batch No								122568
Chemtest LIMS ID					Limit values			AF77728
Sample ID				Inert waste landfill	Stable non-reactive hazardous waste in non-hazardous landfill	Hazardous waste landfill		TP11
Sample No								S4
Depth								1.5m
Matrix								*SOIL*
Determinand↓	SOP↓	*	CAS No↓	Units↓				
Total Organic Carbon	2625	M		%	3	5	6	8.7
Loss on ignition	2610	N		%			10	20.4
Benzene	2760	M	71432	µg kg-1				110
Toluene	2760	M	108883	µg kg-1				150
Ethyl benzene	2760	M	100414	µg kg-1				150
m- & p-Xylene	2760	U	1330207	µg kg-1				290
o-Xylene	2760	U	95476	µg kg-1				720
Total BTEX	2761	M		mg kg-1	6			0.84
PCB 28	2810	N	7012375	mg kg-1				<0.1
PCB 52	2810	N	35693993	mg kg-1				<0.1
PCB 101	2810	N	37680732	mg kg-1				<0.1
PCB 118	2810	N	31508006	mg kg-1				<0.1
PCB 138	2810	N	35065282	mg kg-1				<0.1
PCB 153	2810	N	35065271	mg kg-1				<0.1
PCB 180	2810	N	35065293	mg kg-1				<0.1
Total PCBs (7 congeners)	2811	N		mg kg-1	1			<1
Naphthalene	2700	M	91203	mg kg-1				
	2800	M	91203	mg kg-1				0.9
Acenaphthylene	2700	M	208968	mg kg-1				
	2800	N	208968	mg kg-1				0.6
Acenaphthene	2700	M	83329	mg kg-1				
	2800	M	83329	mg kg-1				<0.1
Fluorene	2700	M	86737	mg kg-1				
	2800	M	86737	mg kg-1				<0.1
Phenanthrene	2700	M	85018	mg kg-1				
	2800	M	85018	mg kg-1				<0.1
Anthracene	2700	M	120127	mg kg-1				
	2800	M	120127	mg kg-1				<0.1
Fluoranthene	2700	M	206440	mg kg-1				
	2800	M	206440	mg kg-1				<0.1
Pyrene	2700	M	129000	mg kg-1				
	2800	M	129000	mg kg-1				<0.1
Benzo[a]anthracene	2700	M	56553	mg kg-1				
	2800	M	56553	mg kg-1				<0.1
Chrysene	2700	M	218019	mg kg-1				
	2800	M	218019	mg kg-1				<0.1
Benzo[b]fluoranthene	2700	M	205992	mg kg-1				
	2800	M	205992	mg kg-1				<0.1

All tests undertaken between 23-Feb-2011 and 3-Mar-2011

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

LABORATORY TEST REPORT

Waste Acceptance Criteria Waste Parameters

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL
FAO Kevin McGee

Results of analysis of 2 samples
received 22 February 2011
Cherry Cobb Sands

Report Date
03 March 2011

Login Batch No								**122568**
Chemtest LIMS ID								AF77729
Sample ID								TP12
Sample No								B1
Depth								0.5m
Matrix								*SOIL*
Determinand↓	SOP↓		CAS No↓	Units↓				
Total Organic Carbon	2625	M		%	3	5	6	6.7
Loss on ignition	2610	N		%			10	11.1
Benzene	2760	M	71432	µg kg-1				< 1
Toluene	2760	M	108883	µg kg-1				3.3
Ethyl benzene	2760	M	100414	µg kg-1				< 1
m- & p-Xylene	2760	U	1330207	µg kg-1				5.4
o-Xylene	2760	U	95476	µg kg-1				< 1
Total BTEX	2761	M		mg kg-1	6			0.0053
PCB 28	2810	N	7012375	mg kg-1				<0.1
PCB 52	2810	N	35693993	mg kg-1				<0.1
PCB 101	2810	N	37680732	mg kg-1				<0.1
PCB 118	2810	N	31508006	mg kg-1				<0.1
PCB 138	2810	N	35065282	mg kg-1				<0.1
PCB 153	2810	N	35065271	mg kg-1				<0.1
PCB 180	2810	N	35065293	mg kg-1				<0.1
Total PCBs (7 congeners)	2811	N		mg kg-1	1			<1
Naphthalene	2700	M	91203	mg kg-1				0.6
	2800	M	91203	mg kg-1				
Acenaphthylene	2700	M	208968	mg kg-1				<0.1
	2800	N	208968	mg kg-1				
Acenaphthene	2700	M	83329	mg kg-1				<0.1
	2800	M	83329	mg kg-1				
Fluorene	2700	M	86737	mg kg-1				<0.1
	2800	M	86737	mg kg-1				
Phenanthrene	2700	M	85018	mg kg-1				0.5
	2800	M	85018	mg kg-1				
Anthracene	2700	M	120127	mg kg-1				<0.1
	2800	M	120127	mg kg-1				
Fluoranthene	2700	M	206440	mg kg-1				1.3
	2800	M	206440	mg kg-1				
Pyrene	2700	M	129000	mg kg-1				0.6
	2800	M	129000	mg kg-1				
Benzo[a]anthracene	2700	M	56553	mg kg-1				1.2
	2800	M	56553	mg kg-1				
Chrysene	2700	M	218019	mg kg-1				0.8
	2800	M	218019	mg kg-1				
Benzo[b]fluoranthene	2700	M	205992	mg kg-1				0.5
	2800	M	205992	mg kg-1				

All tests undertaken between 23-Feb-2011 and 3-Mar-2011

This report should be interpreted in conjunction with the notes on the accompanying cover page

LABORATORY TEST REPORT

Waste Acceptance Criteria Waste Parameters

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL
FAO Kevin McGee

Results of analysis of 2 samples
received 22 February 2011
Cherry Cobb Sands

Report Date
03 March 2011

								122568
								AF77728
								TP11
								S4
								1.5m
								SOIL
Benzo[k]fluoranthene	2700	M	207089	mg kg^{-1}				
	2800	N	207089	mg kg^{-1}				<0.1
Benzo[a]pyrene	2700	M	50328	mg kg^{-1}				
	2800	M	50328	mg kg^{-1}				<0.1
Dibenzo[a,h]anthracene	2700	M	53703	mg kg^{-1}				
	2800	N	53703	mg kg^{-1}				<0.1
Indeno[1,2,3-cd]pyrene	2700	M	193395	mg kg^{-1}				
	2800	M	193395	mg kg^{-1}				<0.1
Benzo[g,h,i]perylene	2700	M	191242	mg kg^{-1}				
	2800	M	191242	mg kg^{-1}				<0.1
Coronene	2700	N	191071	mg kg^{-1}				
Total (of 17) PAHs	2700	N		mg kg^{-1}	100			
Total (of 16) PAHs	2800	N		mg kg^{-1}				<2
pH	2010	M				>6		8.3
Acid Neutralisation Capacity	2015	N	ANC	mol kg^{-1}		To evaluate	To evaluate	0.038
Coronene by MS	2800	N	191071	mg kg^{-1}				<0.1
TPH Total WAC	2670	M		mg kg^{-1}	500			10000

All tests undertaken between 23-Feb-2011 and 3-Mar-2011

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LABORATORY TEST REPORT

Waste Acceptance Criteria Waste Parameters

Delta Simons
The Lawn
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LN1 3BL
FAO Kevin McGee

Results of analysis of 2 samples
received 22 February 2011
Cherry Cobb Sands

Report Date
03 March 2011

								122568
								AF77729
								TP12
								B1
								0.5m
								SOIL
Benzo[k]fluoranthene	2700	M	207089	mg kg-1				0.6
	2800	N	207089	mg kg-1				
Benzo[a]pyrene	2700	M	50328	mg kg-1				0.3
	2800	M	50328	mg kg-1				
Dibenzo[a,h]anthracene	2700	M	53703	mg kg-1				0.6
	2800	N	53703	mg kg-1				
Indeno[1,2,3-cd]pyrene	2700	M	193395	mg kg-1				0.2
	2800	M	193395	mg kg-1				
Benzo[g,h,i]perylene	2700	M	191242	mg kg-1				0.2
	2800	M	191242	mg kg-1				
Coronene	2700	N	191071	mg kg-1				<0.1
Total (of 17) PAHs	2700	N		mg kg-1	100			7.2
Total (of 16) PAHs	2800	N		mg kg-1				
pH	2010	M				>6		8.3
Acid Neutralisation Capacity	2015	N	ANC	mol kg-1		To evaluate	To evaluate	0.049
Coronene by MS	2800	N	191071	mg kg-1				
TPH Total WAC	2670	M		mg kg-1	500			230

All tests undertaken between 23-Feb-2011 and 3-Mar-2011

This report should be interpreted in conjunction with the notes on the accompanying cover page

Chemtest

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LABORATORY TEST REPORT

Waste Acceptance Criteria BS EN 12457 Part 3 2 Stage

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL
FAO Kevin McGee

Results of analysis of 2 samples
received 22 February 2011
Cherry Cobb Sands

Report Date
03 March 2011

Login Batch No								**122568**
Chemtest LIMS ID						Limit values		AF77730
Sample ID					Inert waste landfill	Stable non-reactive hazardous waste in non-hazardous landfill	Hazardous waste landfill	TP11
Sample No								S4
Depth								1.5m
Matrix								*LEACHATE*
Determinand↓	SOP↓	*	CAS No↓	Units↓				
As (arsenic) L/S=2	1450	N	7440382	mg kg-¹				<0.05
Ba (barium) L/S=2	1450	N	7440393	mg kg-¹				<0.5
Cd (cadmium) L/S=2	1450	N	7440439	mg kg-¹				<0.01
Cr (chromium) L/S=2	1450	N	7440473	mg kg-¹				<0.05
Cu (copper) L/S=2	1450	N	7440508	mg kg-¹				0.09
Hg (mercury) L/S=2	1450	N	7439976	mg kg-¹				<0.005
Mo (molybdenum) L/S=2	1450	N	7439987	mg kg-¹				0.2
Ni (nickel) L/S=2	1450	N	7440020	mg kg-¹				<0.05
Pb (lead) L/S=2	1450	N	7439921	mg kg-¹				<0.05
Sb (antimony) L/S=2	1450	N	7440360	mg kg-¹				0.05
Se (selenium) L/S=2	1450	N	7782492	mg kg-¹				0.02
Zn (zinc) L/S=2	1450	N	7440666	mg kg-¹				<0.5
Cl (chloride) L/S=2	1220	N	16887006	mg kg-¹				720
F (fluoride) L/S=2	1220	N	16984488	mg kg-¹				<1
SO4 (sulfate) L/S=2	1220	N	14808798	mg kg-¹				1040
Total Dissolved Solids L/S=2	1610	N	TDS	mg kg-¹				3400
Phenol index L/S=2	1920	N	108952	mg kg-¹				<0.5
Dissolved Organic Carbon L/S=2	1610	N	DOC	mg kg-¹				320
As (arsenic) L/S=10	1450	N	7440382	mg kg-¹	0.5	2	25	0.06
Ba (barium) L/S=10	1450	N	7440393	mg kg-¹	20	100	300	<0.5
Cd (cadmium) L/S=10	1450	N	7440439	mg kg-¹	0.04	1	5	<0.01
Cr (chromium) L/S=10	1450	N	7440473	mg kg-¹	0.5	10	70	0.08
Cu (copper) L/S=10	1450	N	7440508	mg kg-¹	2	50	100	0.17
Hg (mercury) L/S=10	1450	N	7439976	mg kg-¹	0.01	0.2	2	<0.005
Mo (molybdenum) L/S=10	1450	N	7439987	mg kg-¹	0.5	10	30	0.35
Ni (nickel) L/S=10	1450	N	7440020	mg kg-¹	0.4	10	40	0.07
Pb (lead) L/S=10	1450	N	7439921	mg kg-¹	0.5	10	50	0.06
Sb (antimony) L/S=10	1450	N	7440360	mg kg-¹	0.06	0.7	5	0.08
Se (selenium) L/S=10	1450	N	7782492	mg kg-¹	0.1	0.5	7	0.03
Zn (zinc) L/S=10	1450	N	7440666	mg kg-¹	4	50	200	<0.5
Cl (chloride) L/S=10	1220	N	16887006	mg kg-¹	800	15000	25000	1130
F (fluoride) L/S=10	1220	N	16984488	mg kg-¹	10	150	500	1.49
SO4 (sulfate) L/S=10	1220	N	14808798	mg kg-¹	1000	20000	50000	1940
Total Dissolved Solids L/S=10	1610	N	TDS	mg kg-¹	4000	60000	100000	7220
Phenol index L/S=10	1920	N	108952	mg kg-¹	1			<0.5
Dissolved Organic Carbon L/S=10	1610	N	DOC	mg kg-¹	500	800	1000	1050

All tests undertaken between 23-Feb-2011 and 3-Mar-2011

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

LABORATORY TEST REPORT

Waste Acceptance Criteria BS EN 12457 Part 3 2 Stage

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL
FAO Kevin McGee

Results of analysis of 2 samples
received 22 February 2011
Cherry Cobb Sands

Report Date
03 March 2011

Login Batch No								**122568**
Chemtest LIMS ID								AF77731
Sample ID								TP12
Sample No								B1
Depth								0.5m
Matrix								*LEACHATE*
Determinand↓	SOP↓		CAS No↓	Units↓				
As (arsenic) L/S=2	1450	N	7440382	mg kg-1				<0.05
Ba (barium) L/S=2	1450	N	7440393	mg kg-1				<0.5
Cd (cadmium) L/S=2	1450	N	7440439	mg kg-1				<0.01
Cr (chromium) L/S=2	1450	N	7440473	mg kg-1				<0.05
Cu (copper) L/S=2	1450	N	7440508	mg kg-1				0.08
Hg (mercury) L/S=2	1450	N	7439976	mg kg-1				<0.005
Mo (molybdenum) L/S=2	1450	N	7439987	mg kg-1				0.88
Ni (nickel) L/S=2	1450	N	7440020	mg kg-1				0.05
Pb (lead) L/S=2	1450	N	7439921	mg kg-1				<0.05
Sb (antimony) L/S=2	1450	N	7440360	mg kg-1				0.07
Se (selenium) L/S=2	1450	N	7782492	mg kg-1				0.02
Zn (zinc) L/S=2	1450	N	7440666	mg kg-1				<0.5
Cl (chloride) L/S=2	1220	N	16887006	mg kg-1				1140
F (fluoride) L/S=2	1220	N	16984488	mg kg-1				<1
SO4 (sulfate) L/S=2	1220	N	14808798	mg kg-1				1890
Total Dissolved Solids L/S=2	1610	N	TDS	mg kg-1				4610
Phenol index L/S=2	1920	N	108952	mg kg-1				<0.5
Dissolved Organic Carbon L/S=2	1610	N	DOC	mg kg-1				<50
As (arsenic) L/S=10	1450	N	7440382	mg kg-1	0.5	2	25	<0.05
Ba (barium) L/S=10	1450	N	7440393	mg kg-1	20	100	300	<0.5
Cd (cadmium) L/S=10	1450	N	7440439	mg kg-1	0.04	1	5	<0.01
Cr (chromium) L/S=10	1450	N	7440473	mg kg-1	0.5	10	70	0.08
Cu (copper) L/S=10	1450	N	7440508	mg kg-1	2	50	100	0.13
Hg (mercury) L/S=10	1450	N	7439976	mg kg-1	0.01	0.2	2	<0.005
Mo (molybdenum) L/S=10	1450	N	7439987	mg kg-1	0.5	10	30	1.3
Ni (nickel) L/S=10	1450	N	7440020	mg kg-1	0.4	10	40	0.1
Pb (lead) L/S=10	1450	N	7439921	mg kg-1	0.5	10	50	<0.05
Sb (antimony) L/S=10	1450	N	7440360	mg kg-1	0.06	0.7	5	0.11
Se (selenium) L/S=10	1450	N	7782492	mg kg-1	0.1	0.5	7	0.03
Zn (zinc) L/S=10	1450	N	7440666	mg kg-1	4	50	200	<0.5
Cl (chloride) L/S=10	1220	N	16887006	mg kg-1	800	15000	25000	1850
F (fluoride) L/S=10	1220	N	16984488	mg kg-1	10	150	500	2.29
SO4 (sulfate) L/S=10	1220	N	14808798	mg kg-1	1000	20000	50000	3280
Total Dissolved Solids L/S=10	1610	N	TDS	mg kg-1	4000	60000	100000	9450
Phenol index L/S=10	1920	N	108952	mg kg-1	1			<0.5
Dissolved Organic Carbon L/S=10	1610	N	DOC	mg kg-1	500	800	1000	121

All tests undertaken between 23-Feb-2011 and 3-Mar-2011

Report sample ID range AF77728 to AF77731

This report should be interpreted in conjunction with the notes on the accompanying cover page

Chemtest
The right chemistry to deliver results

Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

FAO Kevin McGee
03 March 2011

Dear Kevin McGee

Test Report Number **58575**
Your Project Reference **Cherry Cobb Sands**

Please find enclosed the results of analysis for the samples received 23 February 2011.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

Authorised Signatory

☐ Darrell Hall	Director
☑ Phil Hellier	Director
☐ Keith Jones	Technical Manager
☐ John Crawford	Quality Manager
☐ Malcolm Avis	Director

UKAS TESTING 2183

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

ISO 14001 sira UKAS ENVIRONMENTAL MANAGEMENT

Notes to accompany report:

- *The sign < means 'less than'*
- *Tests marked 'U' hold UKAS accreditation*
- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
- *n/e means 'not evaluated'*
- *i/s means 'insufficient sample'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are outside of the scope of UKAS accreditation*
- *The results relate only to the items tested*
- *Stones represent the quantity of material removed prior to analysis*
- *All results are expressed on a dry weight basis*
- *The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, phenols*
- *For all other tests the samples were dried at < 37°C prior to analysis*
- *Uncertainties of measurement for the determinands tested are available upon request*
- *Soil descriptions, including colour and texture, are beyond the scope of MCertS accreditation*
- *None of the test results included in this report have been recovery corrected*

Test Report 58575 Cover Sheet

Delta Simons
The Lawn
Union Road
Lincoln
LN1 3BL

FAO Kevin McGee

LABORATORY TEST REPORT

Results of analysis of 8 samples received 23 February 2011

Cherry Cobb Sands

Report Date
03 March 2011

Login Batch No					**58575**							
Chemtest LIMS ID					AF78355	AF78356	AF78357	AF78358	AF78359	AF78360	AF78361	AF78362
Sample ID					TP2	TP4	TP6	TP12	TP10	TP9	TP14	TP13
Sample No												
Sampling Date					22/2/2011	22/2/2011	22/2/2011	22/2/2011	22/2/2011	22/2/2011	22/2/2011	22/2/2011
Depth					1.0m	2.0m	1.0m	0.0m - 0.3m	0.0m - 0.4m	3.0m	3.0m	1.0m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*								
2220	Chloride (extractable)	16887006	g l-¹	M	0.033	0.049	0.027	0.011	<0.010	0.24	0.33	1.2
2430	Sulfate (total) by BS1377 (HCl extract)	14808798	%	M	0.22	0.21	0.14	0.20	0.13	0.13	0.16	0.21
2010	pH			M	8.6	8.5	8.6	8.2	8.2	8.5	8.7	8.7
2030	Moisture		%	n/a	21	24.1	21.2	23.5	23.7	19.8	21.9	23.5
	Stones content (>50mm)		%	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
2140	Soil colour			n/a	brown	brown	brown	brown	brown	brown	brown	brown
	Soil texture			n/a	sand	clay	sand	sand	sand	clay	sand	sand
	Other material			n/a	stones	stones	stones	stones	stones	stones	stones	stones

All tests undertaken between 24-Feb-2011 and 1-Mar-2011

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

Appendix VIII

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A different perspective

Point ID	East	North	Elevation	Notes
BH1	522878.582	420090.347	3.247	Borehole Lid
BH1GL	522878.493	420090.141	2.897	Borehole Ground Level
CPT1	523320.350	419220.405	2.562	
CPT2	522990.565	419875.802	2.537	
CPT3	522602.646	419783.414	2.475	
CPT4	522869.657	420088.881	2.592	
CPT5	522631.104	420576.685	2.612	
CPT6	522435.403	420925.884	2.619	
CPT7	521800.119	420856.032	2.667	
CPT8	522056.019	421134.567	3.160	
CPT9	522237.218	421334.246	3.189	
CPT10	521940.108	421660.431	2.672	
CPT11	521650.584	421980.132	2.492	
CPT12	521559.718	422098.302	2.752	
TP1	522919.763	419451.041	2.623	
TP2	522991.241	419877.390	2.553	
TP3	522603.998	419785.055	2.521	
TP4	522861.284	420066.666	2.395	
TP5	522626.283	420567.996	2.742	
TP6	522270.126	420181.714	2.273	
TP7	522449.547	420930.078	2.853	
TP8	521987.615	421086.810	2.358	
TP9	521658.101	421367.916	2.356	
TP10	521929.114	421660.301	2.510	
TP11	521330.446	421593.767	2.538	
TP12	521304.341	421543.827	2.489	
TP13	521298.923	421613.423	2.531	
TP14	521406.141	421923.639	2.660	

delta-simons
environmental consultants

TITLE:
Exploratory Hole Co-ordinates and Levels
Cherry Cobb Sands

DWN: KDM

PROJECT NO.: 10-2041.01

DATE: Mar 2011

FIGURE NO.: App VIII