Steve Hopkins
Engineering Geologist
CEMEX
CEMEX House
Evreux Way
Rugby
CV21 2DT

70030744-R001-Cromwell-Report

18 December 2017

Dear Steve

Cromwell North (Proposed) Quarry

Please find attached all information relating to the works carried out at the proposed quarry site near Cromwell.

The site works were undertaken in April 2017 by Geotechnics Ltd under the supervision of WSP. Eleven Static Piezocone Penetration Tests (CPTU) were undertaken across the site. Fifteen boreholes and eight trial pits were completed. Twenty one soil samples were scheduled for Particle Size Distribution.

WSP were also asked to comment on third party shallow soil chemical analysis data; a copy of our response is also attached.

[redacted]

Will Alfaway
Senior Geo-Environmental Consultant

Encl.
CPT Report
Exploratory Hole Logs
Exploratory Hole Plan
Letter 70030744-L01 – dated 09 May 2017
Particle Size Distribution Results

1 Queens Drive
Birmingham, West Midlands
B5 4PJ
Tel: +44 121 352 4700
Tel: +44 121 352 4701
wsp.com

480000E
480250E
480500E
480750E
481000E
481250E
363250N
363000N
362750N
362500N
362250N

CP01/17(WM)
50mm GW Installation
Plain and bentonite seal: 0-2.8m
Slotted and gravel pack: 2.8-7.5m
Soils & clay (OB): 2.80m
Sand and gravel (MIN): 4.70m

CP07/17
Soils & clay (OB): 2.50m
Sand and gravel (MIN): 4.00m

TP01/17
Soils and Clay (OB): 1.80m
(end within overburden)

CPT01/17
Soils & clay (OB): 2.65m
Sand and gravel (MIN): 4.05m

CP02/17(WM)
50mm GW Installation
Plain and bentonite seal: 0-2.8m
Slotted and gravel pack: 2.8-7.5m
Soils & clay (OB): 3.20m
Sand and gravel (MIN): 1.80m

CP08/17
Soils & clay (OB): 2.20m
Fine-medium sand (OB): 1.10m
Sand and gravel (MIN): 3.30m

TP02/17
Soils and Clay (OB): 0.60m
Sand and Gravel: 1.90m_

CPT02/17
Soils & clay (OB): 3.60m
Sand and gravel (MIN): 4.30m

TP03/17
Soils and Clay (OB): 2.10m
Sand and Gravel: 1.40m_

CP03/17(WM)
50mm GW Installation
Plain and bentonite seal: 0-2.2m
Slotted and gravel pack: 2.2-6.0m
Soils & clay (OB): 2.20m
Sand and gravel (MIN): 3.80m

CP09/17
Soils & clay (OB): 1.40m
Sand and gravel (MIN): 2.30m

CP04/17 (WM)
50mm GW Installation
Plain and bentonite seal: 0-4.6m
Slotted and gravel pack: 4.6-10.0m
Soils & clay (OB): 4.60m
Sand and gravel (MIN): 2.70m

CPT03/17
Soils & clay (OB): 2.20m
Sand and gravel (MIN): 4.40m_

CP10/17
Soils & clay (OB): 2.00m
Fine-medium sand (OB): 1.20m
Sand and gravel (MIN): 5.00m

TP04/17
Soils and Clay (OB): 2.80m
Sand and Gravel: 0.70m_

CP05/17 (WM)
50mm GW Installation
Plain and bentonite seal: 0-3.2m
Slotted and gravel pack: 3.2-10.0m
Soils & clay (OB): 1.80m
Fine-medium sand (OB): 1.40m
Sand and gravel (MIN): 6.30m

CPT04/17
Soils & clay (OB): 3.10m
Sand and gravel (MIN): 3.60m

CPT05/17 CPT05A/17
Soils & clay (OB): 2.70m
Sand and gravel (MIN): 5.00m
Soils & clay (OB): 3.00m
Sand and gravel (MIN): 0.22m_

TP05/17
Soils and Clay (OB): 2.30m
Sand and Gravel: 1.30m_

TP06/17
Soils and Clay (OB): 1.20m
Sand and Gravel: 1.50m_

CPT06/17
Soils & clay (OB): 2.60m
Sand and gravel (MIN): 3.50m_

CP11/17
Soils & clay (OB): 2.00m
Sand and gravel (MIN): 6.10m

CP12/17
Soils & clay (OB): 1.70m
Fine-medium sand (OB): 0.80m
Sand and gravel (MIN): 4.30m

CP13/17
Soils & clay (OB): 4.90m
Sand and gravel (MIN): 2.40m

CP15/17 (WM)
50mm GW Installation
Plain and bentonite seal: 0.0-2.5m
Slotted and gravel pack: 2.5-7.7m
Soils & clay (OB): 0.80m
Sand and gravel (MIN): 6.90m

CPT07/17
Soils & clay (OB): 3.20m
Sand and gravel (MIN): 5.00m

TP07/17
Soils and Clay (OB): 2.10m
Sand and Gravel: 0.20m_

CPT08/17
Soils & clay (OB): 3.50m
Sand and gravel (MIN): 3.90m

CPT09/17
Soils & clay (OB): 2.90m
Sand and gravel (MIN): 0.50m_

TP08/17
Soils and Clay (OB): 2.20m
Sand and Gravel: 1.00m_

CP14/17
Soils & clay (OB): 3.00m
Sand and gravel (MIN): 5.90m

CP06/17
Soils & clay (OB): 1.80m
Sand and gravel (MIN): 5.80m

CPT10/17
Soils & clay (OB): 2.40m
Sand and gravel (MIN): 3.60m

Legend and Notes

- Area under CEMEX's control
- CP Borehole Location - Installed with monitoring standpipe
- CP Borehole Location - Backfilled on completion
- Cone Penetration Test Location
- Trial Pit Location

Models	Plotted from: 1701-S016 FINAL EXPLORATORY HOLE LOCATIONS.LSS
	Overlay 1: 2015 Aerial Photography
	Overlay 2: 1701-S002 Green Line Boundary
	Overlay 3:

CEMEX

National Reserves Department
CEMEX UK Operations Limited
Rugby House, Evreux Way
Rugby, Warwickshire
CV21 2DT
Telephone 01788 517000
Facsimile N/A

Drawn By: Steven Hopkins	Company:
Date: 30.August.2017	Site: Cromwell North
Scale(S): 1:5000 (A3)	Project: Ground Investigation
Checked / Approved by: SLH	Title: Exploratory Hole Plan
OS Ref.: NY0778	Drawing No.: 1701-S016-CRN-D-201

IN SITU
SITE INVESTIGATION

STATIC CONE PENETRATION TEST

FACTUAL REPORT

CLIENT GEOTECHNICS

PROJECT NEWARK

Project	**Newark**
Project No.	**1170175**
Client	**Geotechnics Limited**
Address	**The Geotechnical Centre, 203 Torrington Avenue, Tile Hill, Coventry, CV4 9AP**

Attention: Mr Steven Chapman

Dear Mr Chapman,

We have pleasure in providing a digital copy of our report and data in AGS format for the above project.

We hope that you are satisfied with the performance of our staff, equipment and reporting on this project. If you should have any queries about any aspect of the works carried out, please do not hesitate to contact us. We look forward to being of service to you in the future.

Yours faithfully,
In Situ Site Investigation Limited

Darren Ward
Director

Report Issue

Issue	Date	Description	Prepared	Sign	Checked	Sign
01	21/03/2017	Final	Rachel Cleaver	RC	Darren Ward	

Table of Contents

1.0 INTRODUCTION

In Situ Site Investigation Limited (In Situ) was engaged in a geotechnical site investigation at Newark on behalf of Geotechnics Limited (the client). The site investigation consisted of completing *11 Static Piezocone Penetration Tests (CPTU)* to provide information on the soil conditions and derived geotechnical parameters at:

Newark
NG23 6JF

All test locations were provided by the client, as shown on the site map, in *Appendix A.1*. The tests were stopped when they reached the target depth as per the client's technical specifications or for other technical reasons, as detailed in *Appendix A.2* and on each CPTU log.

The fieldwork was carried out on 16/03/2017 as per the client's request.

The work on site and the final factual reporting have been undertaken in accordance with the international technical standard *BS EN ISO 22475-1:2012*.

2.0 FIELDWORK

2.1 CONE PENETRATION TESTS

The fieldwork activity is summarised in Table 2.1.

Table 2.1 Fieldwork Summary	
CPT Operator/s	Ben Bilsbrough
Date Started	16/03/17
Date Finished	16/03/17
In Situ S.I. Project Manager	Darren Ward
Main Contractor's Site Manager	Ed Smith

2.1.1 Rig Information

Details of CPTU rig used in this project are shown in Table 2.2. Full data sheet for the rig is presented in *Appendix A.3*.

Table 2.2 Rig Summary	
Rig Name	**Rig Description**
CPT 006	14 Tonne tracked rig

2.1.2 CPTU Cone

Details of electric CPTU cone (Type TE2) used in this project conforming to the requirements of Application Class 2 of *ISO 22476-1:2012*, are shown in Table 2.3.

Table 2.3 Cone Summary		
Number	**Cross-section area**	**Filter position**
S15-CFIIP.1486	15cm^2	u_2

A full datasheet of the cone used is shown in *Appendix A.4*.

The cone's measured parameters are shown in Table 2.4.

Table 2.4 Completed Fieldwork Summary
11 CPTU to a maximum depth of 8.80m. Each test measured Cone Resistance, q_c, Sleeve Friction, f_s, Porewater Pressure in the shoulder position, u_2, Inclination in X and Y axes.
Provision of factual report with estimated soil type, derived geotechnical parameters and AGS data.

2.1.3 CPTU Cone Calibration

The cone resistance and sleeve friction are recorded by calibrated load cells in the cone. The CPTU load cells and pressure transducers are regularly calibrated in line with *ISO 22476-1:2012* standard by the cone manufacturer. The cone calibration certificate for the cone used at this site are presented in *Appendix A.5*.

2.1.4 CPTU Cone Saturation

The pore water pressure is recorded using a calibrated pressure transducer located in the piezocone. To ensure pore water pressure measurements are not affected by the presence of air in the measuring transducer, a de-airing procedure is carried out prior to each test. The cone and filter are saturated using a glycerine fluid with a viscosity of 10,000CST.

2.1.5 Test Procedure

The tests are carried out in accordance with the *International Standard for Electrical Cone and Piezocone Penetration Test (ISO 22476-1:2012)*.

The final depths of the tests were determined by either completion to the specified test depth or when the maximal safe capacity of the equipment was reached. A schedule of the tests performed is shown in *Appendix A.2*, which has been compiled from the operators' daily progress reports.

The data is transmitted from the digital CPTU through an umbilical cable that runs through the push rods to the data acquisition system. Results are displayed instantaneously on the computer logging screen. The results are recorded on the computer hard disc.

The rate of penetration is kept constant at 2cm/s ±10% except when penetrating very dense or hard strata. Before each test is carried out zero values are taken of the cone to check if it is within calibration. At the end of each test, zero values are taken again to see if there has been any drift during the test. These values are inspected during the post processing stage. This is a quality check on the data and the testing procedure. Individual test zero values are shown on their corresponding test results in *Appendix B* and *C*.

2.1.6 *In Situ Pore Pressure (u_0)*

The in situ or hydrostatic pore pressure is required for the calculation of several derived parameters included in this report. These values are presented on the pore pressure plot, *Form 01*, which is included in *Appendix B*. For this report, the values were estimated by our client.

2.2 POSITIONING

Positioning and surveying of all investigated locations was the responsibility of the client. The site map and position of the tests are presented in *Appendix A.1*

3.0 CONE PENETRATION MEASURED PARAMETERS

All measured parameters of tests carried with the CPTU cone are shown in *Appendix B* and all the information about data processing and results are given in sections *3.1*, *3.2* and *3.3*.

3.1 DATA PROCESSING

The measured parameters, cone end resistance, q_c, sleeve friction, f_s, porewater pressure measurements with filter in shoulder position, u_2 and inclination for *x* and *y* axis, I_x, I_y, were recorded for every *10 mm* of penetration keeping a constant speed of *20 mm/s ± 5 mm/s*, which may slightly change when the cone is penetrating hard strata.

The measured data from the site works is processed and presented using specialised CPT software. The interpretations on the CPTU results were carried out following the recommendations of *Lunne et al. (1997)*, *Robertson (2015)* and *BS EN ISO 22475-1:2012.* Measured parameters, mentioned in *Sections 3.2* and *3.3*, were used to derive all the geotechnical parameters, which are presented in *Chapter 4.0*. The soil behaviour type method used on this report is *Robertson et al (1986)*, shown in *Figure 3.2*.

3.1.1 Zero Measurements

Before and after each CPTU test, zero measurements are recorded for each channel of the cone. The zero measurements are presented on the logs in *Appendix B* and *C*. This is a routine quality check carried out on site.

3.2 MEASURED PARAMETERS

3.2.1 Cone Resistance (q_c)

Cone resistance, q_c, is measured as the total force acting on the cone, divided by the projected area of the cone. The results are presented in *MPa*, on *Log 01*, in *Appendix B*, scale *0-20 MPa* with a minor scale printing on the same graph at *0-4 MPa*.

3.2.2 Sleeve Friction (f_s)

Sleeve friction, f_s, is measured as the total frictional force acting on the friction sleeve divided by its surface area. The results are presented in *kPa*, on *Log 01*, in *Appendix B*, using a scale of *0-500 kPa*.

3.2.3 Porewater pressure (u_2)

The pore pressure, u_2, is measured during the test. If the material is free draining and saturation is maintained it will normally measure hydrostatic pore pressure. In materials that are not free draining, it will record the total pore pressure (hydrostatic plus any excess pore pressures generated) created by the cone penetration through this material.

The filter element can be mounted in one of three positions. For all tests carried out in this project the filter was mounted in the u_2 position (see *Figure 3.1*).

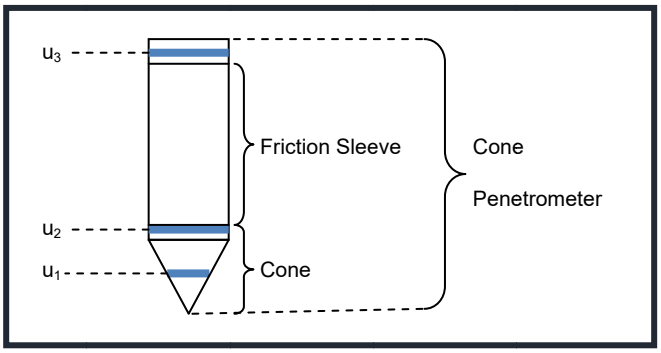

Figure 3.1: *Diagram showing pore pressure filter locations (after Lunne et al., 1997)*

3.2.4 Inclination (I_x, I_y)

The CPT rig was set up to obtain a thrust direction as near as possible to vertical. The CPTU cones have inclinometers incorporated to measure the non-verticality of the test. For test depths less than *15 m*, significant non-verticality is unusual, provided the initial thrust direction is vertical.

3.3 ESTIMATED SOIL BEHAVIOUR TYPE

3.3.1 Friction Ratio (R_f)

The friction ratio, R_f is the ratio between the sleeve friction and the cone resistance (Lunne *et al.,* 1997).

$$Fricton\ Ratio\ (R_f) = \left(\frac{Sleeve\ Friction\ (f_s)}{Cone\ Resistance\ (q_c)}\right) \times 100$$

3.3.2 Estimated Soil Behaviour Type (SBT)

The estimation of soil behaviour type, *SBT*, using measurements of cone resistance and sleeve friction is based upon the variations of the friction ratio and cone resistance. The

friction ratio varies depending upon whether the soil is cohesive or granular. The cone resistance varies depending on the strength and densities of the soil.

The interpretation used in this report is *Robertson et. al. (1986)*, which is shown in Figure 3.2. The results are presented on *Log 01*, in *Appendix B*.

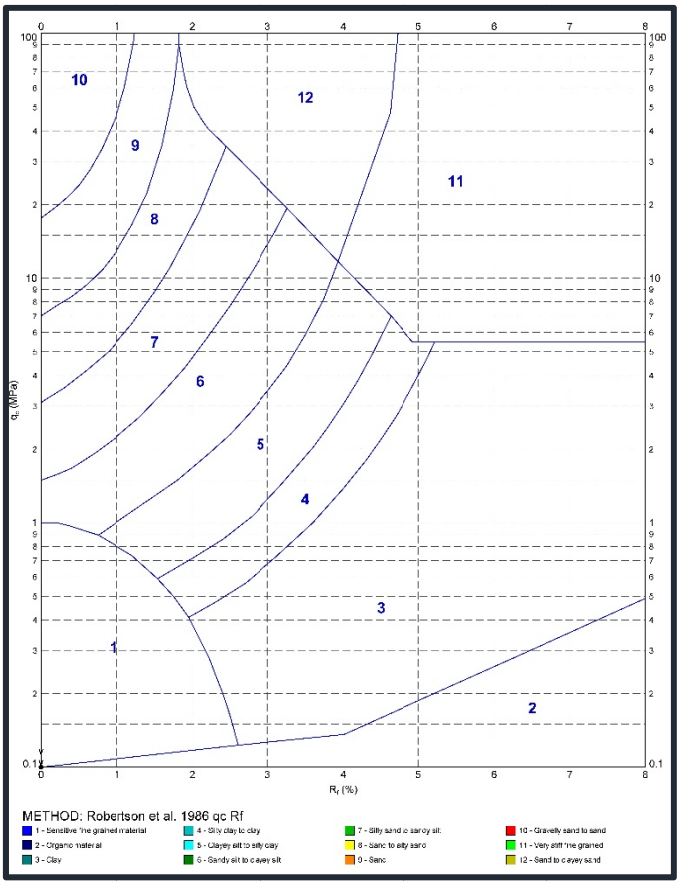

Figure 3.2: *Robertson et al., 1986 soil behaviour type chart.*

3.3.3 Pore Pressure Ratio (B_q)

Pore pressure ratio, B_q is the ratio between the measured pore pressure generated during penetration and the corrected cone resistance minus the total overburden stress.

Pore pressure ratio as defined by *Senneset and Janbu (1985)* is defined as:

$$B_q = \frac{u_2 - u_0}{q_t - \sigma_{vo}}$$

where

u_2	is pore pressure measured between the cone and the friction sleeve
u_0	is equilibrium pore pressure
σ_{vo}	is total overburden stress
q_t	is cone resistance corrected for unequal end area effects

3.4 APPLIED CORRECTIONS

3.4.1 Corrected Cone Resistance (q_t)

For each penetration test, the measured cone resistance, q_c, can be corrected for the ''unequal area effect'' due to the influence of the ambient pore water pressure acting on the cone.

The correction has been applied using the following equation by Lunne et *al.,* 1997:

$$q_t = q_c + [u_2.(1 - \alpha)]$$

where

α is the cone area ratio

The cone used on this project has a cone area ratio of *0.79*. This value is geometrically measured.

3.4.2 Depth Correction

All tests in the report have been corrected for depth difference caused by inclination. This has been calculated using the method described in *ISO 22476-1:2012*.

To calculate the corrected depth the following formula is used:

$$z = \int_0^l C_{inc} \cdot dl$$

where

z is penetration depth, in *m*
l is penetration length, in *m*
C_{inc} is correction factor for the effect of the inclination of the CPTU relative to the vertical axis.

The equation for calculating the correction factor for the influence of the inclination for a bi-axial inclinometer is:

$$C_{inc} = \frac{1}{\sqrt{(1 + tan^2\beta_1 + tan^2\beta_2}}$$

where

β_1 is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane, in degrees
β_2 is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane that is perpendicular to the plane of angle β_1, in degrees

4.0 GEOTECHNICAL DERIVED PARAMETERS

A number of empirical correlations can be used to derive geotechnical parameters from CPTU data. This report includes only the parameters which are described in this chapter. The results of all correlations used to obtain the geotechnical derived parameters are presented on *Log 02* and *Log 03* in *Appendix C*.

Please note that each empirical correlation is derived for a certain type of soil, and may not be appropriate for all the soil types encountered on this project.

4.1 SOIL BEHAVIOUR TYPE INDEX (I_c)

The soil behaviour type index, I_c, was derived by *Jefferies and Davies (1991)*, and was created to simplify the application of CPTU SBT chart shown in *Chapter 3*, *Figure 3.2*. This approach has been modified for use with the *Robertson (1990)* normalised CPT soil classification chart, *Figure 4.1*. The normalised cone parameters Q_t and F_r (for definitions see *Appendix A6* Symbol List) can be combined into one Soil Behaviour Type Index, I_c, `*(Lunne et al., 1997)*.

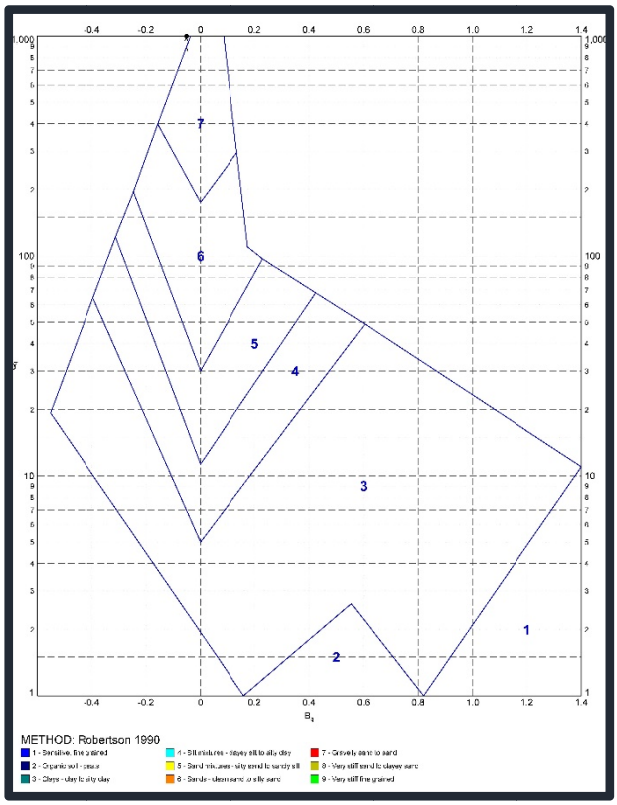

Figure 4.1: *Robertson 1990 soil behaviour type chart.*

The soil behaviour type index, I_c, can then be defined using *Robertson (2010)* formula, given below:

$$I_c = ((3.47 - logQ_t)^2 + (logF_r + 1.22)^2)^{0.5}$$

where

Q_t is the normalized cone resistance which represents the simple normalization with a stress exponent (n) of *1.0*, which applies well to clay-like soils

F_R is the normalized friction ratio, in *%*

The boundaries of soil behaviour type are then given in terms of the index, I_c, presented in *Table 4.1* below.

The soils behaviour type index does not apply to zones *1*, *8* and *9*. The profiles of I_c provide a simple guide to the continuous variation of soil behaviour type in a given soil profile based on CPTU results, with a reliability greater than *80%* compared with soil samples *(Robertson, 2015).*

Zone	Soil Behaviour Type	I_c
1	Sensitive fine grained	N/A
2	Organic Soils – clay	>3.6
3	Clays – silty clay to clay	2.95 – 3.6
4	Silt mixtures – clayey silt to silty clay	2.60 – 2.95
5	Sand mixtures – silty sand to sandy silt	2.05 – 2.6
6	Sands – clean sand to silty sand	1.31 – 2.05
7	Gravelly sand to dense sand	<1.31
8	Very stiff sand to clayey sand*	N/A
9	Very stiff fine grained *	N/A

** Heavily overconsolidated or cemented*

Table 4.1: *Normalized CPTU Soil Behaviour Type (SBT_n) Index values, I_c.(Robertson, 2010)*

4.2 N VALUE OF STANDARD PENETRATION TEST (SPT) (N_{60})

The derived *N* value of *SPT,* N_{60}, is strongly and directly related to the cone resistance, q_c.

In this report the N_{60} value is derived using the following correlations, developed by *Robertson and Wride (1998)* and *Jefferson and Davies (1998)*

1) *Robertson & Wride (1998)*

$$N_{60} = \frac{q_c}{8.5 \cdot p_a \left(1 - \frac{I_C}{4.6}\right)}$$

2) *Jefferson and Davies (1993)*

$$N_{60} = \frac{q_c}{0.85 \cdot \left(1 - \frac{I_C}{4.75}\right)}$$

where

q_c	is the cone resistance
p_a	is the atmospheric pressure equal to *100 kPa*
I_c	is the soil behaviour type index calculated as given in *section 4.1*

It is suggested that this method provides a better estimation of the *N* value than the actual *SPT* test, due to its poor repeatability. But in fine grained soil with high sensitivity these methods of estimating N_{60} may overestimate it *(Jefferies and Davies, 1991).*

4.3 RELATIVE DENSITY (D_r)

Relative density, D_r, is an intermediate parameter for coarse grained soils, widely used to describe sand deposits. All the research on deriving the relative density from CPTU tests results are carried out for ***clean predominantly quartz sands***. The studies have shown that CPTU resistance in granular soils is controlled by sand relative density, in situ effective stresses and compressibility. The more compressible sands tend to give lower penetration resistance for a given relative density then less compressible sands.

In this report relative density is calculated using the methods suggested by *Baldi et al., (1986)*, *Jamiolkowski et al., (2001)* and *Kulhawy and Mayne (1990)* as shown in the equations below:

1) Baldi et al., (1986)

$$D_r = \frac{1}{C_2} \cdot ln\left(\frac{q_c \cdot Wehr}{C_1 \cdot (\sigma'_{v0})^{0.55}}\right) \cdot 100$$

where

C_1 is a consolidation coefficient which is *157* for normally consolidated soils and *181* for over consolidated soils

C_2 is a consolidation coefficient which is *2.41* for normally consolidated soils and *2.46* for over consolidated soils

Wehr is a correction coefficient for calcareous soils

2) Jamilkowski et al., (2001)

$$D_r = 100 \cdot \left[0.268 \cdot ln\left(\frac{q_t/\sigma_{atm}}{\sqrt{\sigma'_{v0}/\sigma_{atm}}}\right) + C_1\right]$$

where

C_1 is a compressibility coefficient which is *-0.675* for average compressible soils, *≤1.0* for high compressible soils and carbonate or calcareous sands and *≥-2.0* for low compressible soils

q_t is corrected cone resistance

σ_{atm} is the atmospheric pressure

3) Kulhawy and Mayne, (1990)

$$D_r = \left[\frac{q_{c1}}{305 \cdot C_1 \cdot OCR^{0.18} \cdot \left(1.2 + 0.05 \cdot log(t/100)\right)}\right]^{0.5} \cdot 100$$

where

q_{c1} is the cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula

$$q_{c1} = \frac{q_c}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

where

q_c is the cone resistance in *kPa*

σ'_{v0} is the initial vertical effective stress in *kPa*

C_1 is a compressibility coefficient which is *-0.91* for low compressible sands, *1.0* for medium compressible sands and *1.09* for high compressible sands

t is time in years

4.4 FRICTION ANGLE (φ')

Friction angle, *φ*', is used to express the shear strength of uncemented, coarse grained soils. In this report friction angle is derived by the correlations of *Mayne and Campanella (2005)*, *Robertson and Campanella (1983)* and *Kulhawy and Mayne (1990)*.

1) Mayne and Campanella, (2005)

$$\varphi' = 29.5^0 \cdot B_q^{0.121} \cdot \left[0.256 + 0.336 \cdot B_q + logQ_t\right]$$

where

B_q is the pore pressure ratio, calculated as in Session 3.3

Q_t is the normalized cone resistance

2) Roberston and Campanella, (1983)

$$\varphi' = \tan^{-1}\left(0.1 + 0.38 \cdot log\left(\frac{q_t}{\sigma'_{v0}}\right)\right)$$

where

q_c is the cone resistance in *kPa*

σ'_{v0} is the initial vertical effective stress in *kPa*

3) Kulhawy and Mayne, (1990)

$$\varphi' = 17.6^0 + 11.0^0 \cdot log(q_{t1})$$

where

q_{t1} is the corrected cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula

$$q_{t1} = \frac{q_t}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

The method suggested by *Mayne and Campanella (2005)* will not provide reliable results for heavily overconsolidated soils, fissured geomaterials and highly cemented or structures clays. This approach gives reliable results when pore pressure is positive and varies *0.1* < B_q < *1.0*. The correlation suggested by *Robertson and Campanella (1983)* estimates the peak friction angle for uncemented, unaged, moderately compressible, predominately quartz sands. For sands of higher compressibility the method will tend to predict low friction angles. The method suggested by *Kulhawy and Mayne (1990)* is an alternate relationship for clean, rounded, uncemented, quartz sands.

4.5 FINES CONTENT (*FC*)

The fines content, *FC*, in this report is estimated using two different methods, one from *Robertson and Wride (1998)* and the other, *Suzuki et al (1998)* as presented below:

1) Robertson and Wride (1998)

$$I_C < 1.26: FC = 0$$
$$1.26 \leq I_C \leq 3.5: FC(\%) = 1.75I_C^{3.25} - 3.7$$
$$3.5 < I_C: \ FC = 100\%$$

2) Suzuki et al (1998)

$$FC(\%) = 2.8I_C^{2.6}$$

where

I_c is the soil behaviour type index, calculated as in section 4.1

4.6 UNDRAINED SHEAR STRENGTH (s_u)

Estimation of undrained shear strength, s_u, from CPTU tests using corrected cone resistance is carried out using the following correlation from *Lunne et al. (1981)*:

$$S_u = \frac{(q_t - \sigma_{v0})}{N_{kt}}$$

where

N_{kt} is the empirical cone factor, which varies from *10* (*6* for very soft sensitive fine grained soils) to *20*. In this report 3 values are considered: *15*, *17.5* and *20*. N_{kt} tends to increase with increasing plasticity and decrease with increasing soil sensitivity. It decreases as B_q increases. (*Lunne et al., 1997*)

σ_{vo} = total overburden stress.

This report only presents the undrained shear strength data on soils with soil behaviour type index, I_c values greater than *2.60*.

The value of undrained shear strength, s_u to be used in analysis depends on the design problem. In general, the simple shear direction of lading often represents the average undrained strength. For larger, moderate to high risk projects, where high quality field and laboratory data may be available, site specific correlations should be developed based on appropriate and reliable values of s_u.

4.7 SENSITIVITY (S_t)

The sensitivity, S_t of clays is defined as the ratio of undisturbed peak undrained shear strength to totally remoulded undrained shear strength.

In this report S_t is calculated using two correlations developed by *Schmertmann (1978)* and *Mayne (2007)*.

1) Schmertmann (1978)

$$S_t = \frac{s_u}{s_{u(rem)}} = \frac{q_t - \sigma_v}{N_{kt}} \left(\frac{1}{f_s}\right)$$

where

$s_{u(rem)}$ is the remoulded undrained shear strength. It can be assumed equal to the sleeve resistance, f_s.

2) Mayne (2007)

$$S_t = \frac{0.073 \cdot (q_t - \sigma_{v0})}{f_s}$$

For relatively sensitive clays , $S_t > 10$, the value of f_s can be very low and not very accurate, hence the estimate of sensitivity should be used as a guide only.

4.8 SOIL UNIT WEIGHT (γ)

Soil unit weight, γ in this report is calculated by using one method for sands, considered under dry conditions and two methods for clays, considered under saturated conditions. These relationships are developed by *Mayne (2007)* and the equations are presented below:

1) Mayne (2007)

Dry unit weight for sands:

$$\gamma_{dry} = 1.89 \cdot log(q_{t1}) + 11.82$$

Saturated unit weight for clays method 1

$$\gamma_{sat} = 8.32 \cdot log(V_S) - 1.61 \cdot log(z)$$

Saturated unit for clays method 2

$$\gamma_{sat} = 2.60 \cdot log(f_s) + 15 \cdot G_s - 26.5$$

where

q_{t1} is the corrected cone resistance corrected for initial vertical effective stress and atmospheric pressure, calculated by the following formula:

$$q_{t1} = \frac{q_t}{\sqrt{\sigma'_{v0} \cdot \sigma_{atm}}}$$

z is the depth
V_s is the shear wave velocity, calculated as $V_S = 118.8 \cdot log(f_s) + 18.5$
G_s is the specific gravity of solids, typically between *2.40* and *2.90*

4.9 STATE PARAMETER (ψ)

The state parameter, *ψ* is defined as the difference between the current void ratio, *e* and the void ratio at critical state e_{cs}, at the same mean effective stress for granular soils.

The problem of evaluating the state parameter from CPTU response is complex and depends on several soil parameters, including shear stiffness, shear strength, compressibility and plastic hardening. (*Jefferis and Been, 2006*)

In this report, the state parameter is calculated based on five methods as follows:

1) Been et al. (1987)

$$\psi = -\frac{ln\left(\frac{Q_p}{k}\right)}{m}$$

and

$$Q_p = \left(\frac{3Q_t}{1 + 2K_0}\right)$$

where
Q_t is the normalized cone resistance
K_0 is the coefficient of lateral earth pressure

2) Shuttle and Jefferies (1998)

$$\psi = -\frac{ln\left(\frac{Q_p}{k}\right)}{m}$$

where

$$k = \left((3.79 + 1.12ln(I_r))(1 + 1.06(M - 1.25))(1 - 0.30(N - 0.2))(H/1000)^{0.326}(-1.55(\lambda - 0.01))\right)^{1.45}$$

$$m = 1.45(1.04 + 0.46ln(I_r))(1 - 0.4(M - 1.25))(1 - 0.30(N - 0.2))(H/100)^{0.15}(1 - 2.21(\lambda - 0.01))$$

where
Q_t is the normalised cone resistance
I_r is rigidity index

K_0 is the coefficient of lateral earth pressure
M is critical state ratio
N is dilation parameter
H is plastic hardening modulus;
λ is slope *CSL* line

3) Shuttle and Jefferies (1998)

The state parameter calculated according this third method is similar to state parameter calculated as presented in the second method, except for the rigidity index that is calculated as follows:

$$I_r = I_{r100}\left(\frac{P_a}{\sigma'_{v0}}\right)^{0.5}$$

where

I_{r100} is rigidity index in reference pressure
P_a is the reference pressure equal to 100 kPa
σ'_{v0} is effective vertical overburden stress

4) Plewes (1992)

$$\psi = -\frac{ln\left(\frac{Q_p/(1-B_q)}{k'}\right)}{m'}$$

where

$$k' = M\left(3 + \frac{0.85}{\lambda}\right)$$
$$m' = 11.9 - 13.3\lambda$$
$$\lambda = \frac{F_r}{10}$$

where

Q_t is the normalized cone resistance
B_q is pore pressure ratio
K_0 is the coefficient of lateral earth pressure
F_R is normalized friction ratio
M is critical state ration

5) Been and Jefferies (1992)

$$\psi = -\frac{ln\left(\frac{Q_p/(1-B_q)}{k'}\right)}{m'}$$

where

$$k' = M\left(3 + \frac{0.85}{\lambda}\right)$$
$$m' = 11.9 - 13.3\lambda$$
$$\lambda = \frac{1}{34 - 10I_C}$$

For high-risk projects a detailed interpretation of CPTU results using laboratory results and numerical modelling can be appropriate (e.g. *Shuttle* and *Cunning*, *2007*), although soil variability can complicate the interpretation procedure. For low risk projects and in the initial screening for high-risk projects there is a need for a simple estimate of soil state.

Plewes et al (1991) provided a means to estimate soil state using the normalized soil behaviour type, *SBTn* chart suggested by *Jefferies and Davies (1991)*. *Jefferis and Been (2006)* suggested that soils with a state parameters less than *-0.05* are dilative at large strains.

4.10 IN SITU STRESS RATIO (K_0)

There are various estimations to determine in situ stress ratio, K_0, from CPTU in fine grained soils. In this report the methods suggested by *Mayne (2007)* and *Kulhawy and Mayne (1990)* are used, as given below:

1) Mayne (2007)

$$K_0 = (1 - sin\varphi')OCR^{sin\varphi'}$$

$$Max\ K_0 = K_p = \frac{(1 + sin\varphi')}{(1 - sin\varphi')}$$

$$K_0 = 0.192\left(\frac{q_t}{\sigma_{atm}}\right)^{0.22}\left(\frac{\sigma_{atm}}{\sigma_{v0}}\right)^{0.22}OCR^{0.27}$$

where

OCR is the overconsolidation ration, calculated as presented in session *4.12*

2) Kulhawy and Mayne (1990)

$$K_0 = 0.1\left(\frac{q_t - \sigma_{v0}}{\sigma_{v0}'}\right)$$

These approaches are generally limited to mechanically overconsolidated, fine grained soils. As considerable scatter exits in the database used for these correlations, in moderate to high risk projects further tests should be performed and these correlations must be considered only as a guide.

4.11 OVERCONSOLIDATION RATIO (OCR)

Overconsolidation ratio, *OCR* is defined as the ratio of the maximum past effective consolidation tress and the present effective overburden stress:

$$OCR = \frac{\sigma'_p}{\sigma'_{v0}}$$

This definition is appropriate for mechanically overconsolidated soils, where the only change has been the removal of overburden stress. For cemented and aged soils the *OCR* may represent the ratio of the yield stress and the present effective overburden stress.

In this report σ'_p is calculated based on six methods as presented below:

1) Mayne (1995)

$$\sigma'_p = 0.33(q_t - \sigma_{v0})$$

2) Chen & Mayne (1996)

$$\sigma'_p = 0.53\Delta u$$

3) Mayne (2005)

$$\sigma'_p = 0.6(q_t - u_2)$$

4) Robertson (2009)

$$\sigma'_p = 0.25(Q_t^{1.25} - \sigma'_{v0})$$

5) Mayne (2005)

$$\sigma'_p = \left[\frac{0.192\left(\frac{q_t}{\sigma_{atm}}\right)^{0.125}}{(1 - sin\varphi')\left(\frac{\sigma'_{v0}}{\sigma_{atm}}\right)^{0.31}}\right]^{\left(\frac{1}{sin\varphi' - 0.27}\right)} \sigma'_{v0}$$

6) Mayne (2007)

$$\sigma'_p = 0.101\sigma_{atm}^{0.102}(G_0)^{0.478}\sigma'^{0.420}_{v0}$$

For larger, moderate to high risk projects, where additional high quality field and laboratory data may be available, site specific correlations should be developed based in consistent and relevant values of *OCR*.

4.12 SMALL STRAIN YOUNG MODULUS (E_0)

Deriving small strain undrained Young's modulus, E_0, from CPTU is difficult. There is insufficient data available to make a direct correlation, and it is recommended that c_u should be derived, then E_U estimated, as a rough order of value from one of the available correlations between E_U and c_u (*Meigh, 1987*).

In this report the small strain Young's modulus is derived as follows:

1) Defined from elastic theory:

$$E_0 = 2(1+\nu)G_0$$

where

v is the Poisson ratio, equal to *0.2*

G_0 is the small strain shear modulus calculated by the formula given below:

$$G_0 = 1634\left(\frac{q_c}{\sqrt{\sigma'_{v0}}}\right)^{-0.75} q_c$$

2) Calculated based on the degree of loading, q_c, effective stress and reduction factor

$$E_0 = \alpha q_c$$

where

α is calculated from degree of loading, q_c, effective stress and reduction factor, given in *Figure 4.2*

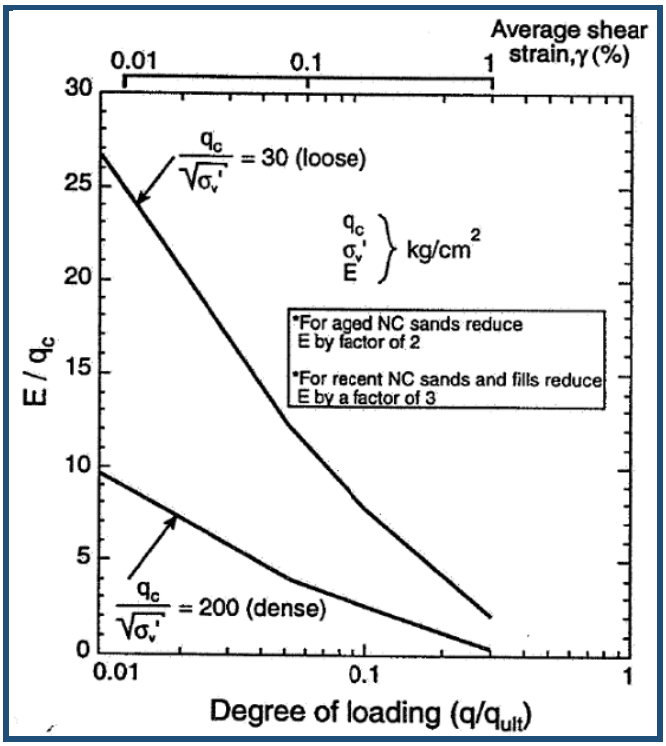

Figure 4.2: *Estimation of equivalent Young's modulus for sand based on degree of loading (Robertson, 1990)*

4.13 CONSTRAINED MODULUS (M)

Constrained Modulus, *M*, can be estimated by CPTU using the following empirical relationship:

$$M = \alpha_M(q_t - \sigma_{v0})$$

where

α_M varies with soil plasticity and natural water content for a wide range of fine grained soils and organic soils. *Meigh (1987)* suggested that α_M lies in the range of *2 to 8*, whereas *Mayne (2001)* suggested the value of *5*.

Robertson (2001) suggested that α_M varies with Q_t, such that:

When $I_c > 2.2$ (fine grained soils) use: $\alpha_M = Q_t$ when $Q_t < 14$

$\alpha_M = 14$ when $Q_t > 14$

When $I_c < 2.2$ (coarse grained soils) use: $\alpha_M = 0.0188[10^{(0.55I_c+1.68)}]$

In this report the Constrained Modulus, *M*, is calculated after *Kulhawy and Mayne (1990)* using the equation below:

$$M = 8.25(q_t - \sigma_{v0})$$

Also an alternative method is included in the results, developed by *Burns and Mayne (2002)* using the following relationship:

$$M = 0.02G_0$$

4.13.1 Equivalent Oedometer Coefficient of Compressibility (mv)

Equivalent oedometer coefficient of compressibility, m_v can be calculated directly by the Constrained Modulus, *M*, as follows:

$$m_v = \frac{1}{M}$$

4.14 SMALL STRAIN SHEAR MODULUS (G_0)

Elastic theory states that the small strain shear modulus, G_0, can be determined from the following equation:

$$G_0 = \rho v_s^2$$

where

ρ is the mass density of the soil

v_s is the shear wave velocity

In this report the small strain shear modulus, G_0, will be presented calculated by the three methods shown below, developed by *Rix & Stoke (1992)*, *BE* and *UB Rix & Stoke (1992)*, respectively.

$$G_0 = 1634\left(\frac{q_c}{\sqrt{\sigma'_{v0}}}\right)^{-0.75} q_c$$

$$G_0 = \frac{\gamma_{bulk}}{g} v_s^2$$

where

q_c is the net cone tip resistance in kPa
σ'_{v0} is the effective initial vertical stress in kPa
γ_{bulk} is the bulk density of the soil
v_s is the shear wave velocity

This correlation of G_0 is applicable to all soil types.

4.14.1 Mass Density of Soil (ρ)

Mass density of soil, ρ, is defined as:

$$\rho = \frac{\gamma}{g}$$

where

γ is the elastic stiffness of the soils at shear strain less than 10^{-4} %, $\gamma<10^{-4}$ %.

4.15 HIDRAULIC CONDUCTIVITY (k)

An approximate estimate of soil hydraulic conductivity of coefficient of permeability, *k*, can be made from an estimate of soil behaviour type using the CPTU *SBT chart*, and presented in the table below:

SBT Zone	SBT	Range of k (m/s)	SBT_n I_c
1	Sensitive fine grained	$3x10^{-10}$ to $3x10^{-8}$	NA
2	Organic soils-clay	$1x10^{-10}$ to $1x10^{-8}$	$I_c>3.60$
3	Clay	$1x10^{-10}$ to $1x10^{-9}$	$2.95<I_c<3.60$
4	Silt Mixture	$3x10^{-9}$ to $1x10^{-7}$	$2.60<I_c<2.95$
5	Sand Mixture	$1x10^{-7}$ to $1x10^{-5}$	$2.05<I_c<2.60$
6	Sand	$1x10^{-5}$ to $1x10^{-3}$	$1.31<I_c<2.05$
7	Dense sand to gravelly sand	$1x10^{-3}$ to 1	$I_c<1.31$
8	*Very dense/ stiff soil	$1x10^{-8}$ to $1x10^{-3}$	NA
9	*Very stiff fine grained soil	$1x10^{-9}$ to $1x10^{-7}$	NA

**Overconsolidated and/ or cemented*

Table 4.2: *Estimated soil permeability (k) based on the CPTU SBT chart by Roberston (2009)*

The average relationship between soil permeability, *k* and SBT_n I_c, shown in *Table 4.1*, can be represented by the following relationships:

When $1.0 < I_c \leq 3.27$ $\quad k = 10^{(0.952-3.04I_c)}$
When $3.27 < I_c \leq 4.0$ $\quad k = 10^{(-4.52-1.37I_c)}$

In this report, the hydraulic conductivity is given using 2 methods, *Robertson et al. (1986)* and *Robertson et al. (1990)*, considering both minimum and maximum values for each method.

The hydraulic conductivity (permeability), *k*, values, minimum and maximum, defined after soil behaviour type *Robertson et al. (1986)* are presented in *Table 4.3*, below:

SBT Zone	Soil Behaviour Type (SBT)	Range of hydraulic conductivity, *k (m/s)*
1	Sensitive fine grained	$3x10^{-9}$ to $3x10^{-8}$
2	Organic soils	$1x10^{-8}$ to $1x10^{-6}$
3	Clay	$1x10^{-10}$ to $1x10^{-9}$
4	Silty CLAY to CLAY	$3x10^{-9}$ to $1x10^{-8}$
5	Clayey SILT to silty CLAY	$1x10^{-8}$ to $1x10^{-7}$
6	Sandy SILT to clayey SILT	$1x10^{-7}$ to $1x10^{-6}$
7	Silty SAND to sandy SILT	$1x10^{-5}$ to $1x10^{-6}$
8	SAND to silty SAND	$1x10^{-5}$ to $1x10^{-4}$
9	SAND	$1x10^{-4}$ to $1x10^{-3}$
10	Gravelly SAND to SAND	$1x10^{-3}$ to 1
11	Very stiff fine grained	$1x10^{-8}$ to $1x10^{-6}$
12	SAND to clayey SAND	$3x10^{-7}$ to $3x10^{-4}$

Table 4.3: *Estimated soil permeability (k) based on SBT chart by Robertson et al. (1986)*

The hydraulic conductivity (permeability), *k*, minimum and maximum values, defined after soil behaviour type by *Robertson et al. (1990)* are presented in *Table 4.4*, here below:

SBT Zone	Soil Behaviour Type (SBT)	Range of hydraulic conductivity, *k (m/s)*
1	Sensitive fine grained	$3x10^{-9}$ to $3x10^{-8}$
2	Organic soils	$1x10^{-8}$ to $1x10^{-6}$
3	Clay	$1x10^{-10}$ to $1x10^{-9}$
4	Silt Mixture	$3x10^{-9}$ to $1x10^{-7}$
5	Sand Mixture	$1x10^{-7}$ to $1x10^{-5}$
6	Sand	$1x10^{-5}$ to $1x10^{-3}$
7	Gravelly sands to dense sands	$1x10^{-3}$ to 1

8	Very stiff sand to clayey sand	$1x10^{-8}$ to $1x10^{-6}$
9	Very stiff fine grained	$1x10^{-8}$ to $1x10^{-6}$

Table 4.4: *Estimated soil permeability (k) based on SBT chart by Robertson et al. (1990).*

4.16 CONSOLIDATION CHARACTERISTICS

All the results of consolidation characteristics calculated using the formulas below are presented in *Appendix D*.

4.16.1 Rigidity Index (I_R)

The rigidity index, I_R, for fine materials is defined using the following formula, developed by *Mayne (2001)*:

$$I_R = \exp\left[\left(\frac{1.5}{M} + 2.925\right)\left(\frac{q_t - \sigma_{v0}}{q_t - u_2}\right) - 2.925\right.$$

where

M is the Cam Clay constant, slope of the critical state line defined as:

$$M = \frac{6sin\varphi'}{3 - sin\varphi'}$$

where

φ' is the internal friction angle.

The second method used to define the rigidity index, I_R, for fine material is based on plasticity index and overconsolidation ratio, *OCR*, and calculated after the relationship developed by *Keaveny and Mitchel (1986)* as follows:

$$I_R = \frac{\exp\left(0.0435(137 - PI)\right)}{[1 + \ln\{1 + 0.385(OCR - 1)^{3.2}\}]^{0.8}}$$

where

PI is the plasticity index of the soil, equal to 20.
OCR is the overconsolidation ratio of the soil

4.16.2 Coefficients of consolidation (c_h, c_v)

The coefficient of consolidation is interlinked with the hydraulic conductivity through the formula below:

$$c = \frac{kM}{\gamma_w}$$

where

M is the 1-D constrained modulus relevant to the problem (i.e. unloading, reloading, virgin loading, etc)

γ_w is the unit weight of water
k is the hydraulic conductivity

In geotechnical practice it is very difficult to measure *c* and *k*, because due to soil anisotropy *c* and *k* have different values in the horizontal, c_h and k_h and vertical c_v and k_v direction. The relevant design values depend on drainage and loading direction.

The coefficient of consolidation can be estimated by measuring the dissipation or rate of decay of pore pressure with time after a stop in CPTU penetration. The coefficient of consolidation should be interpreted at *50%* dissipation, using the following formula:

$$c = (\frac{T_{50}}{t_{50}})r_0^2$$

where

T_{50} is theoretical time factor
t_{50} is measured time for *50%* dissipation
r_0 is penetrometer radius

In soils of very low permeability the time for dissipation can be decreased by using smaller diameter probes. A theoretical solution for this cases is given by *Teh and Houlsby (1991)* and it is compared with data from around the world by *Robertson et al. (1992)*, as shown in *Figure 4.3*.

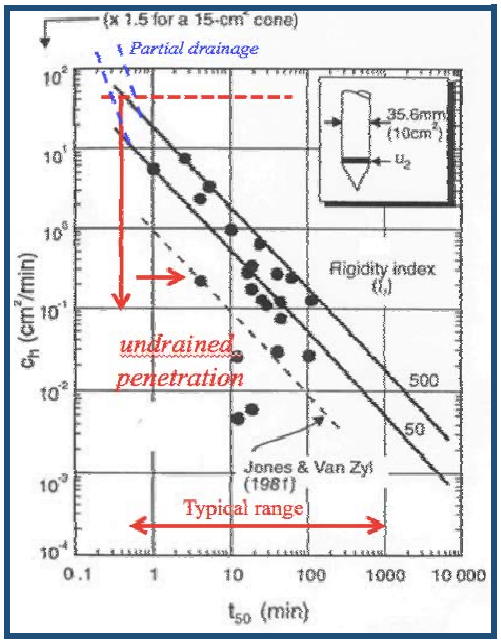

Figure 4.3: *Average laboratory c_h values and CPTU results*
(after Robertson et al. 1992, Teh and Houlsby theory shown as solid lines for I_R = 50 and I_R = 500).

c_h estimation is controlled by soil stress history, sensitivity, anisotropy, rigidity index (relative stiffness), fabric and history. In overconsolidated soils, the pore pressure behind the cone

tip can be low or negative, results in dissipation data that can initially rise before decreasing to the equilibrium values. Care is required to ensure the dissipation test to end at the right moment of time, not stopped prematurely after the initial rise.

An approximate estimate of the coefficient of consolidation in the vertical direction can be obtained using the ratios of permeability in the horizontal and vertical direction given in the section on hydraulic conductivity, since:

$$c_v = c_h(\frac{k_v}{k_h})$$

For relative short dissipations, the dissipation results can be plotted on a square-root time scale. The gradient of the initial straight line in m, where:

$$c_h = (\frac{m}{M_T})^2 r^2 I_r^{0.5}$$

where

M_T is *1.15* for u_2 position and *10 cm²* cone (*r=1.78 cm*).

4.17.3 Coefficients of permeability (hydraulic conductivity, k_h, k_v)

The horizontal coefficient of permeability can be estimated from the following expression:

$$k_h = \frac{\gamma_w}{2.3\sigma'_{v0}} RR c_h$$

where

RR is the compression ratio in the overconsolidated range. It represents the strain per log cycle of effective stress during recompression and can be determined from laboratory consolidation tests (*$0.5x10^{-2}$ <RR<$2x10^{-2}$* was recommended by *Baligh and Levadoux*).

Robertson et al. (1992a) presented a summary of available data from dissipation tests and laboratory determined k_h values.

Nature of clay	k_h/k_v
No macrofabric, or only slightly developed macrofabric, essentially homogeneous deposits	1 to 1.5
From fairly well to well developed macrofabric, e.g. sedimentary clays with discontinuous lenses and layers of more permeable material	2 to 4
Varved clays and other deposits containing embedded and more or less continuous permeable layers	3 to 15

Table 4.4: *Range of field values of k_h/k_v for soft clays (from Jamiolkowski et al., 1985).*

Estimation of soil permeability from CPTU and dissipation data is subject to much uncertainty and should be used as a guide only.

5.0 CPTU RESULTS APPLICATIONS

5.1 SOIL PROFILING AND APPLICATIONS IN GEOTECHNICAL DESIGN

5.1.1 Soil Behaviour Type

The major applications of CPTU are on *soil behaviour type and soil profiling*. Typically, the cone resistance, q_c is high in sands and low in clays, and the friction ratio, $R_f = f_s/q_t$ is low in sands and high in clays. The CPTU cannot be expected to provide accurate predictions of soil type based on *physical characteristics,* e.g. *grain size distribution*, but provides a guide to the *mechanical characteristics*, including: *strength*, *stiffness*, and *compressibility* of the soils, or the *soil behaviour type*, *SBT*.

The most commonly used CPTU soil behaviour type chart, suggested by *Robertson et al. (1986)* uses the basic CPTU measured parameters of cone resistance, q_c and friction ratio, R_f. The chart is global in nature and can provide reasonable predictions of soil behaviour type for CPTU testing. The expected overlap in some zones is modified in the interpretations of this report somewhat based on previous experience or local knowledge of the site.

Since both the penetration resistance and sleeve resistance increase with depth due to the increase in effective overburden stress, the CPTU data requires normalization for overburden stress for very shallow and/or very deep tests. A popular CPTU soil behaviour chart based on normalized CPTU data is firstly proposed by *Robertson (1990)*. The chart identifies general trends in ground response, such as: *increasing soil density*, *OCR*, *age* and *cementation* for granular soils, and *increasing stress history*, *OCR* and *soil sensitivity* for cohesive soils.

A more general normalized CPTU *SBT* chart, using large strain *soil behaviour* descriptions, proposed by *Robertson (2012)* is shown in *Figure 5.1*.

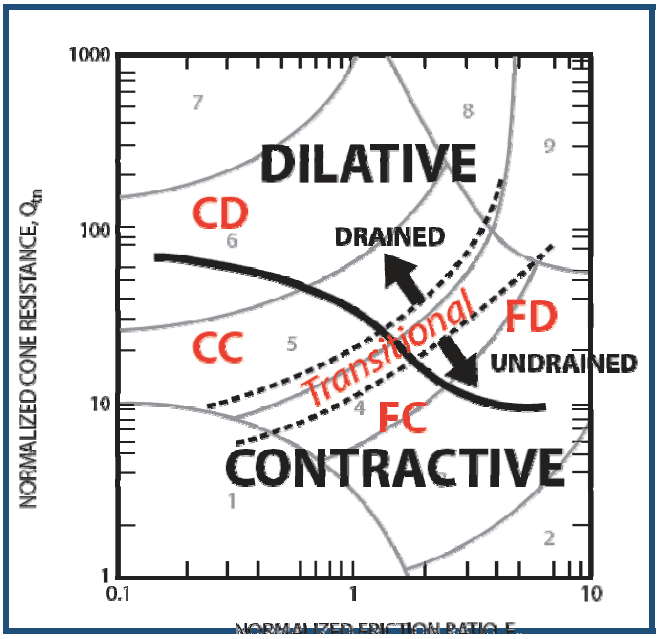

Figure 5.1: *Normalized CPTU Soil Behaviour Type (SBT_n) chart, Q_{tn}-F_R using general large strain soil behaviour description (Robertson, 2012).*

*

CD	is coarse grained dilative soil-predominately drained CPTU
CC	is coarse grained contractive soil-predominately drained CPTU
FD	is fine grained dilative soil-predominately undrained CPTU
FC	is fine grained contractive soil-predominately undrained CPTU

5.1.2 Soil Profiling

CPTU is an excellent test for soil profiling. The continuous monitoring of pore pressure during the cone penetration improves the soil stratigraphy descriptions. The pore pressure develops in response to the soil type being penetrated in the area where the pore pressure element is located. Soft, firm or stiff clays and contractive silts can show very high pore pressure. Very stiff overconsolidated clays and dilative silts can give very low or negative pore pressures same as very dense silty sands.

The thin layers of sand, or silt in a thick layer of clay, or thin layers of clay or silt in a thick layer of sand are easily distinguished during a CPTU test, which will give a response time sufficiently fast to observe pore pressure changes even in the very thin layers of soils (< *5mm*), depending on the response of soil to the advancing of cone.

The sandy soils tend to produce high cone resistance and low friction ratio, whereas soft clayey soils tend to produce low cone resistance and high friction ratio. Organic soils such as peat tend to have very low cone resistance and very high friction ratio. Soils with high horizontal stresses (*high OCR*) tend to have higher cone resistance and friction ratio.

CPTU is an excellent tool to classify the soils based on their behaviour type, and not based on grain size distribution. (*Douglas and Olser, 1981*)

The measurements of sleeve friction, f_s are often less reliable than the measurements of cone resistance, q_c (*Lunne et al., 1986*), but to overpass these problems pore pressure parameter ratio, B_q, and the classification charts based on it, which are also presented in *Appendix A.9*, are used when necessary.

For more reliability in soil profiling, the soil interpretations in this report are carried out based on three parameters measured on site, cone resistance, sleeve friction and pore pressure and three derived geotechnical parameters soil behaviour type index for all soils, undrained shear strength for cohesive soils and relative density for granular soils.

Generally, soils that fall in zones *8*, *9* and *10* of *Robertson et al (1986)* chart (*6* and *7* of *Robertson (1990)* chart) represent approximately drained penetration, whereas, soils in zones 1, 2, 3, 4, 5 and 6 of *Robertson et al (1986)* chart (1, 2, 3 and 4 of *Robertson (1990)* chart) represent approximately undrained penetration. Soils in zones 7, 11 and 12 of *Robertson et al (1986)* (5, 8 and 9 of *Robertson (1990)* chart) may represent partially drained penetration. The classification is often influenced by changes in *stress history*, *in situ stresses*, *sensitivity*, *stiffness*, *mineralogy*, etc. An advantage of pore pressure measurements during cone penetration is the ability to evaluate drainage conditions more directly. (*Lunne et al., 1997*)

The information about the rate and manner of excess pore pressures during the dissipations significantly helps the accurate classification in the corresponding depths of dissipation tests. In very stiff, overconsolidated clayey soils, the pore pressure behind the cone is very low and sometimes negative of the equilibrium pore pressure, u_0, whereas the pore pressure on the face of the cone is very large due to the large increase in normal stresses created by the cone penetration. When penetration is stopped in overconsolidated clays, pore pressure recorded behind the cone may initially increase before decreasing to the equilibrium pore pressure. The rise is caused by local equalization of the high pore pressure gradient around the cone.

Cone penetration in fine grained soils, such as clays and silts, is generally undrained. Cone penetration tests under undrained conditions generate high pore pressure and this reading is extremely useful, because it affects both cone resistance and sleeve friction measurements. These parameters should be corrected using the measured pore pressure.

CPTU in coarse gained soils, such as sandy or gravelly soils is generally drained. In these conditions there is no excess pore pressure generated as a result of cone penetration. Relative density has been used as the main parameter for description of sandy deposits.

5.1.3 Applications in geotechnical design

CPTU measured parameters are used to derive geotechnical parameters, which are the input in several geotechnical analyses. An alternate approach is to directly apply CPTU results to the geotechnical calculations.

As a guide, *Table 5.1* shows a summary of the applicability of CPTU results for direct design applications. The ratings shown in the table have been assigned based on current experience and represent a qualitative evaluation of the confidence level assessed to each design problem and general soil type. Details of ground conditions and project requirements can influence these ratings.

Type of soil	Pile Design	Bearing Capacity	Settlement	Compaction Control	Liquefaction
Sand	A-B	A-B	B-C	A-B	A-B
Clay	A-B	A-B	B-C	C-D	A-B
Intermediate Soils	A-B	B-C	B-C	B-C	A-B

Table 5.1: *Perceived applicability of CPTU for various direct design problems.*

A is high
B is high to moderate
C is moderate
D is moderate to low

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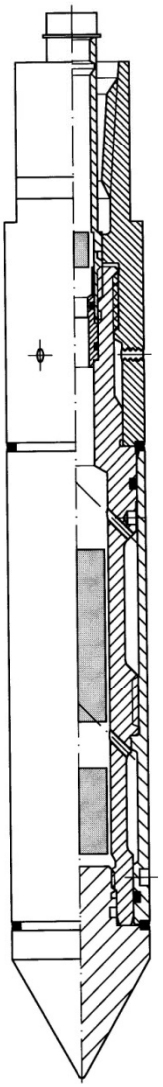
APPENDIX A

APPENDIX A1 – Site Map

Not provided

APPENDIX A2 – Cone Datasheet

GeoPoint Systems bv
Rijksstraatweg 22F
2171 AL Sassenheim
Tel. : +31 71 301 92 51
Fax : +31 71 301 92 52
E-mail : info@geopoint.nl
ING bank : 68.23.01.396
Postbank : 5226758
BTW nr. : NL806331677B01



SPECIFICATIONS S15 SERIES ELECTRICAL CONES

The electronic subtraction cones have been developed to address the durability problems inherent in other cone designs. The unit consists of a single element temperature compensated strain gauge transducer for measuring both cone resistance and local sleeve friction. This design is therefore more robust than a compression type cone. The cone support electronics package is located directly behind the transducer. The precision strain gauge amplifiers and power supply eliminate the effects of cable resistance on the measurements. A standard subtraction cone is capable of measuring simultaneously the following channels: Tip, Local friction, Pore pressure, Temperature and Inclination.

GENERAL SPECIFICATIONS

Cone Tip Section Area	1,500 mm2
Friction Sleeve Surface	22,500 mm2
Total Length	325 mm
Weight	4200 g
Power Supply	± 15 VDC, 100 mA.
Output	0 – 10 VDC*
Working Temperature	0 - 60˚C
Storage Temperature	- 40 to + 85˚C
Connector	Lemo 10 pins (others on request)

TIP RESISTANCE

Range	100/150* kN
Accuracy	0.25 % FS
Maximum Load	150 % of range
Cone Area Ratio	0.75

LOCAL SLEEVE FRICTION

Range	100/150* kN
Accuracy	0.50 % FS
Maximum Load	150 %
Sleeve Area Ratio	1.0 (EA)

PORE PRESSURE

Range	1/2/5/10* MPa
Accuracy	0.5 % FS
Maximum Load	150 % of range

INCLINATION

Range	25 ˚ (biaxial)
Accuracy	< 2 ˚

All our equipment complies with the ISSMGE, ASTM, DIN and NEN Standards.

**Other output and voltage ranges available on request. Loadcells may be calibrated for lower ranges.*

APPENDIX A3 – Cone Calibration Certificate

Sondeerapparatuur Waterspanningsmeters Hellingmeters Veldmeet-apparatuur

GeoPoint Systems bv

Rijksstraatweg 22F
2171 AL Sassenheim
Tel. : +31 71 301 92 51
Fax : +31 71 301 92 52
E-mail : info@geopoint.nl
BTW : NL814690178.B01
IBAN : NL28 INGB0682301396
BIC : INGBNL2A

Cone Calibration Certificate

Certificate:	**GS-1486-001**	
Instrument Type:	Electric Subtraction Cone	
Model:	S15-CFIIP	
Serial number:	1486	
Calibration date:	15-11-2016	
Client:	Insitu	
Calibrated by:	W. Volgering	
Calibration instruments		
Manufacturer:	Hottinger Baldwin Messtechnik GmbH	
HBM certificate no. :	49046	
Calibration conditions		
Ambient temperature:	19.9	°C
Atmospheric pressure:	1024	mBar
Cone specifications		
Cone base area:	1500	mm2
Load tip resistance (nom.):	100	kN
Friction sleeve area:	22500	mm2
Load tip + local friction (nom.):	100	kN
Load friction sleeve (nom.):	22.5	kN
Load pore pressure (nom.):	2	MPa
Inclination (nom.):	+/- 20	°
Temperature compensation (all channels):	0...+40	°C
Maximum overload capacity (all channels):	100	%
Cone area ratio (a):	0.79	
Max. Inaccuracy, relative to measurement value:	1.0	%

	Tip:		Sleeve:		Pore Pressure:		Inclinometer:		
	qc in kN	mV	fs in kN	mV	MPa	mV	Degrees	X (mV)	Y (mV)
Zero points:		0252		0236		0266			
	0	0	0	0	0	0	0	2437	2322
	5	0303	5	0312	0.4	1382	-20	0330	0187
	10	0607	10	0623	0.8	2758	20	4583	4472
	15	0911	15	0936	1.2	4131			
	20	1214	20	1248	1.6	5499			
	25	1521	25	1563	2.0	6851			
	30	1826	30	1876					
	35	2131	35	2190					
	40	2436	40	2504					
	45	2740	45	2815					
	50	3042	50	3127					
	75	4551	75	4676					
	100	6055	100	6222					

Max. error, abs. qc: 35 kPa
Max. error, abs. fs: 2 kPa
Max. error, abs. u2: 10 kPa
Max. error, abs. I: 1 °

This calibration is compliant with GeoPoint Systems internal quality system, internal calibration procedures and meets the requirements of NEN2649, NEN-EN-ISO 22476-1, NORSOK G-001, ISSMFE and ASTM using calibration equipment traceable to (Inter-) National Standards.

Approved by: B. van Eijk
Date: 15-11-2016

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www.geopoint.eu

APPENDIX A4 – Project Summary Sheet

CPT Tests Summary Sheet

HOLE ID	Final Depth (m)	Date of Test	Cone Used	Test Remarks
CPT 01	7.55	16/03/2017	S15CFIIP.1486	Test refused on tip resistance.
CPT 02	8.70	16/03/2017	S15CFIIP.1486	Test refused on tip resistance.
CPT 03	3.75	16/03/2017	S15CFIIP.1486	Test refused on tip resistance.
CPT 04	7.68	16/03/2017	S15CFIIP.1486	Test refused on tip resistance.
CPT 05	3.09	16/03/2017	S15CFIIP.1486	Test refused on tip resistance.
CPT 05A	3.22	16/03/2017	S15CFIIP.1486	Test refused on tip resistance.
CPT 06	6.32	16/03/2017	S15CFIIP.1486	Test refused on tip resistance.
CPT 07	8.80	16/03/2017	S15CFIIP.1486	Test refused on tip resistance.
CPT 08	7.43	16/03/2017	S15CFIIP.1486	Test refused on tip resistance.
CPT 09	3.41	16/03/2017	S15CFIIP.1486	Test refused on tip resistance.
CPT 10	6.60	16/03/2017	S15CFIIP.1486	Test refused on tip resistance.

APPENDIX A5 – CPT Rig Datasheet

RIGS

14 TONNE CPT TRACK MOUNTED RIG (CPT002)

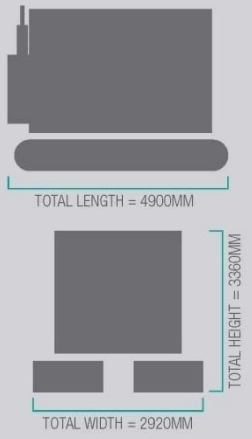
We have a variety of rigs giving us the capacity to meet our clients' needs and specifications for each individual project.

This tracked rig weighs 14 tonnes and is able to push up to a depth of 30 metres, depending on the ground conditions. It has low ground bearing pressure due to the width of the tracks and is ideal for soft, boggy sites which are inaccessible for our wheeled rigs.

CPT RIG DETAILS

DRIVE SYSTEM	RUBBER TRACKED
TOTAL WEIGHT	14 TONNES
CPT RAM THRUST CAPACITY	10 TONNES
MAXIMUM PENETRATION	20-30M DEPENDING ON THE GROUND CONDITIONS.
PERFORMANCE RATES	120M OF TESTING A DAY, DEPENDING ON ACCESS TO POSITIONS.
TYPICAL SITES FOR THIS RIG	SOFT BOGGY SITES. THE RIG HAS VERY LOW GROUND BEARING PRESSURE DUE TO THE WIDTH OF THE TRACKS.

CPT RIG DIMENSIONS



IN SITU SITE INVESTIGATION INSITUSI.COM

APPENDIX A6 – Symbol List

English

a	is area ratio of the cone ($= {}^{A_n}/_{A_c}$)
A	is area
A_c	is projected area of the cone
A_n	is cross sectional area of load cell or shaft
A_s	is area of friction sleeve
A_{sb}	is bottom end area of friction sleeve
A_{st}	is top end area of friction sleeve
B_q	is pore pressure parameter ($= {}^{(u_2 - u_0)}/_{(q_t - \sigma_{v0})}$)
c_h	is horizontal coefficient of consolidation
c_v	is vertical coefficient of consolidation
D	is diameter
D_r	is relative density ($= \frac{e_{max} - e}{e_{max} - e_{min}} x100\%$)
e	is void ratio
e_{max}	is maximum void ratio
e_{min}	is minimum void ratio
E	is Young's modulus
f_s	is unit sleeve friction resistance
f_t	is sleeve friction corrected for pore pressure effects
F_s	is total force acting on friction sleeve
F_R	is normalized friction ratio ($= {}^{f_s}/_{(q_t - \sigma_{v0})}$)
FoS	is factor of safety
FC	is fines content
g	is acceleration due to gravity
G_0	is initial or maximum shear modulus, shear stiffness
I_c	is soil behavior type index
I_r	is rigidity index ($= {}^{G}/_{s_u}$)
I_p	is plasticity index
k	is coefficient of permeability
k_h	is coefficient of permeability in horizontal direction
k_v	is is coefficient of permeability in vertical direction
K_0	is coefficient of earth pressure at rest ($= {}^{\sigma'_{h0}}/_{\sigma'_{v0}}$)
L	is length
m_v	is coefficient of volume change
M	is constrained deformation modulus
M7.5	is earthquake magnitude of 7.5 Richter scale
N	is number of blows of SPT
N_{60}	is SPT energy ratio
N_k	is cone factor
N_{ke}	is cone factor
N_{kt}	is cone factor
$N_{\Delta u}$	is cone factor
p_a	is reference stress ($= 100\ kPa$)
q_c	measured cone resistance
q_e	effective cone resistance ($= q_t - u_2$)
q_n	is net cone resistance ($= q_t - \sigma_{v0}$)

q_t	is corrected cone resistance ($= q_c - (1-a)u_2$)
Q_c	is total force acting on the cone
Q_t	is normalized cone resistance ($= {q_t - \sigma_{v0}}/{\sigma'_{v0}}$)
R_f	is friction ratio ($= \left({f_t}/{q_t}\right) x100\%$ or alternatively $= \left({f_t}/{q_t}\right) x100\%$)
s_u	is undrained shear strength
s_{ur}	is remoulded undrained shear strength
S_t	is sensitivity
t	is time
t_{50}	is time for 50% dissipation of excess pore water pressure
T_{50}	is time factor at $U = 50\ \%$
u	is pore water pressure
u_0	is in situ pore pressure
u_1	is pore pressure measured on the cone
u_2	is pore pressure measured behind the cone
u_3	is pore pressure measured behind sleeve friction
Δu	is excess pore water pressure
U	is normalized excess pore pressure
V_s	is shear wave velocity
z	is depth

Greek

α	is constant
α	is cone roughness
β	is constant
β_1	is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane, in degrees
β_2	is the angle between the vertical axis and the projection of the axis of the CPTU on a vertical plane that is perpendicular to the plane of angle β_1, in degrees
γ	is unit weight of soil
γ_w	unit weight of water
Δ	is change
Δu	is excess pore pressure ($= u - u_0$)
μ	is Poisson's ratio
ρ	is density
ψ	is state parameter
σ, σ'	is normal stress (total, effective)
σ_h, σ_h'	is horizontal stress (total, effective)
σ_v, σ_v'	is horizontal stress (total, effective)
σ_{v0},σ_{v0}'	is overburden stress (total, effective)
τ_{av}	average cyclic shear stress
τ_{cy}	cyclic shear stress
φ'	effective friction angle

APPENDIX A7 – Abbreviations

ASTM	is American Society for Testing and Materials
CPTU	Cone Pentration Test with Pore Pressure Measurement (Piezocone Test)
CRR	Cyclic Resistance Ratio
CSR	Cyclic Stress Ratio
GWT	Ground Water Table
NC	Normally Consolidated
OC	Overconsolidated
OCR	Overconsolidation Ratio
PL	Limit Pressure
SDMT	Seismic Dilatometer Marchetti
SPT	Standard Penetration Test
TC	Technical Committee

APPENDIX A8 – Glossary

CPT
Cone Penetration Test.

Cone
The part of the cone penetrometer on which the end bearing is developed.

Cone Penetrometer
The assembly containing the *cone*, *friction sleeve*, any other sensors and measuring systems, as well as the connections to the *push-rods.*

Cone resistance, q_c
The total force acting on the cone, Q_c, divided by the projected area of the cone, A_c. $q_c = {Q_c}/{A_c}$

Corrected cone resistance, q_t
The *cone resistance*, q_c corrected for pore water pressure effects.

Corrected sleeve friction, f_t
The *sleeve friction* corrected for pore water pressure effects on the ends of the *friction sleeve*.

Data acquisition system
The system used to measure and record the measurements made by the *cone penetrometer*.

Dissipation Test
A test when the decay of the pore water pressure is monitored during a pause in penetration.

Filter element
The porous element inserted into the cone penetrometer to allow transmission of the pore water pressure to the pore pressure sensor, while maintaining the correct profile of the *cone penetrometer*.

Friction ratio, R_f
The ratio, expressed as a percentage of the *sleeve friction*, f_s, to the *cone resistance*, q_c, both measured at the same depth.

Friction reducer
A local enlargement on the push-rod surface, placed at a distance above the cone penetrometer, and provided to reduce the friction on the *push-rods*.

Friction sleeve
The section of the *cone penetrometer* upon which the *sleeve friction* is measured.

Normalized cone resistance, Q_c or Q_t
The *cone resistance* expressed in a non dimensional form and taking account of stress changes *in situ*, $Q_c = {(q_c - \sigma_{v0})}/{\sigma'_{v0}}$, or when the *corrected cone resistance* is used $Q_t = {(q_t - \sigma_{v0})}/{\sigma'_{v0}}$. where σ_{v0} and σ'_{v0} are the total and effective vertical stress respectively.

Net cone resistance, q_n
The *corrected cone resistance* minus the vertical total stress. $q_n = q_t - \sigma_{v0}$

Normalized friction ratio, F_r
The *sleeve friction* normalized by the *net cone resistance*.

Piezocone
A *cone penetrometer* containing a pore pressure sensor.

Pore pressure, u
The pore pressure generated during penetration and measured by a pore pressure sensor, u_1 when measured on the cone, u_2 when measured just behind the cone and u_3 when measured just behind the friction sleeve.

Pore pressure ratio, B_q
The *net pore pressure* normalized with respect to the *net cone resistance*.

Push-rods
The thick-walled tubes or rods used for advancing the cone penetrometer.

Rig machine
The equipment which pushes the cone penetrometer and rods into the ground.

Sleeve friction, f_s
The total frictional force acting on the *friction sleeve*, F_s, divided by its *surface area*, A_s. $f_s = {}^{F_s}/_{A_s}$

APPENDIX A9 – Soils Description Tables

GRANULAR SOILS (Sands and Gravels)

Description	Relative Density D_r (%)	SPT N value, N_{SPT}
Very Loose	0 – 15	0 - 4
Loose	15 – 35	4 - 10
Medium Dense	35 – 65	10 - 30
Dense	65 – 85	30 - 50
Very Dense	>85	>50

COHESIVE SOILS (Clays and Silts)

Term based on measurement	Undrained Shear Strength Classification, s_u (kPa)
Extremely low	<10
Very low	10 - 20
Low	20 - 40
Medium	40 - 75
High	75 - 150
Very high	150 - 300
Extremely high	>300

APPENDIX B

Cone Penetration Measured Parameters

IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

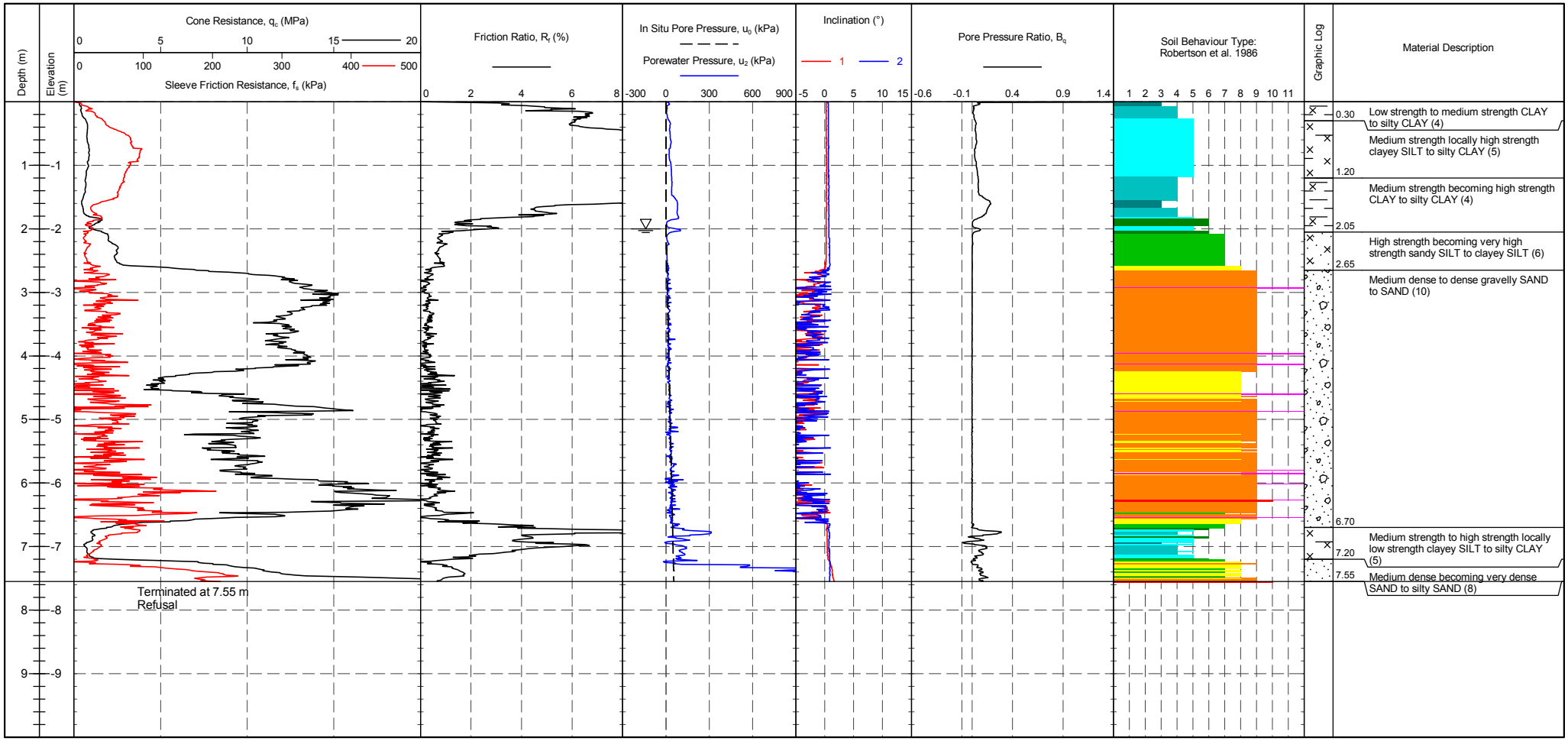
CPT 01

CLIENT : Geotechnics Limited
PROJECT : Newark
LOCATION : Newark
PROJECT No. : 1170175

EASTING :
NORTHING :
ELEVATION : 0.00 m
CHECKED BY : Luisa Dhimitri
TERMINATION REASON : Refusal

REMARK
Test refused on tip resistance.

SHEET : 1 OF 1
STATUS : Final
TEST DATE : 16/03/2017
PLOT DATE : 20/03/2017
METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2		
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2		
CONE AREA RATIO	: 0.79	RIG	: CPT 006		
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough		
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 01		
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild		

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	295 mV	281 mV	-0.154 MPa
Sleeve	292 mV	276 mV	-0.011 kPa
Pore Pressure 2	266 mV	268 mV	0.001 kPa
X-Y Inclinometer	2470 mV	2450 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level
Dissipation Test

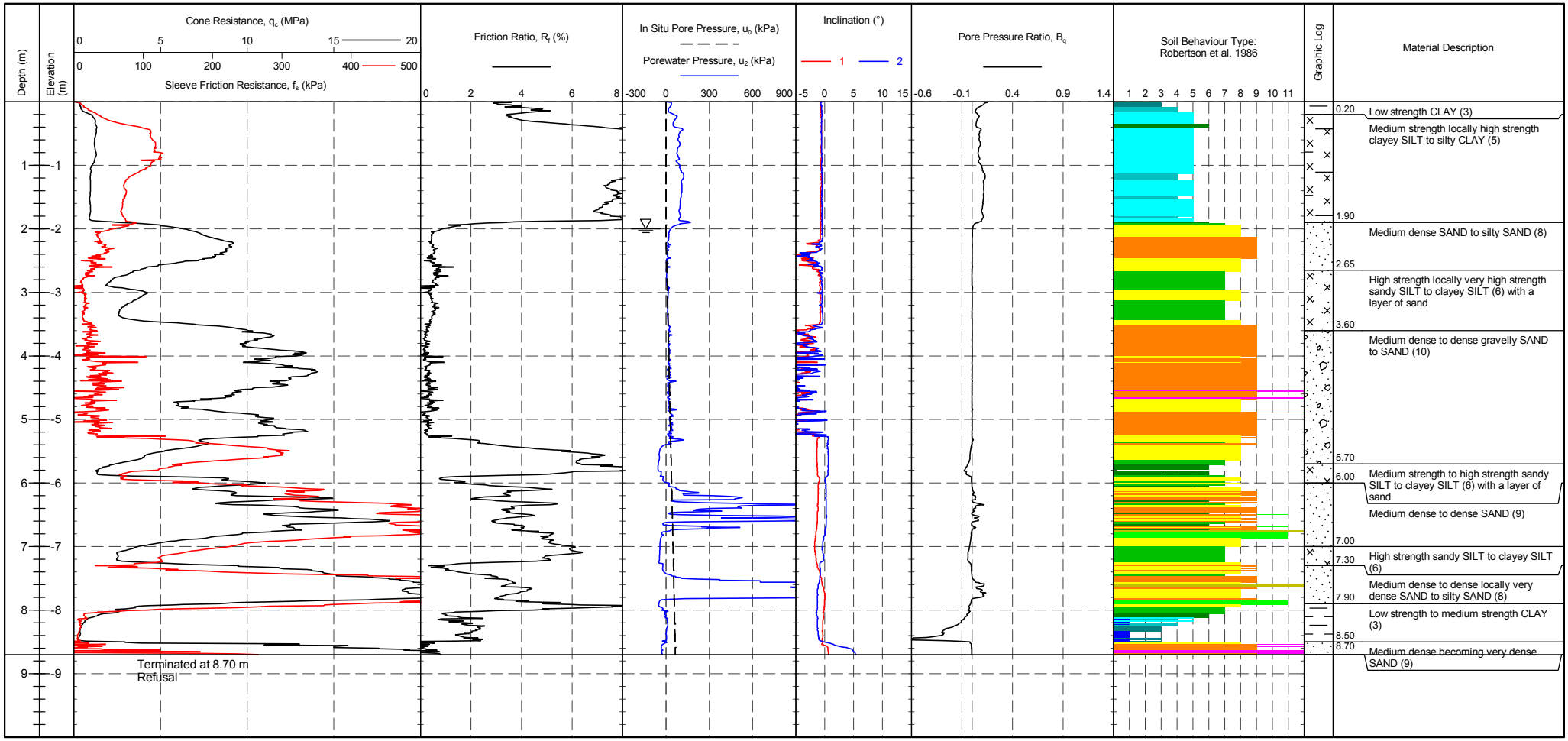
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 02

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	280 mV	-0.011 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	275 mV	271 mV	-0.003 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 02	Pore Pressure 2	275 mV	259 mV	-0.005 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2367 mV	2352 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

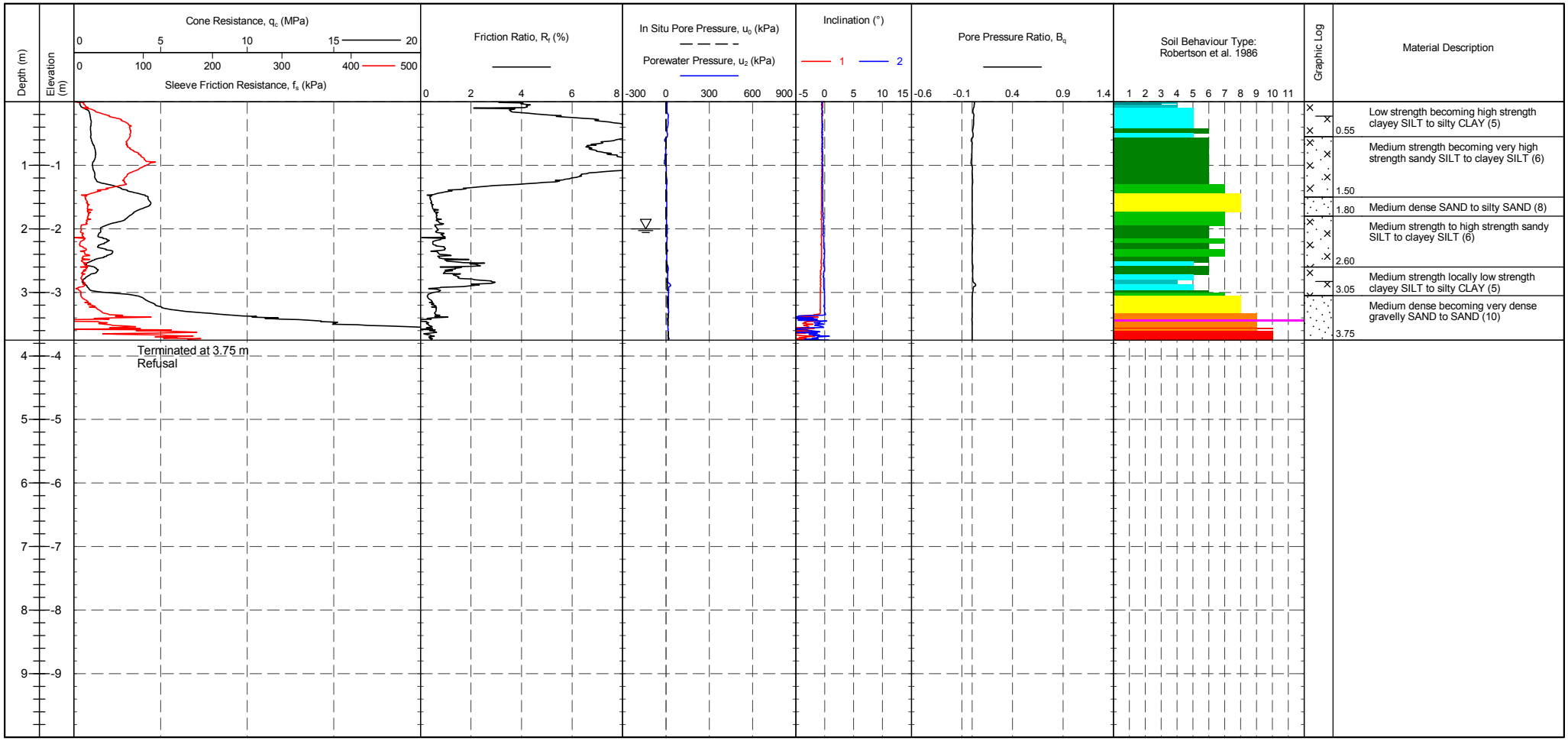
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 03

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES	
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2		
CONE AREA RATIO	: 0.79	RIG	: CPT 006		
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough		
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 03		
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild		

Transducer	Pre	Post	Difference
Tip	282 mV	282 mV	0 MPa
Sleeve	278 mV	278 mV	0 kPa
Pore Pressure 2	258 mV	257 mV	0 kPa
X-Y Inclinometer	2431 mV	2433 mV	

METHOD: Robertson et al. 1986

- 1 - Sensitive fine grained material (1)
- 2 - Organic material (2)
- 3 - CLAY (3)
- 4 - Silty CLAY to CLAY (4)
- 5 - Clayey SILT to silty CLAY (5)
- 6 - Sandy SILT to clayey SILT (6)
- 7 - Silty SAND to sandy SILT (7)
- 8 - SAND to silty SAND (8)
- 9 - SAND (9)
- 10 - Gravelly SAND to SAND (10)
- 11 - Very stiff fine grained (11)
- 12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

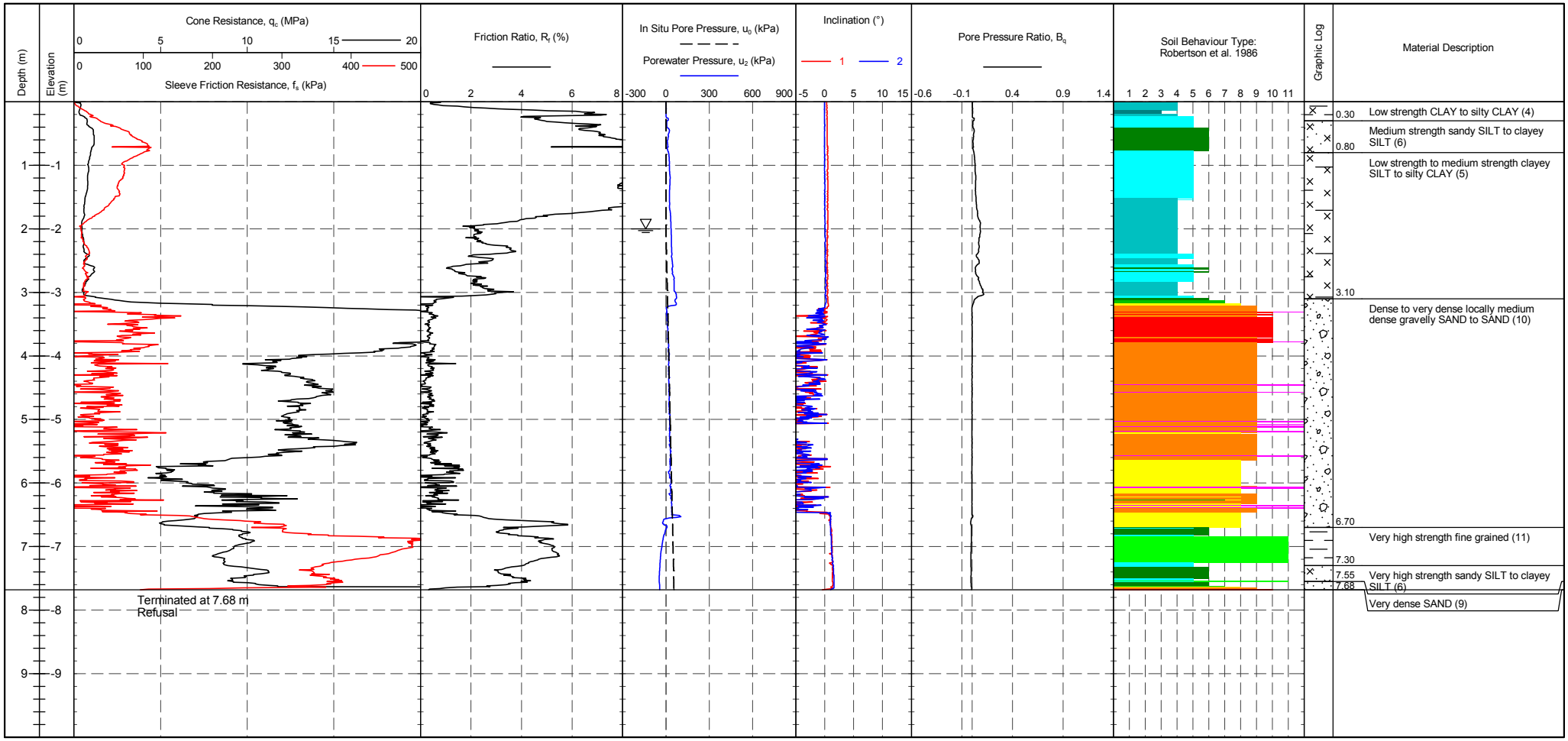
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 04

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES	
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Transducer	Pre / Post / Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	282 mV / 280 mV / -0.022 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	277 mV / 274 mV / -0.002 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 04	Pore Pressure 2	259 mV / 252 mV / -0.002 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2466 mV / 2460 mV

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

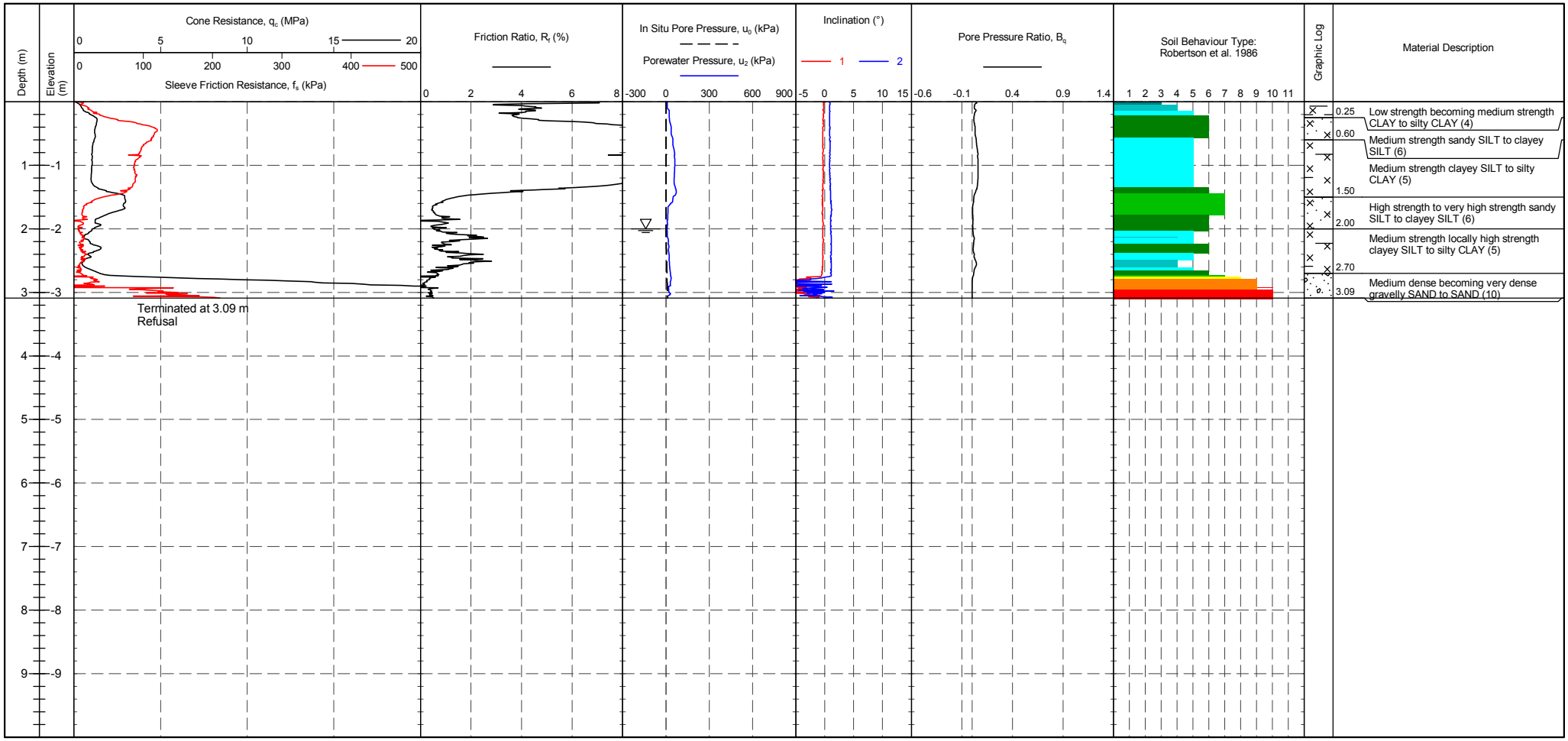
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 05

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES		
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Transducer	Pre	Post
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	283 mV
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	276 mV	279 mV
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 05	Pore Pressure 2	254 mV	258 mV
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2427 mV	2399 mV

Difference
0.022 MPa
0.002 kPa
0.001 kPa

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

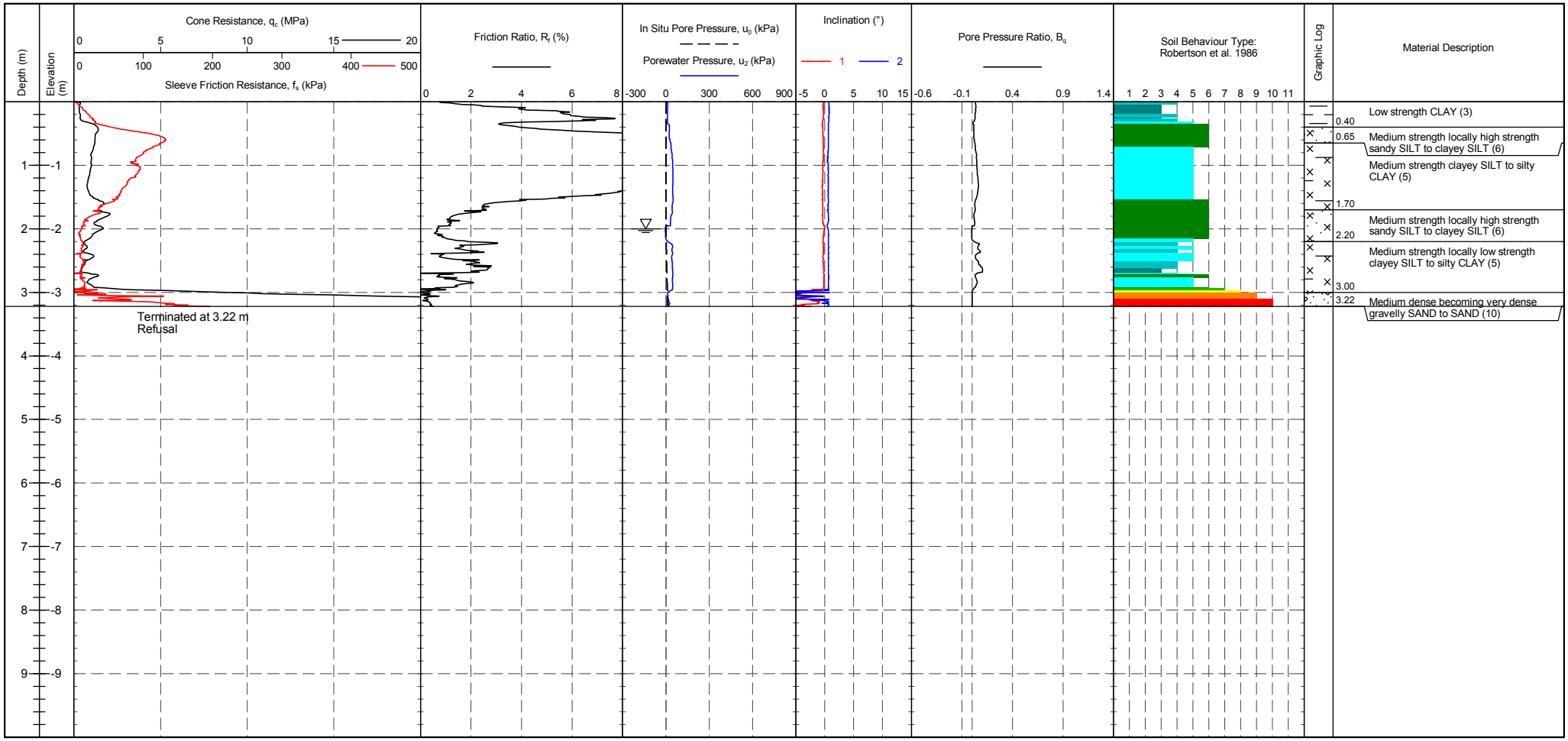
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 05A

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES		
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Transducer	Pre	Post
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	283 mV	283 mV
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	278 mV	279 mV
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 05A	Pore Pressure 2	257 mV	253 mV
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2402 mV	2431 mV

Difference
0 MPa
0.001 kPa
-0.001 kPa

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

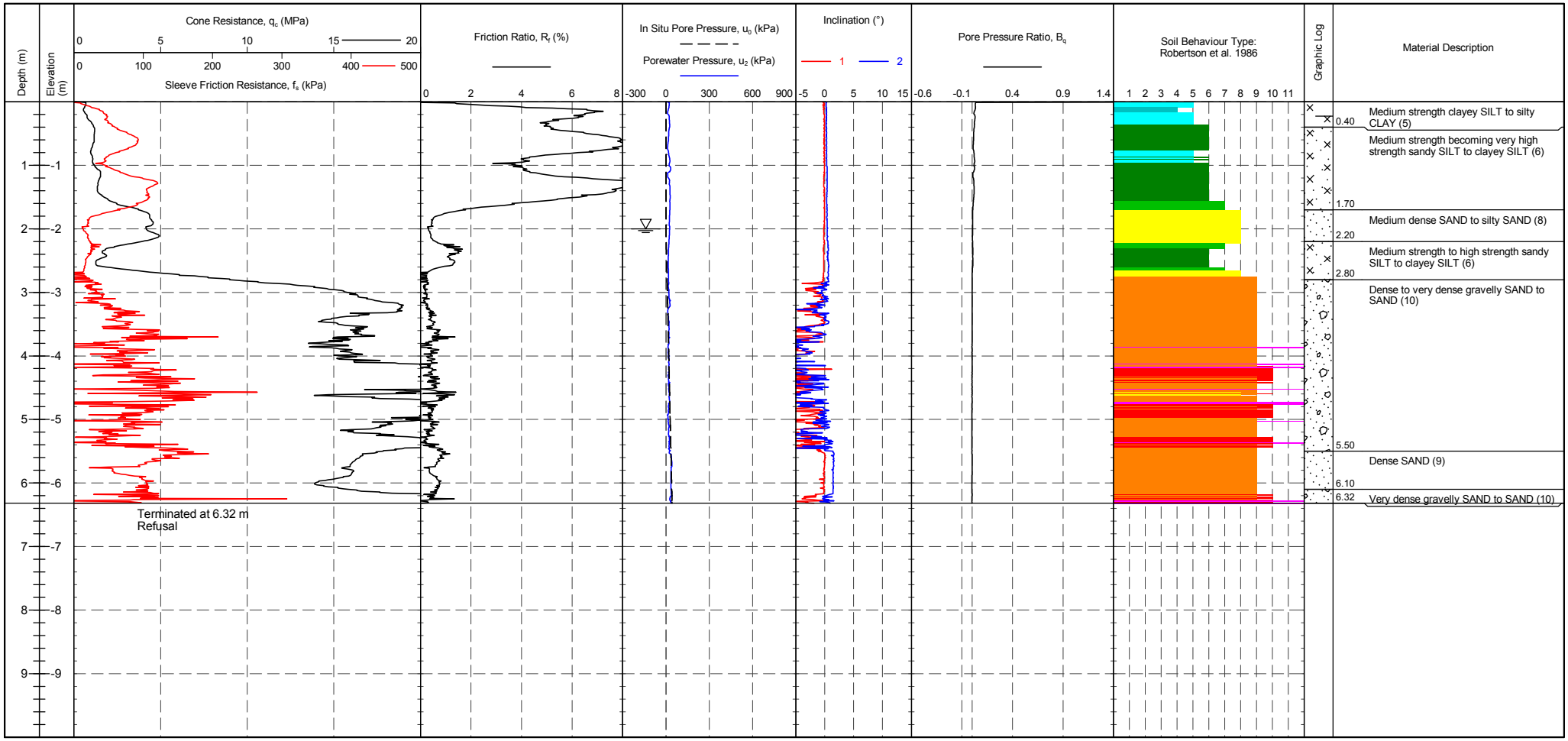
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 06

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	280 mV	-0.011 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	277 mV	276 mV	-0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 06	Pore Pressure 2	255 mV	255 mV	0 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2409 mV	2424 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

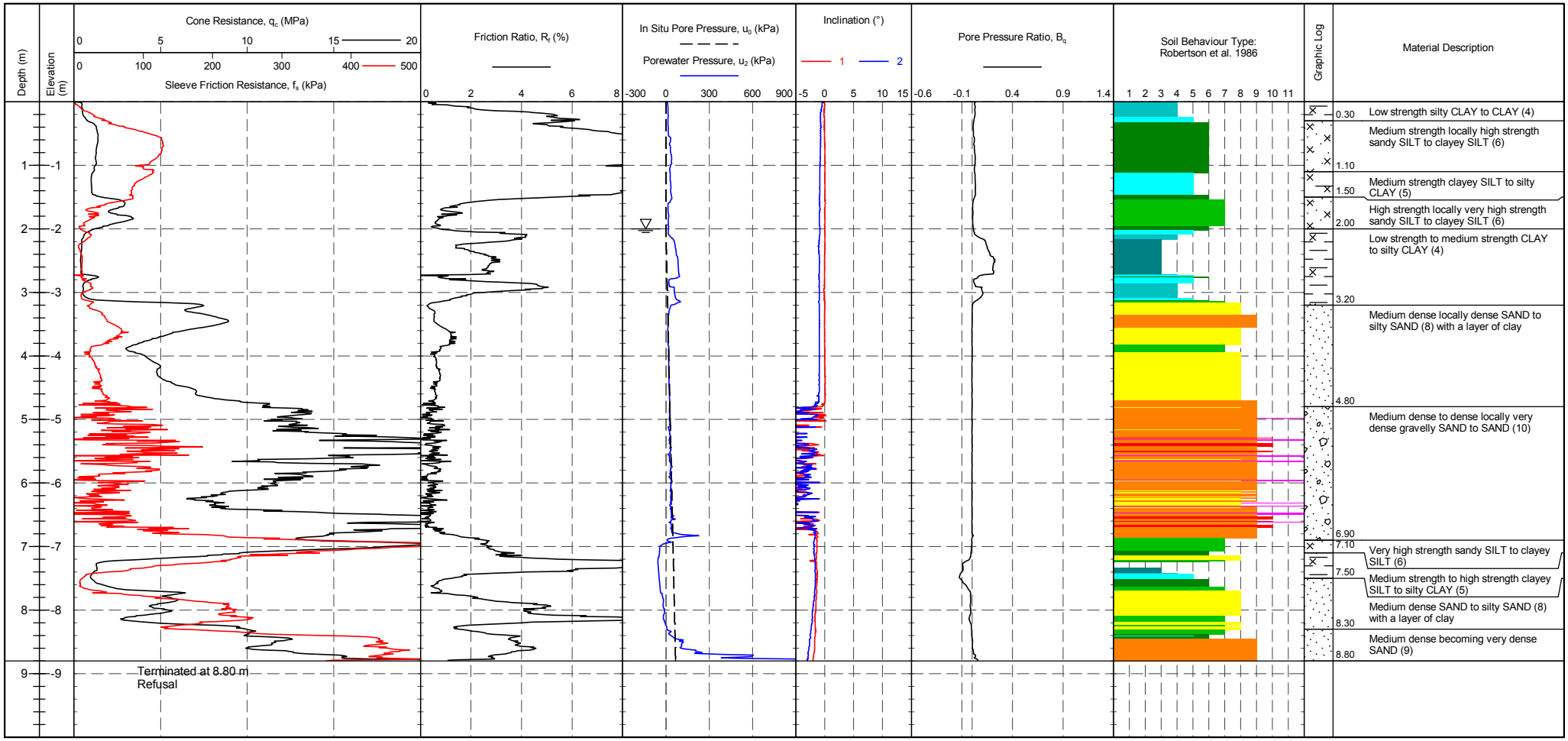
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 07

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2		
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2		
CONE AREA RATIO	: 0.79	RIG	: CPT 006		
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough		
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 07		
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	282 mV	280 mV	-0.022 MPa
Sleeve	277 mV	274 mV	-0.002 kPa
Pore Pressure 2	260 mV	263 mV	0.001 kPa
X-Y Inclinometer	2417 mV	2419 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

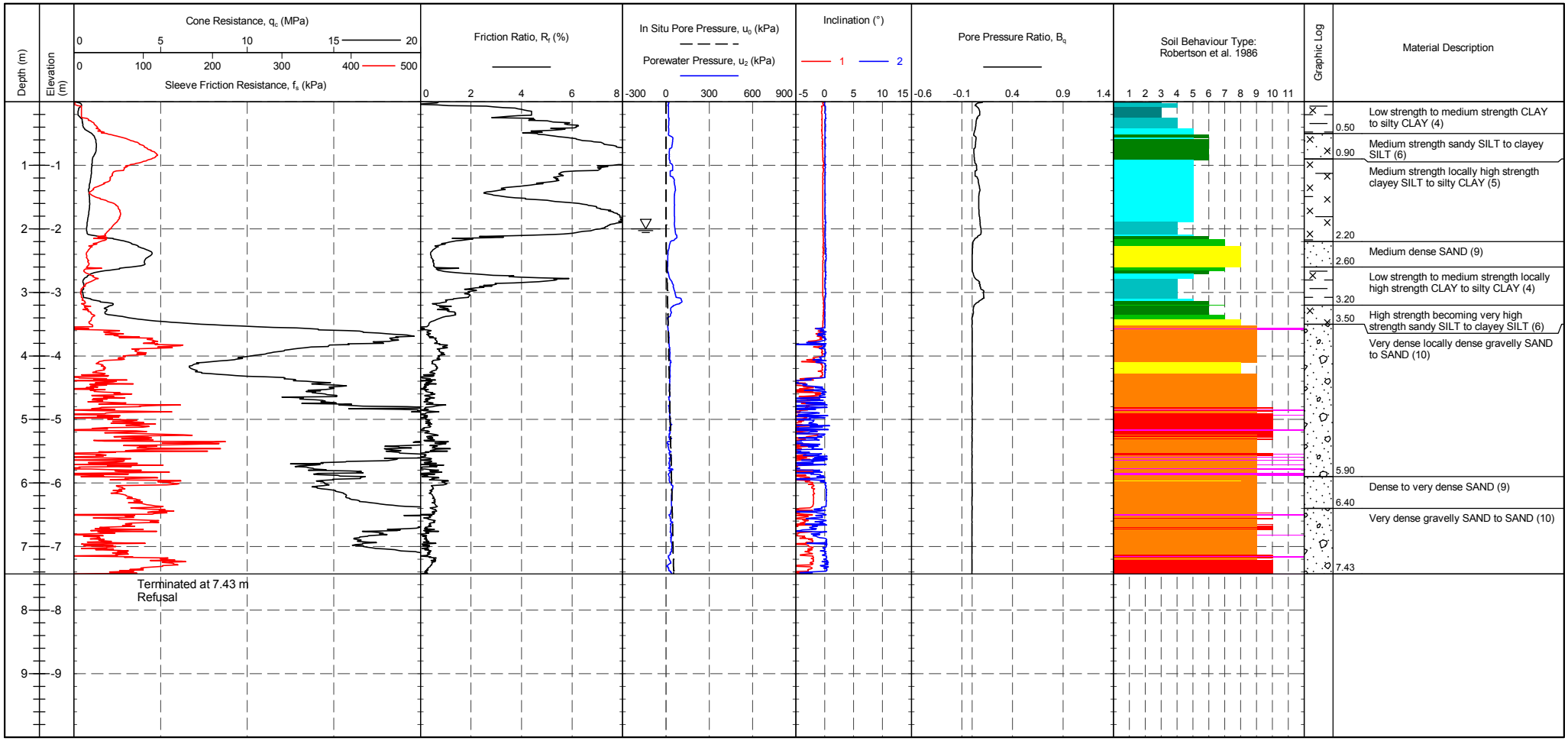
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 08

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES	
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Transducer	Pre / Post / Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV / 277 mV / -0.044 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	275 mV / 273 mV / -0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 08	Pore Pressure 2	255 mV / 249 mV / -0.002 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2372 mV / 2381 mV

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

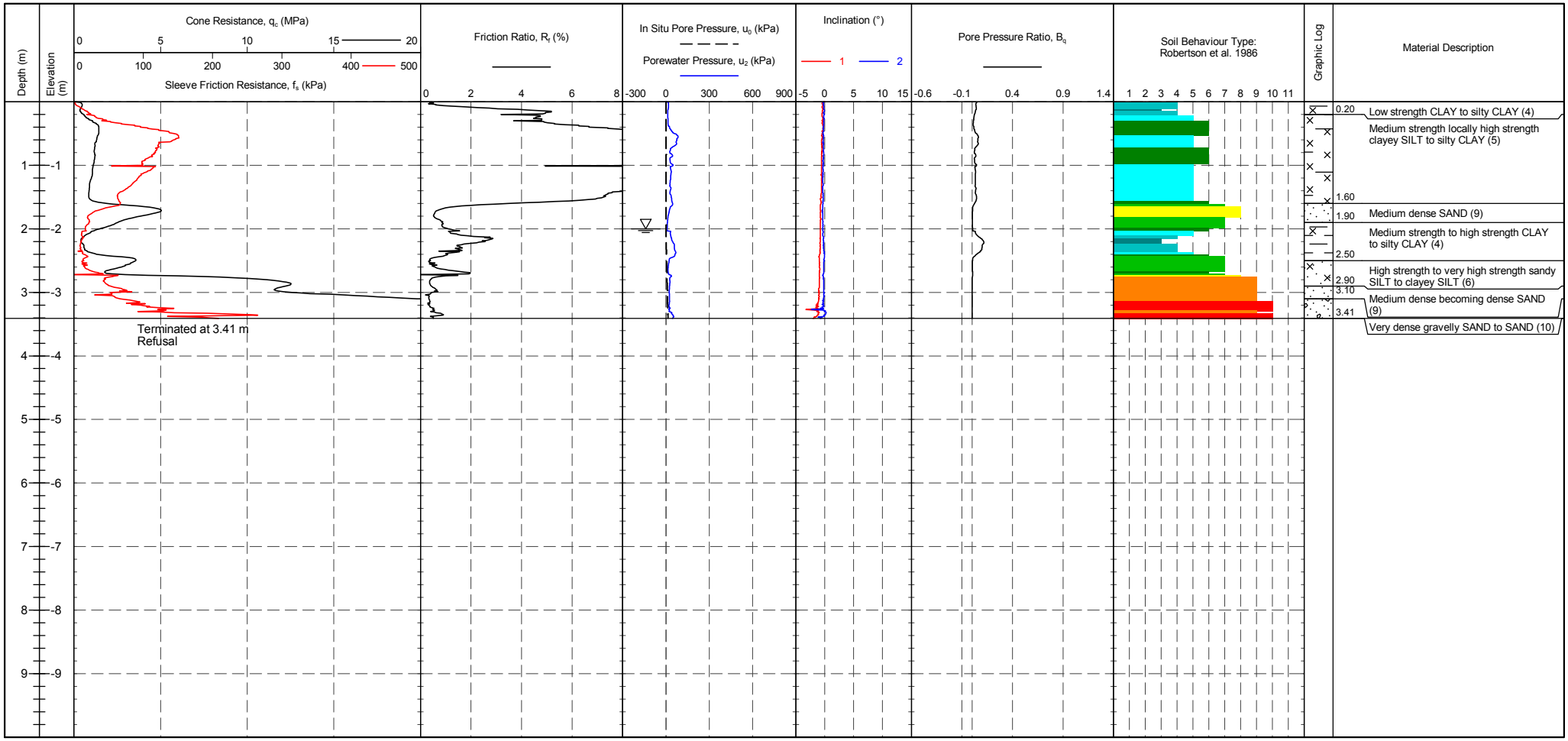
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 09

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	284 mV	0.033 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	267 mV	279 mV	0.009 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 09	Pore Pressure 2	259 mV	254 mV	-0.001 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2457 mV	2437 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

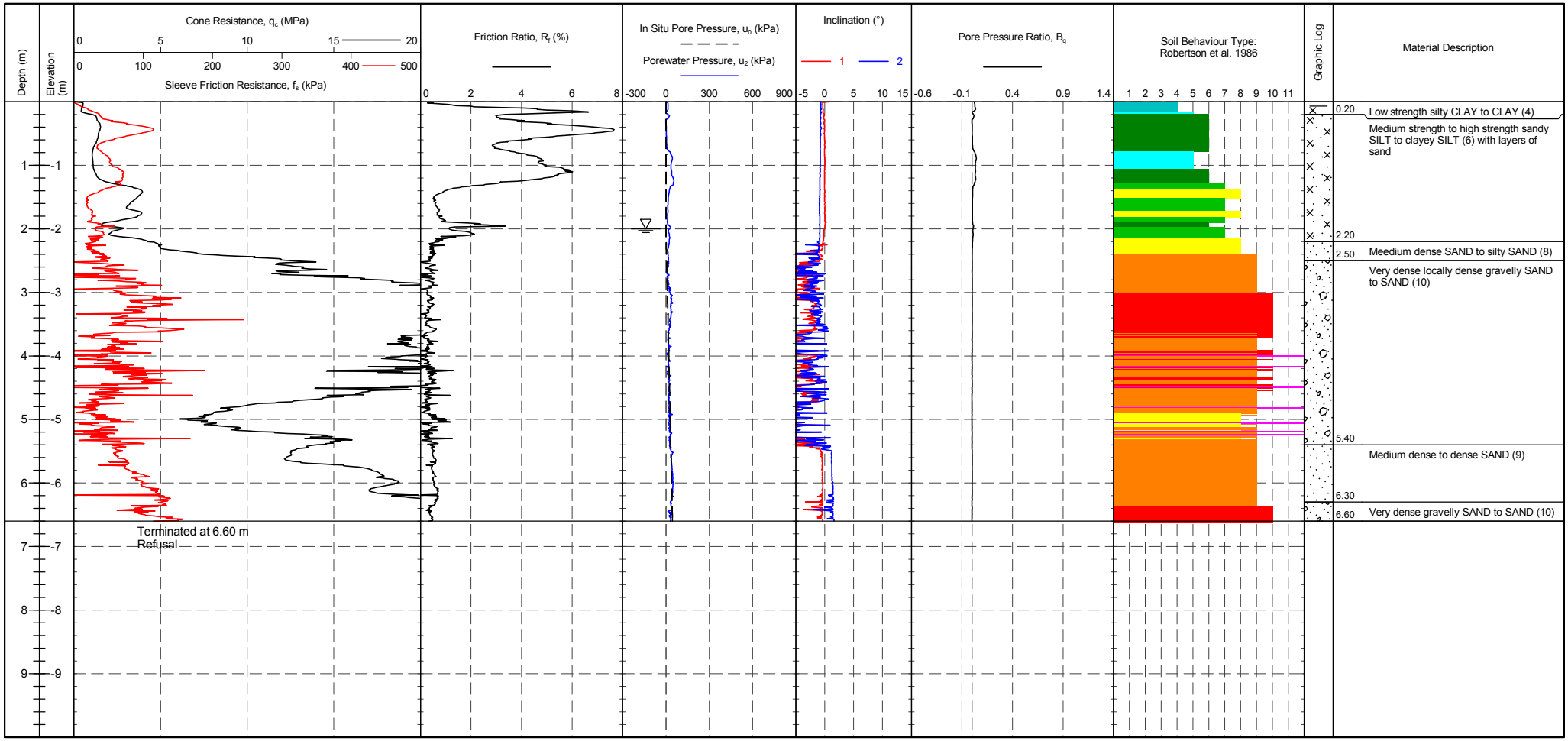
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 10

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2		
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2		
CONE AREA RATIO	: 0.79	RIG	: CPT 006		
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough		
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 10		
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild		

CPTU ZERO VALUES

Transducer	Pre	Post	Difference
Tip	280 mV	277 mV	-0.033 MPa
Sleeve	273 mV	265 mV	-0.006 kPa
Pore Pressure 2	266 mV	253 mV	-0.004 kPa
X-Y Inclinometer	2528 mV	2393 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

APPENDIX C

Geotechnical Derived Parameters

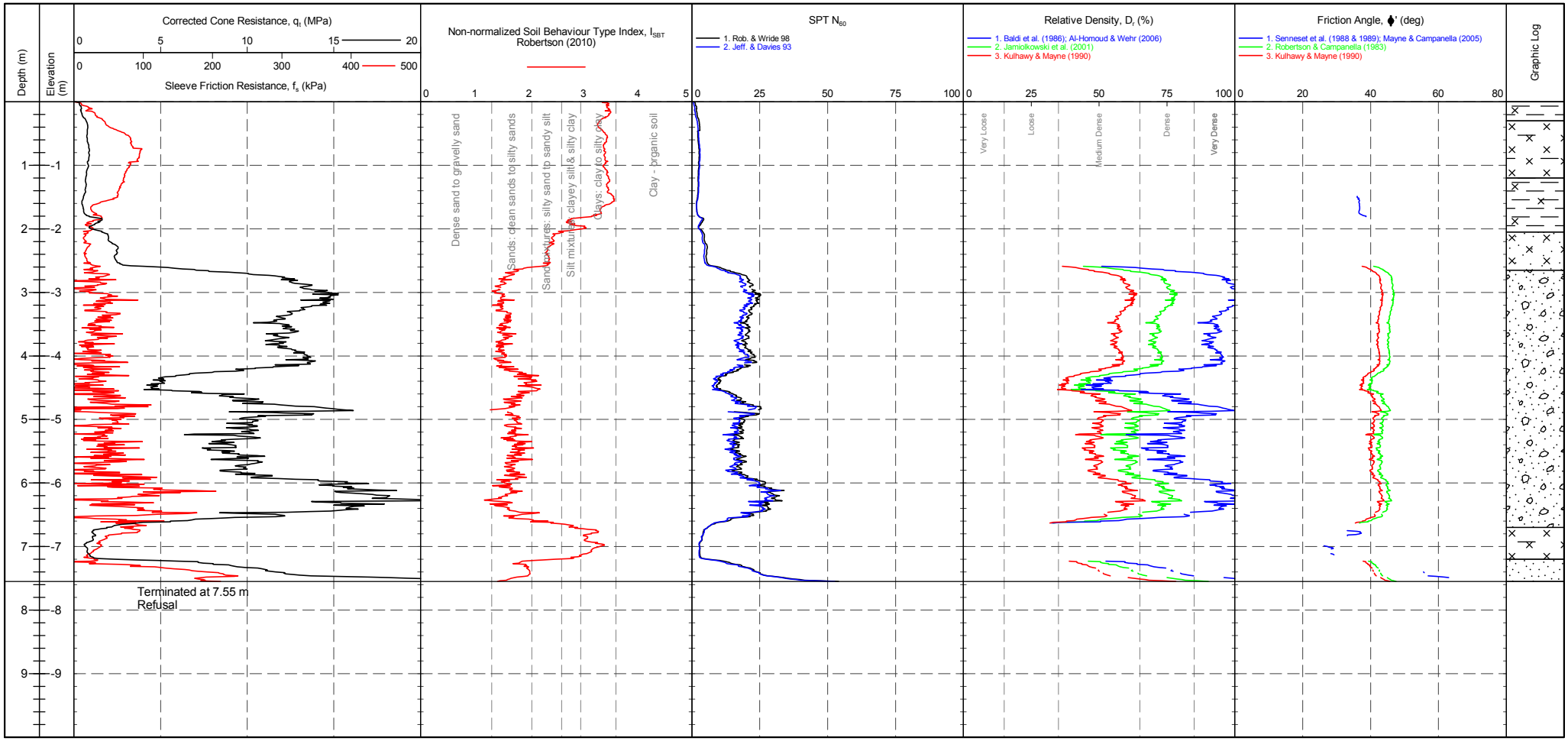
IN SITU SITE INVESTIGATION Working with:

CPT LOG 02

PointID

CPT 01

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Tip	295 mV	281 mV	-0.154 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	292 mV	276 mV	-0.011 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	266 mV	268 mV	0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 01	X-Y Inclinometer	2470 mV	2450 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

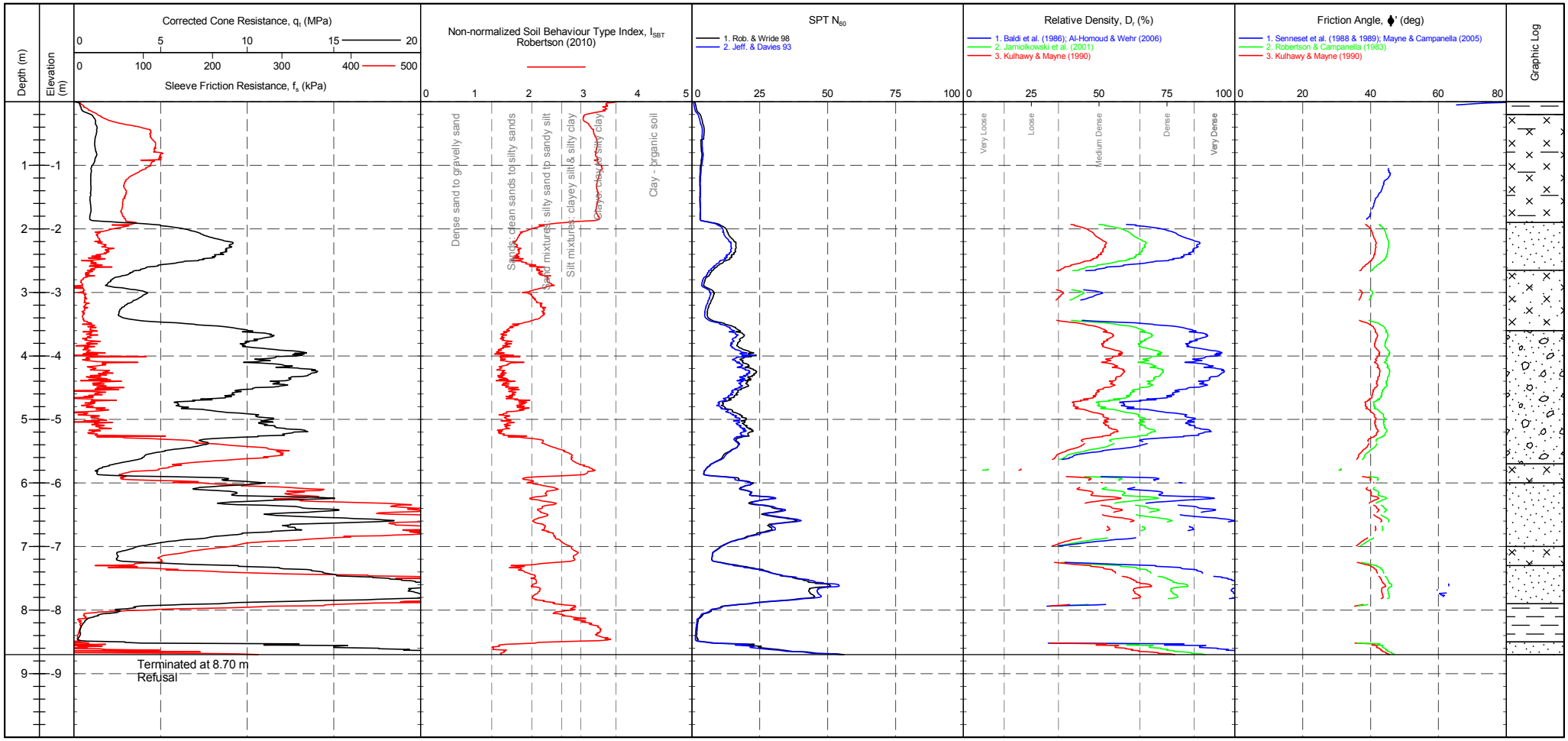
IN SITU SITE INVESTIGATION Working with:

CPT LOG 02

PointID

CPT 02

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Tip	281 mV	280 mV	-0.011 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	275 mV	271 mV	-0.003 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	275 mV	259 mV	-0.005 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 02	X-Y Inclinometer	2367 mV	2352 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

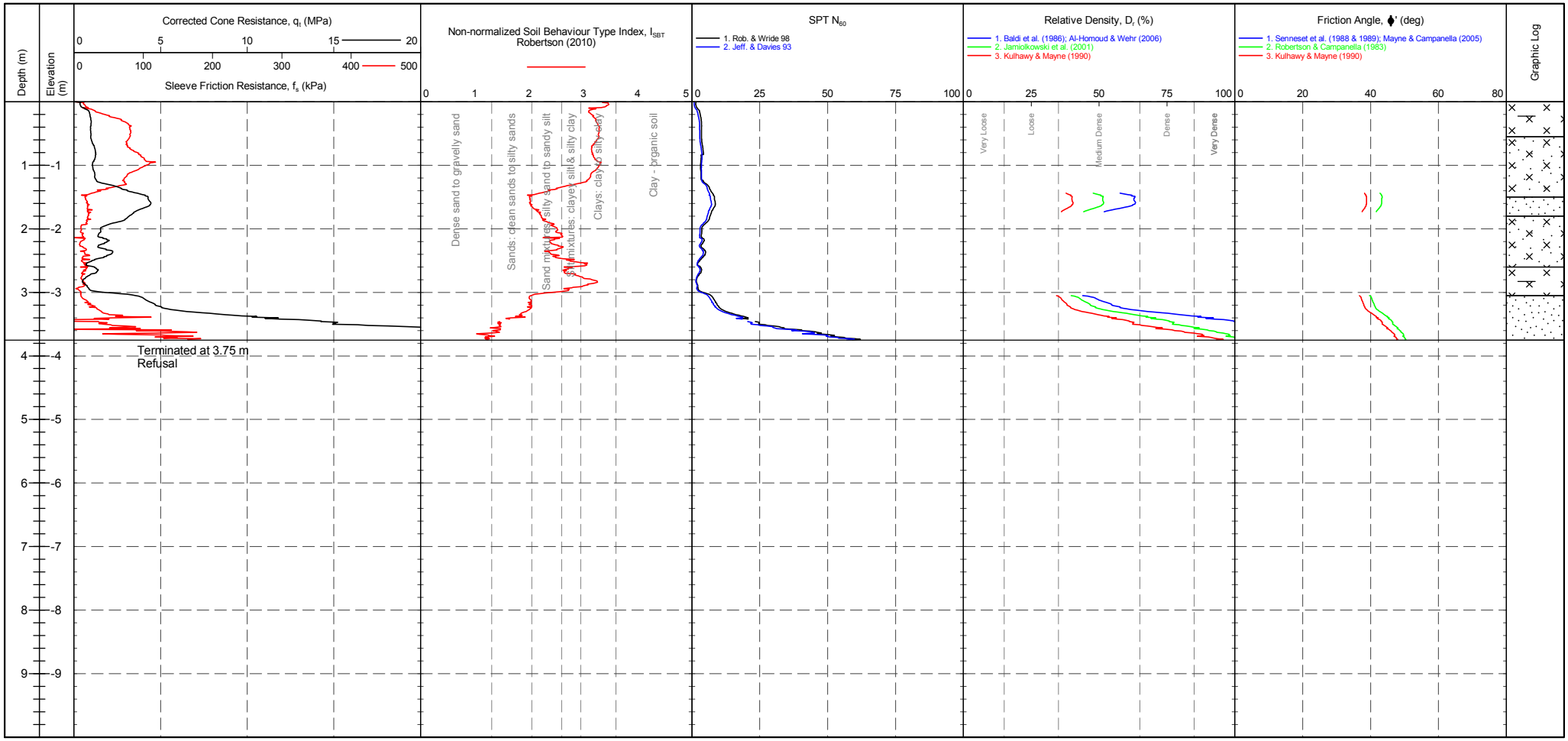
IN SITU SITE INVESTIGATION Working with:

CPT LOG 02

PointID

CPT 03

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Tip	282 mV	282 mV	0 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	278 mV	278 mV	0 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	258 mV	257 mV	0 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 03	X-Y Inclinometer	2431 mV	2433 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

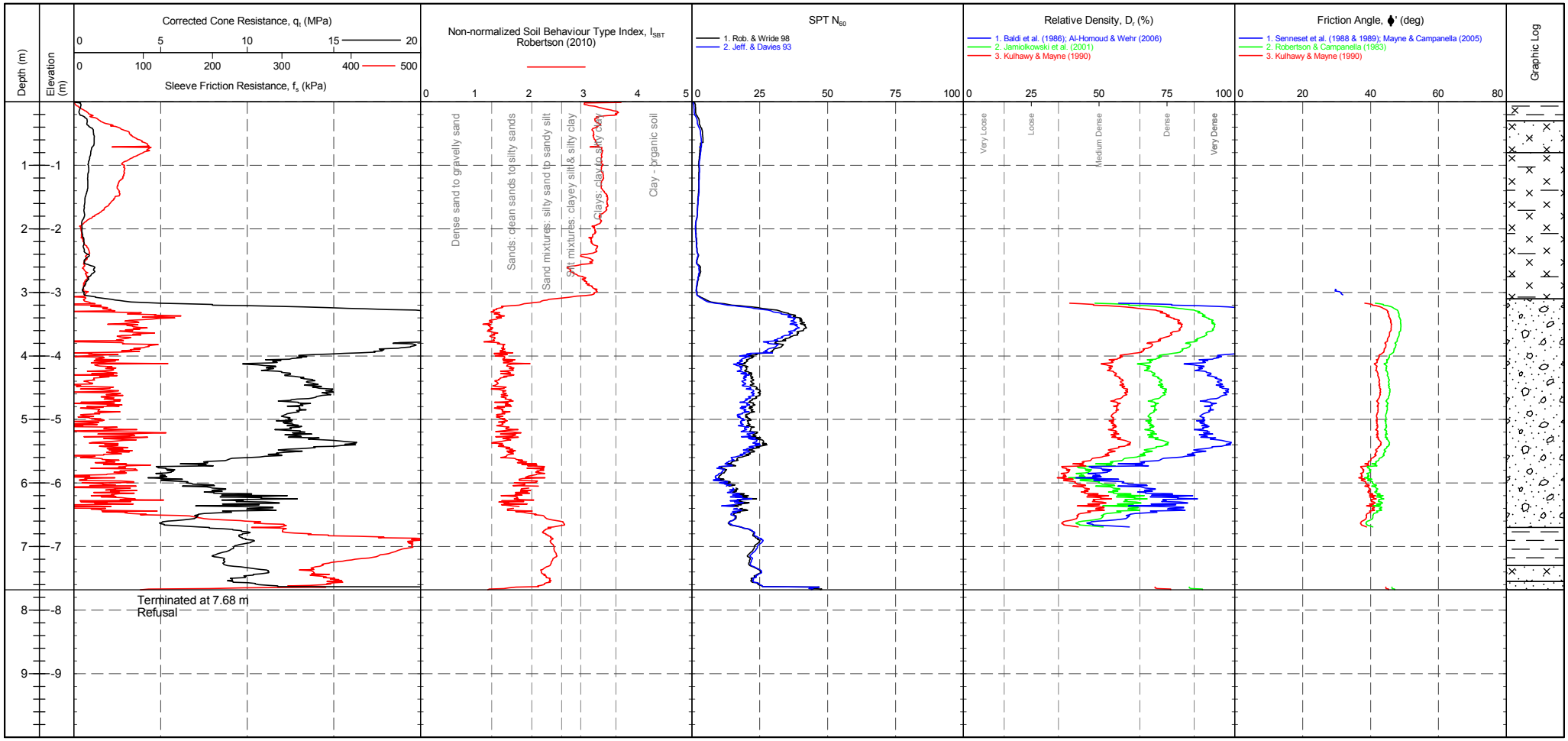
IN SITU SITE INVESTIGATION Working with:

CPT LOG 02

PointID

CPT 04

CLIENT : Geotechnics Limited PROJECT : Newark LOCATION : Newark PROJECT No. : 1170175	EASTING : NORTHING : ELEVATION : 0.00 m CHECKED BY : Luisa Dhimitri TERMINATION REASON : Refusal	REMARK Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 16/03/2017 PLOT DATE : 20/03/2017 METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	282 mV	280 mV	-0.022 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	277 mV	274 mV	-0.002 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 04	Pore Pressure 2	259 mV	252 mV	-0.002 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2466 mV	2460 mV	

Groundwater Level

Dissipation Test

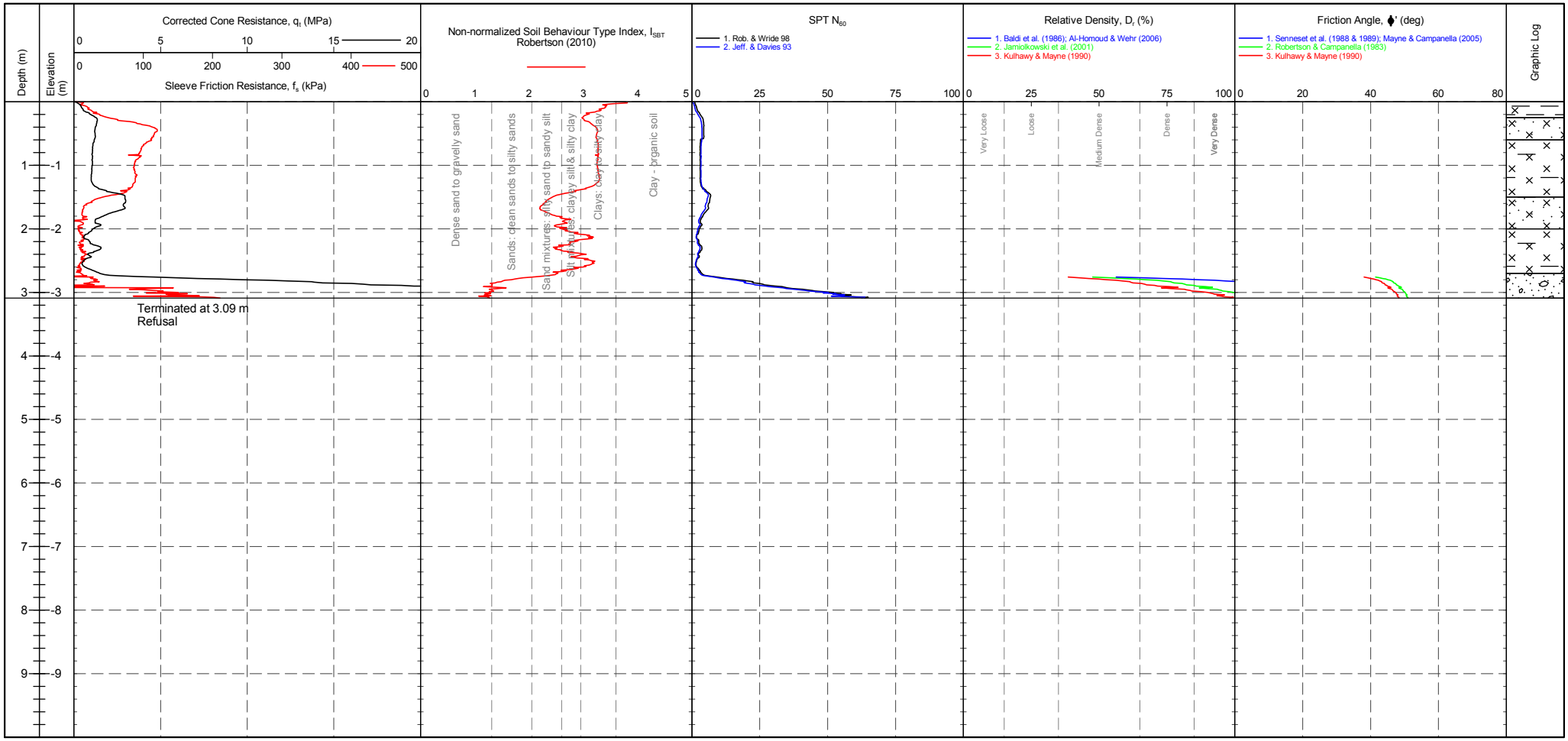
IN SITU SITE INVESTIGATION Working with:

CPT LOG 02

PointID

CPT 05

CLIENT : Geotechnics Limited PROJECT : Newark LOCATION : Newark PROJECT No. : 1170175	EASTING : NORTHING : ELEVATION : 0.00 m CHECKED BY : Luisa Dhimitri TERMINATION REASON : Refusal	REMARK Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 16/03/2017 PLOT DATE : 20/03/2017 METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	283 mV	0.022 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	276 mV	279 mV	0.002 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 05	Pore Pressure 2	254 mV	258 mV	0.001 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2427 mV	2399 mV	

Groundwater Level

Dissipation Test

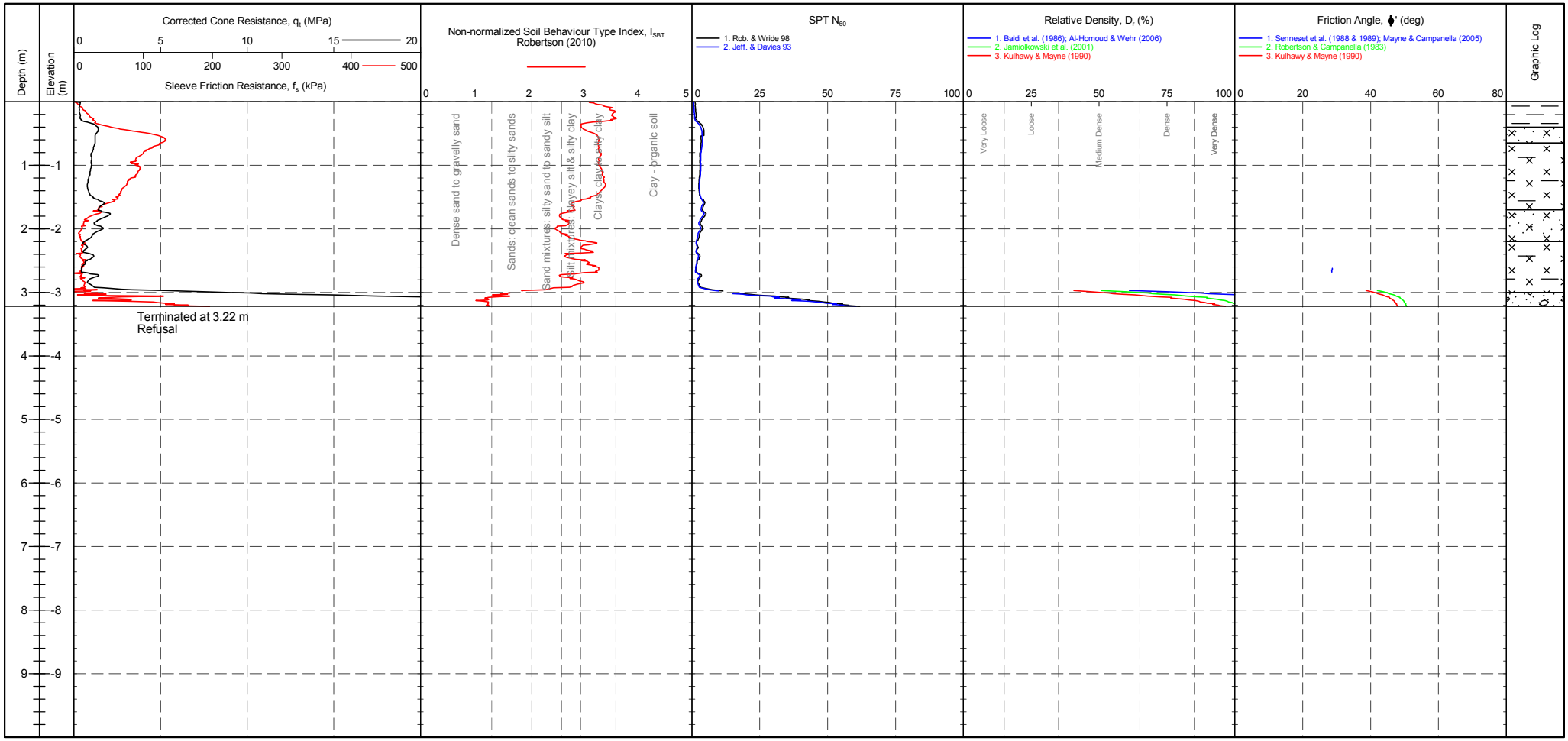
IN SITU SITE INVESTIGATION Working with:

CPT LOG 02

PointID

CPT 05A

CLIENT : Geotechnics Limited PROJECT : Newark LOCATION : Newark PROJECT No. : 1170175	EASTING : NORTHING : ELEVATION : 0.00 m CHECKED BY : Luisa Dhimitri TERMINATION REASON : Refusal	REMARK Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 16/03/2017 PLOT DATE : 20/03/2017 METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	283 mV	283 mV	0 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	278 mV	279 mV	0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 05A	Pore Pressure 2	257 mV	253 mV	-0.001 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2402 mV	2431 mV	

Groundwater Level

Dissipation Test

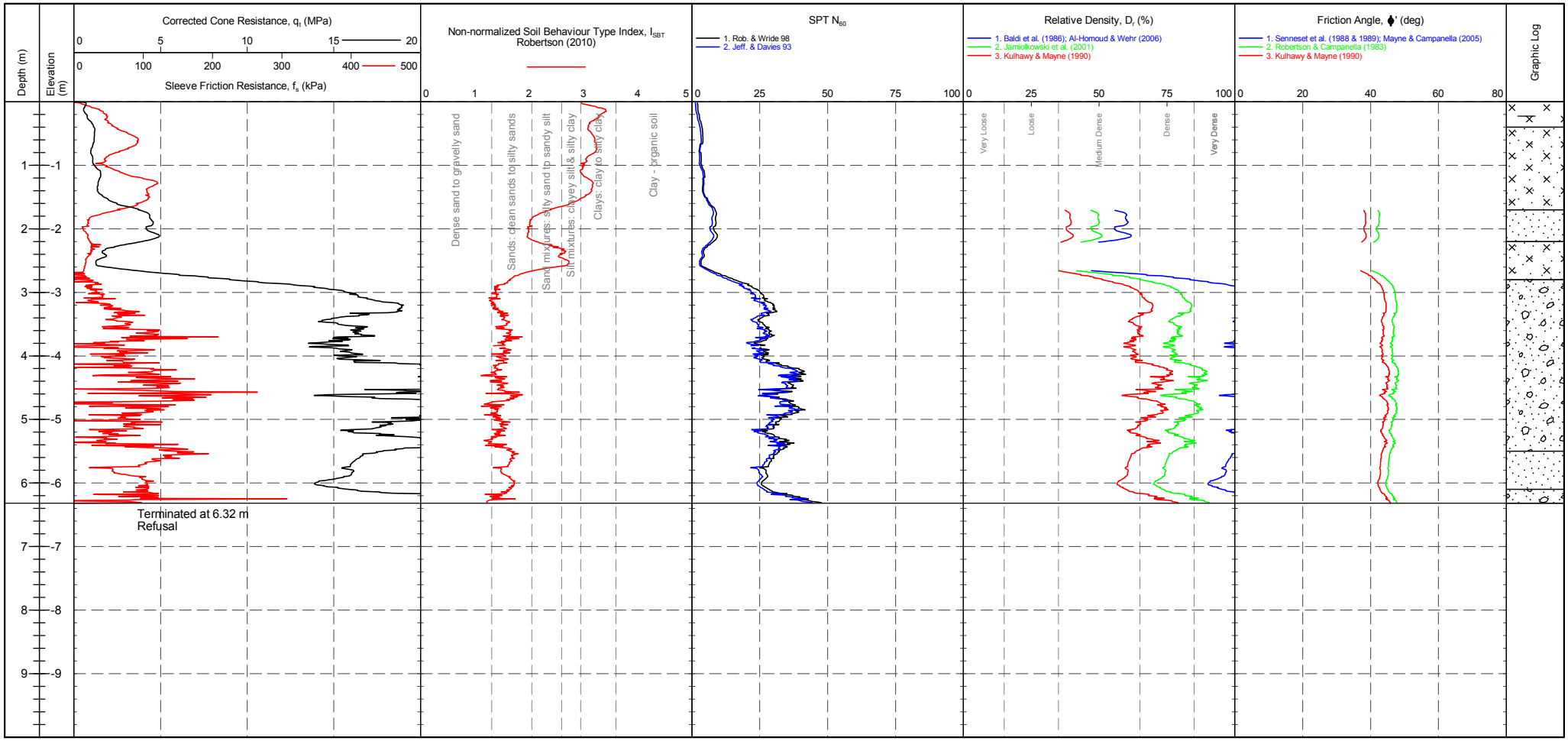
IN SITU SITE INVESTIGATION Working with:

CPT LOG 02

PointID

CPT 06

CLIENT : Geotechnics Limited PROJECT : Newark LOCATION : Newark PROJECT No. : 1170175	EASTING : NORTHING : ELEVATION : 0.00 m CHECKED BY : Luisa Dhimitri TERMINATION REASON : Refusal	REMARK Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 16/03/2017 PLOT DATE : 20/03/2017 METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	280 mV	-0.011 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	277 mV	276 mV	-0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 06	Pore Pressure 2	255 mV	255 mV	0 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2409 mV	2424 mV	

Groundwater Level

Dissipation Test

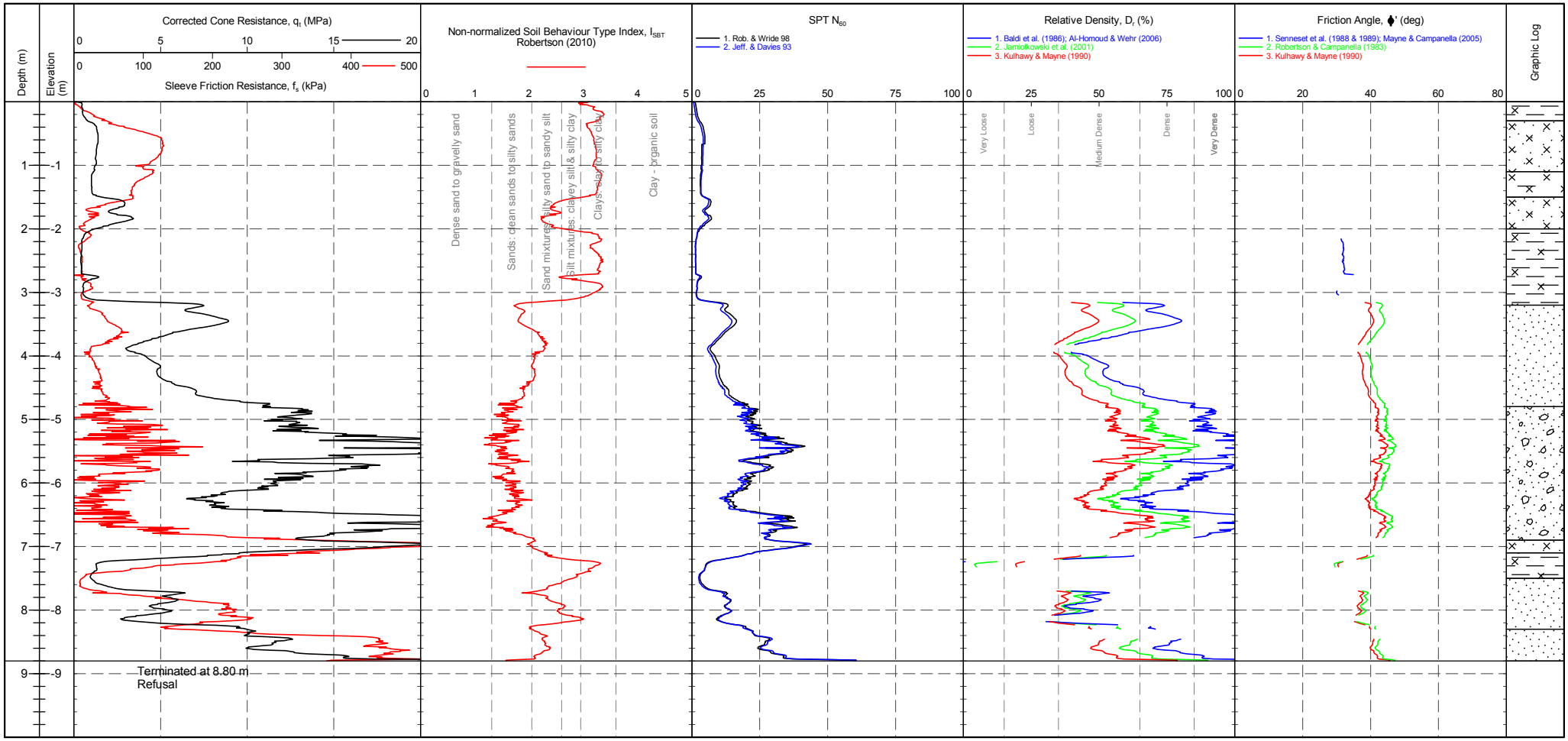
IN SITU SITE INVESTIGATION Working with:

CPT LOG 02

PointID

CPT 07

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Tip	282 mV	280 mV	-0.022 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	277 mV	274 mV	-0.002 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	260 mV	263 mV	0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 07	X-Y Inclinometer	2417 mV	2419 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

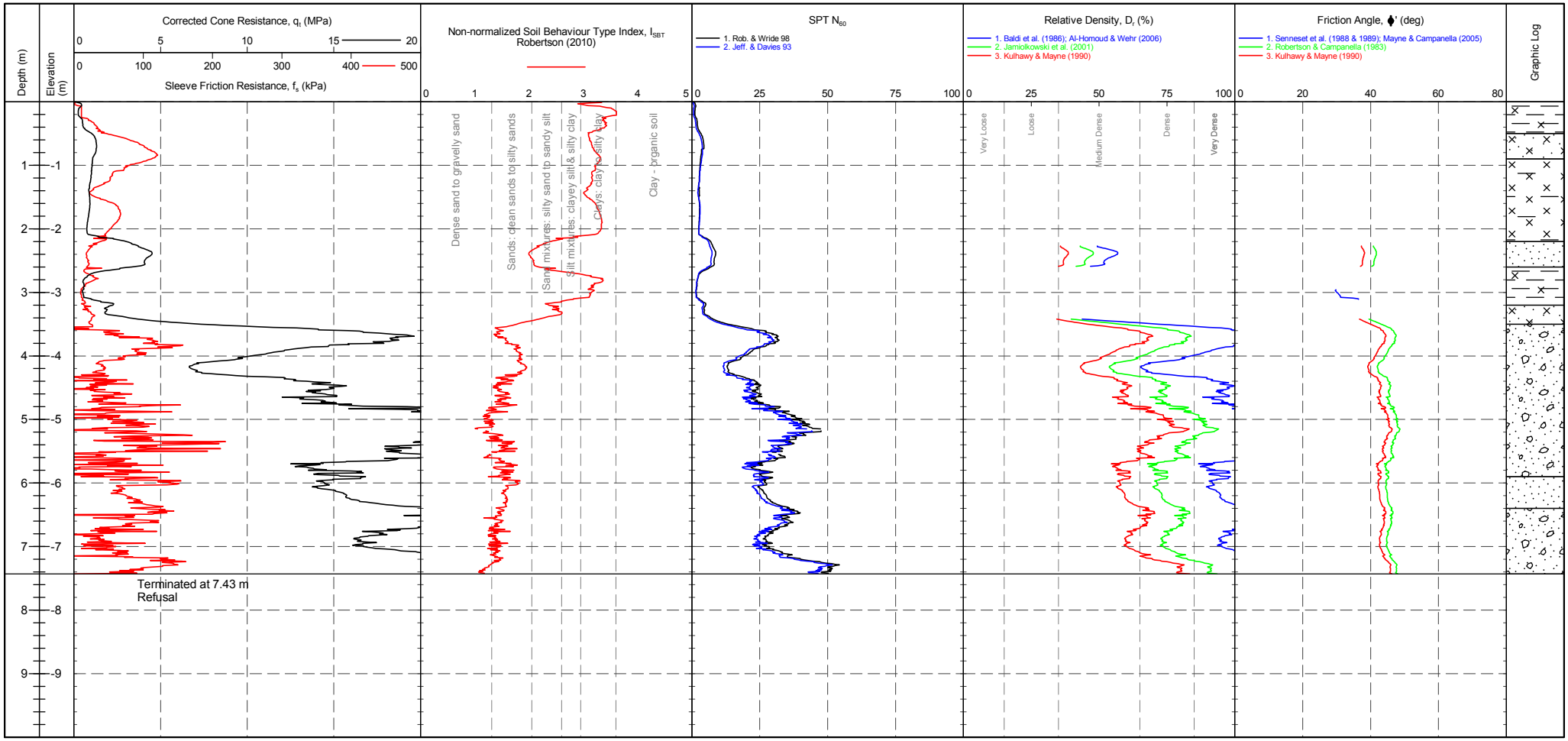
IN SITU SITE INVESTIGATION Working with:

CPT LOG 02

PointID

CPT 08

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	277 mV	-0.044 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	275 mV	273 mV	-0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 08	Pore Pressure 2	255 mV	249 mV	-0.002 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2372 mV	2381 mV	

Groundwater Level

Dissipation Test

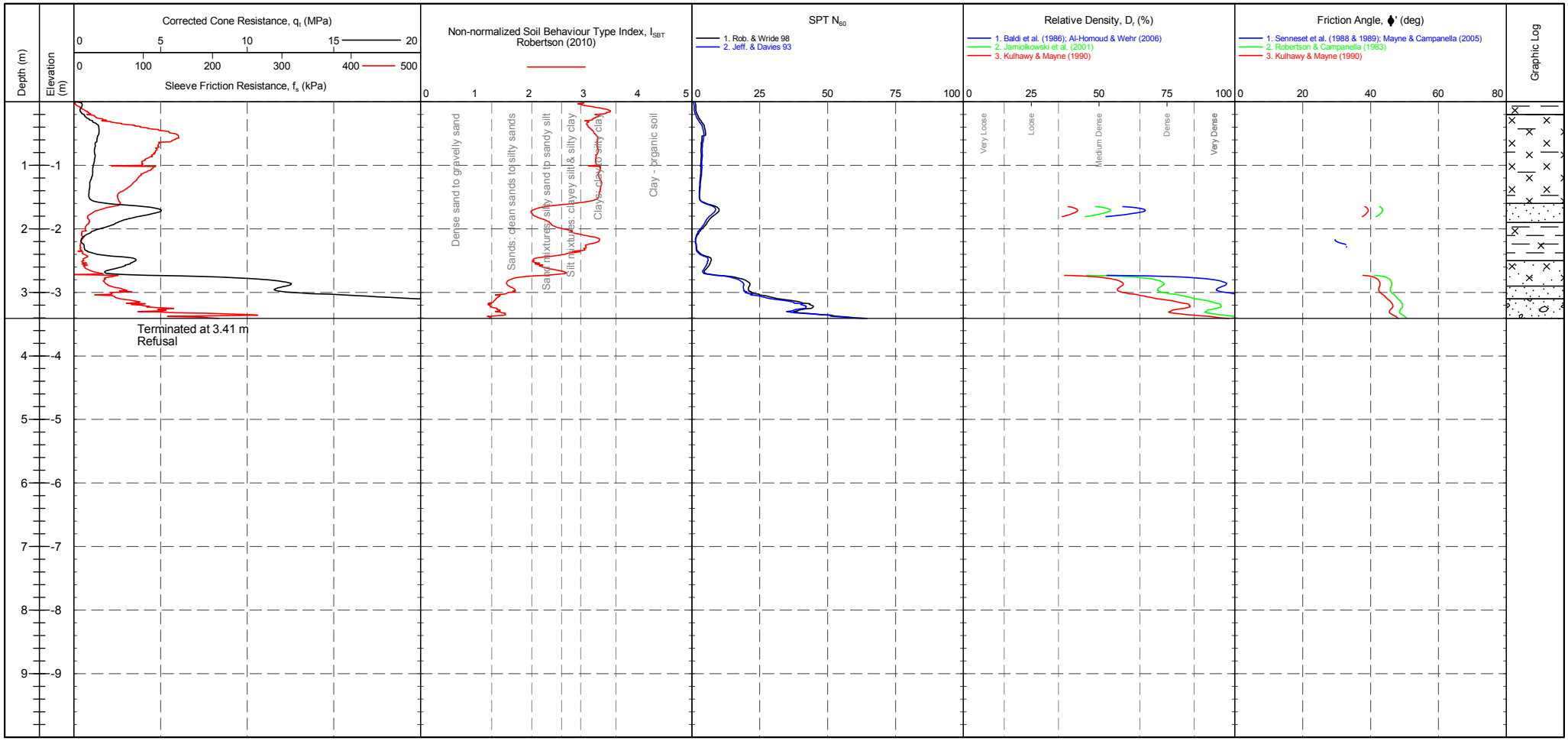
IN SITU SITE INVESTIGATION Working with:

CPT LOG 02

PointID

CPT 09

CLIENT : Geotechnics Limited PROJECT : Newark LOCATION : Newark PROJECT No. : 1170175	EASTING : NORTHING : ELEVATION : 0.00 m CHECKED BY : Luisa Dhimitri TERMINATION REASON : Refusal	REMARK Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 16/03/2017 PLOT DATE : 20/03/2017 METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	284 mV	0.033 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	267 mV	279 mV	0.009 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 09	Pore Pressure 2	259 mV	254 mV	-0.001 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2457 mV	2437 mV	

Groundwater Level

Dissipation Test

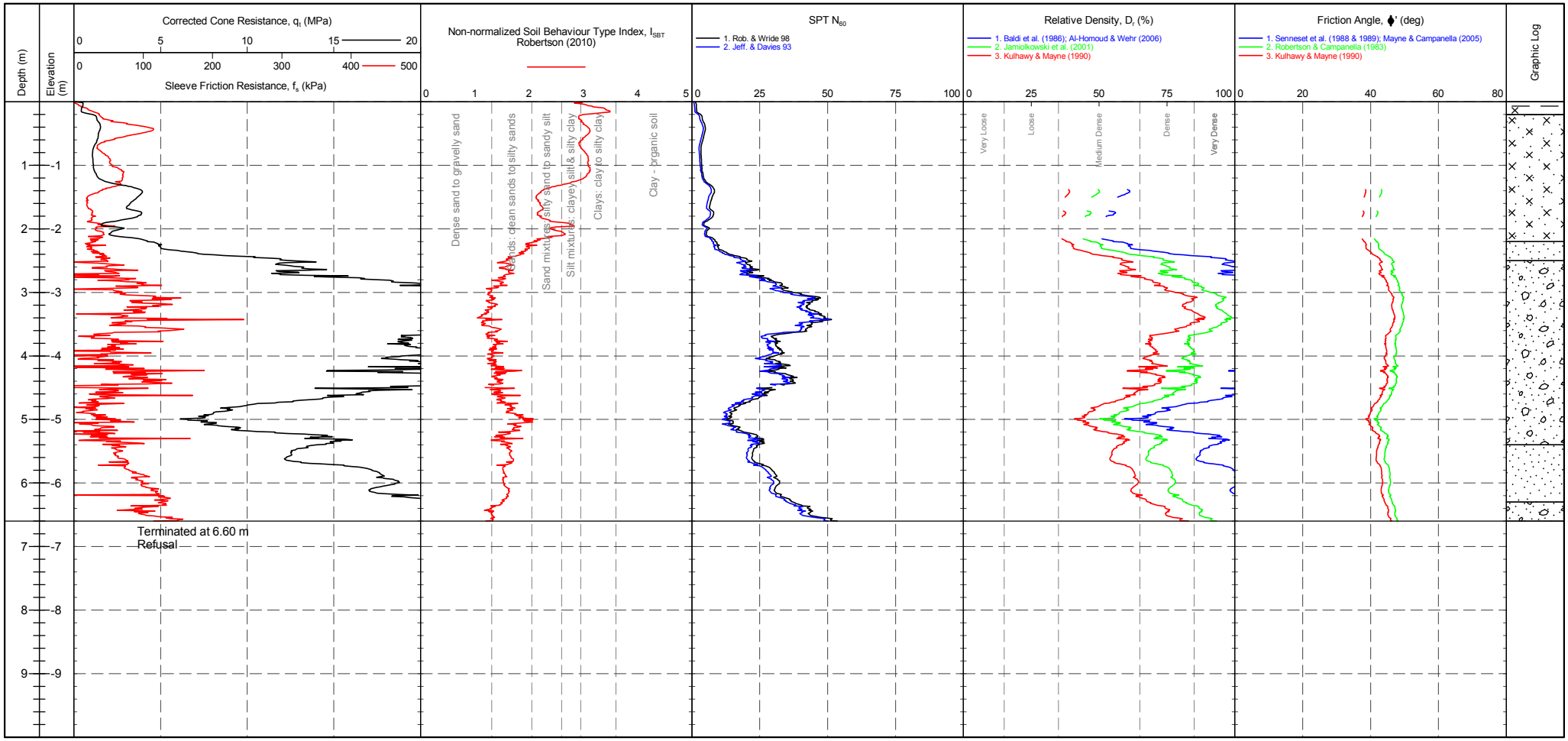
IN SITU SITE INVESTIGATION Working with:

CPT LOG 02

PointID

CPT 10

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Tip	280 mV	277 mV	-0.033 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	273 mV	265 mV	-0.006 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	266 mV	253 mV	-0.004 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 10	X-Y Inclinometer	2528 mV	2393 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

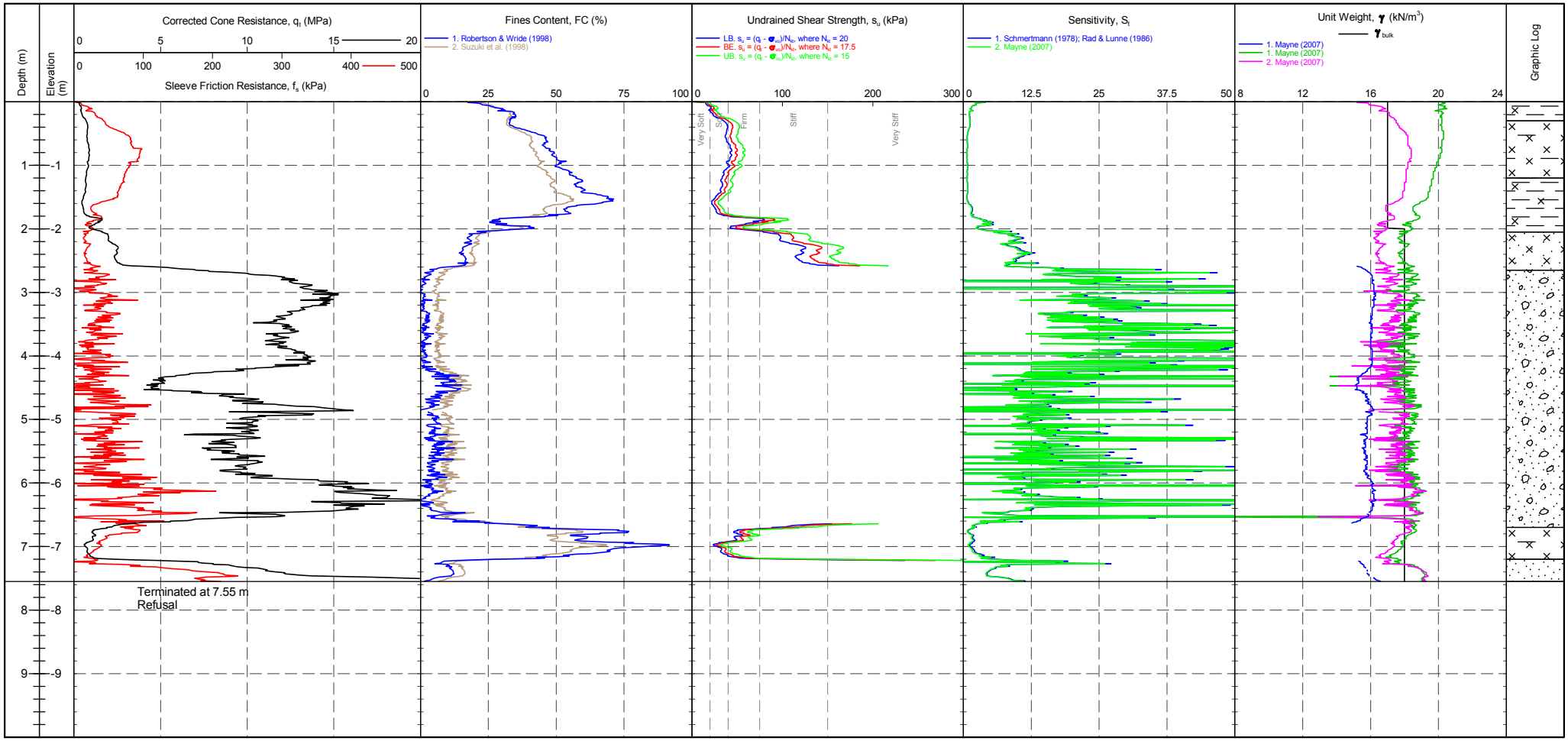
IN SITU SITE INVESTIGATION Working with:

CPT LOG 03

PointID

CPT 01

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Tip	295 mV	281 mV	-0.154 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	292 mV	276 mV	-0.011 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	266 mV	268 mV	0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 01	X-Y Inclinometer	2470 mV	2450 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

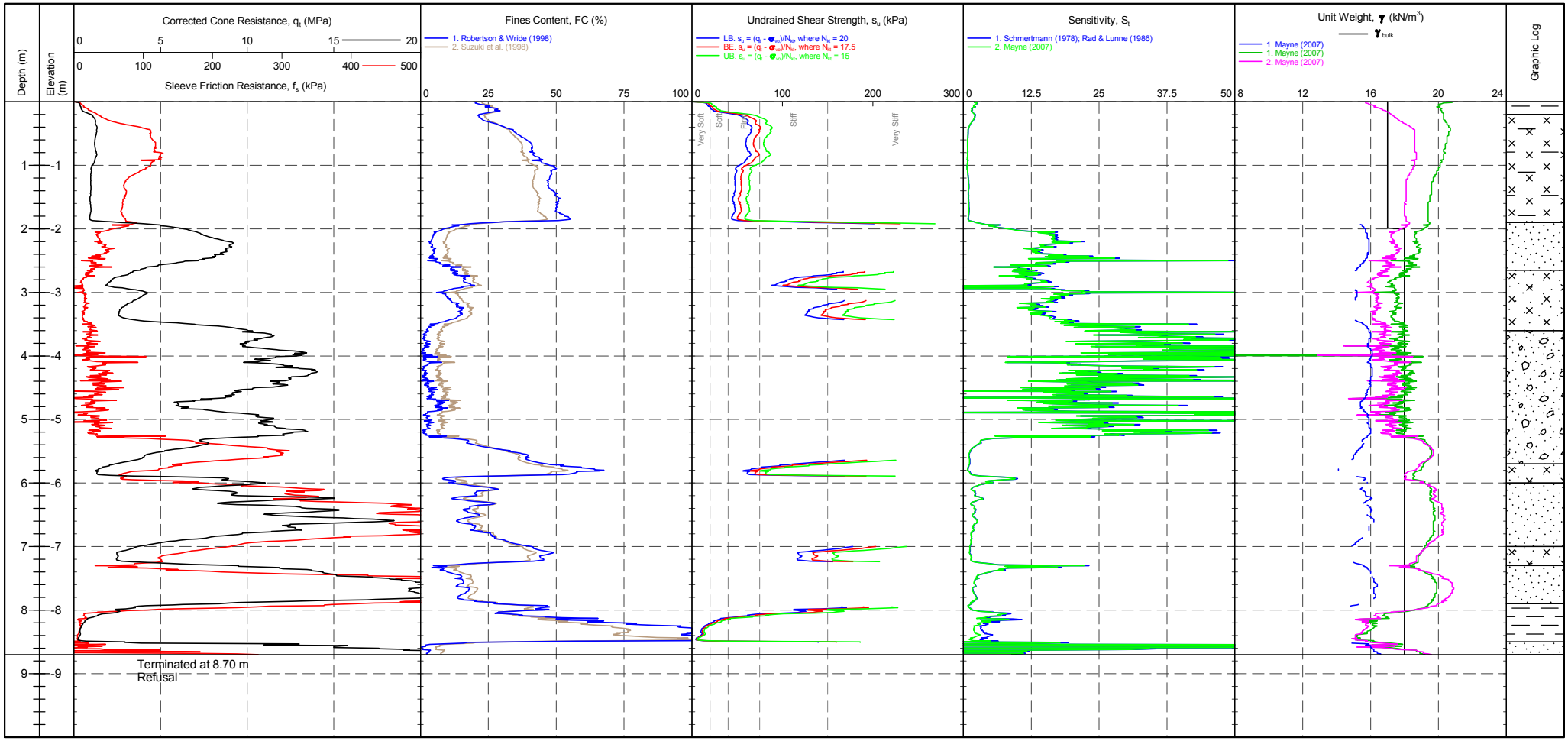
IN SITU SITE INVESTIGATION Working with:

CPT LOG 03

PointID

CPT 02

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Tip	281 mV	280 mV	-0.011 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	275 mV	271 mV	-0.003 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	275 mV	259 mV	-0.005 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 02	X-Y Inclinometer	2367 mV	2352 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

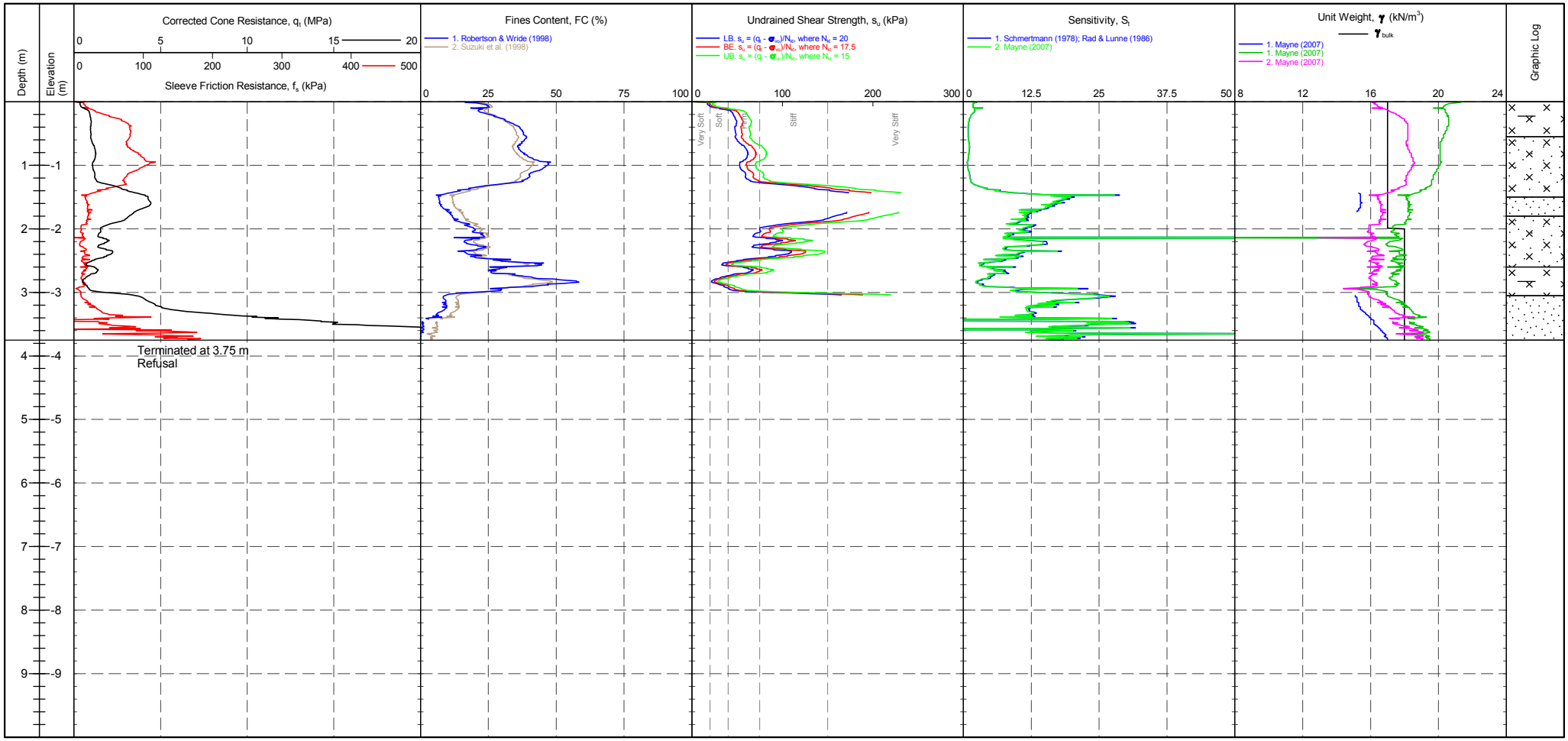
IN SITU SITE INVESTIGATION Working with:

CPT LOG 03

PointID

CPT 03

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	282 mV	282 mV	0 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	278 mV	278 mV	0 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 03	Pore Pressure 2	258 mV	257 mV	0 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2431 mV	2433 mV	

Groundwater Level

Dissipation Test

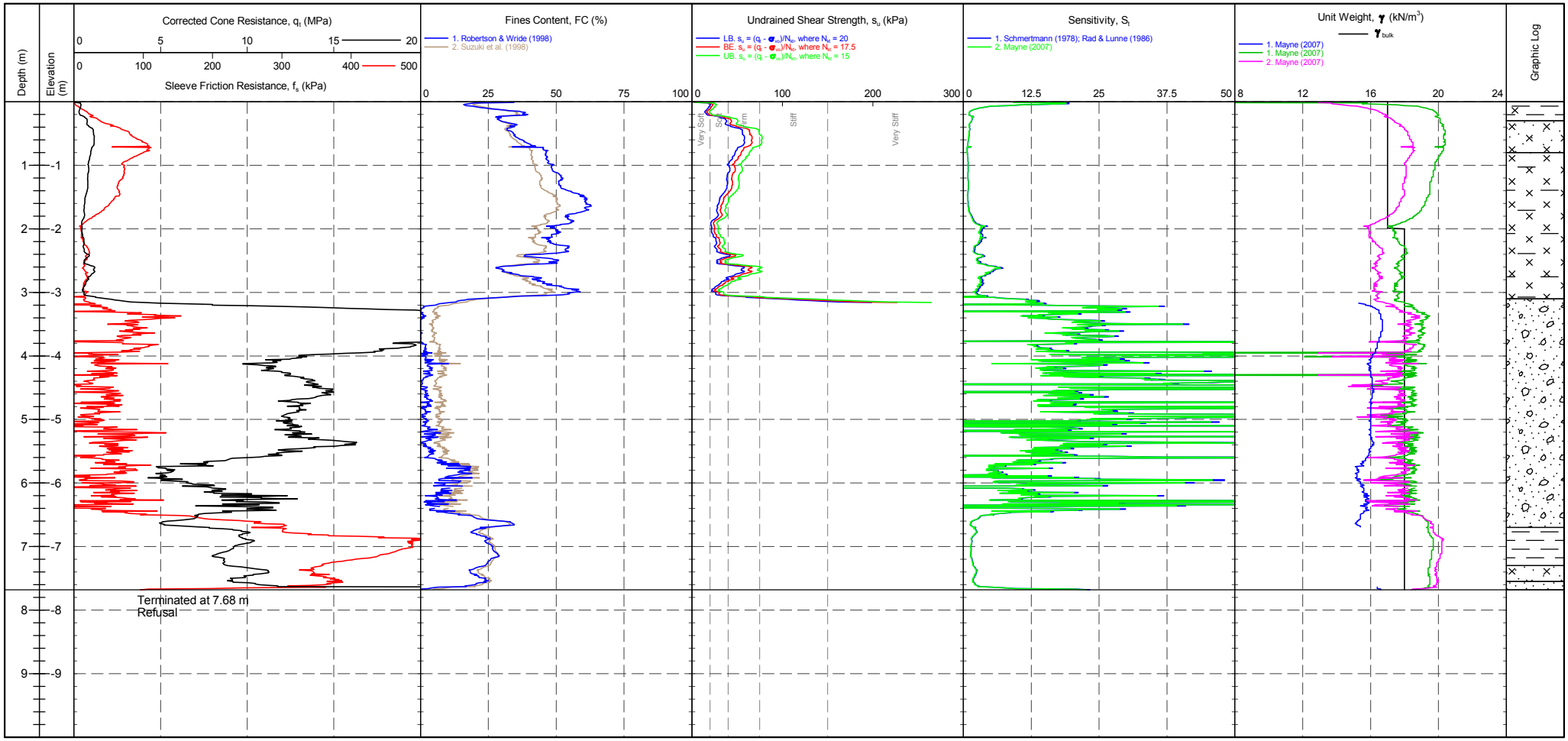
IN SITU SITE INVESTIGATION Working with:

CPT LOG 03

PointID

CPT 04

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Tip	282 mV	280 mV	-0.022 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	277 mV	274 mV	-0.002 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	259 mV	252 mV	-0.002 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 04	X-Y Inclinometer	2466 mV	2460 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

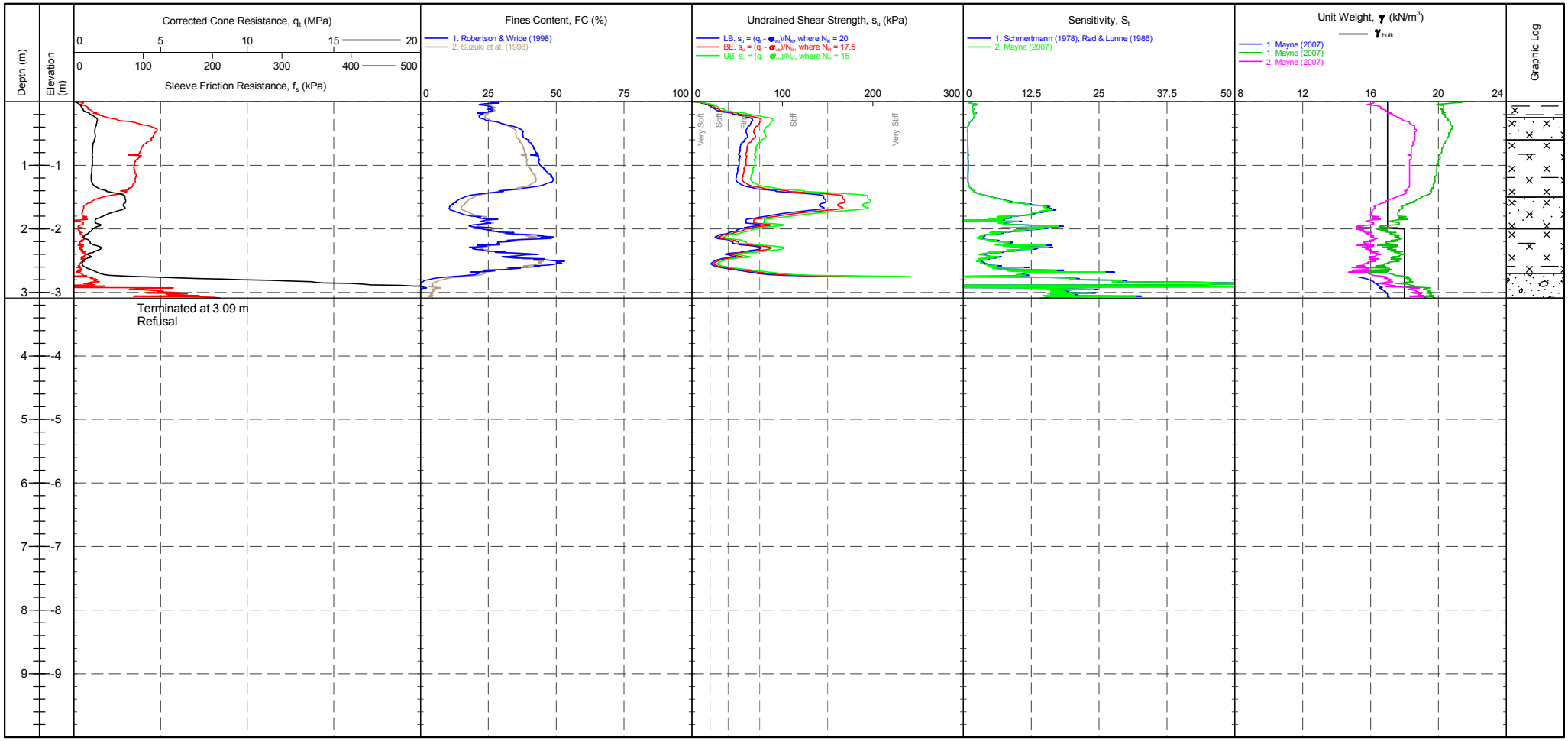
IN SITU SITE INVESTIGATION Working with:

CPT LOG 03

PointID

CPT 05

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Tip	281 mV	283 mV	0.022 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	276 mV	279 mV	0.002 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	254 mV	258 mV	0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 05	X-Y Inclinometer	2427 mV	2399 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

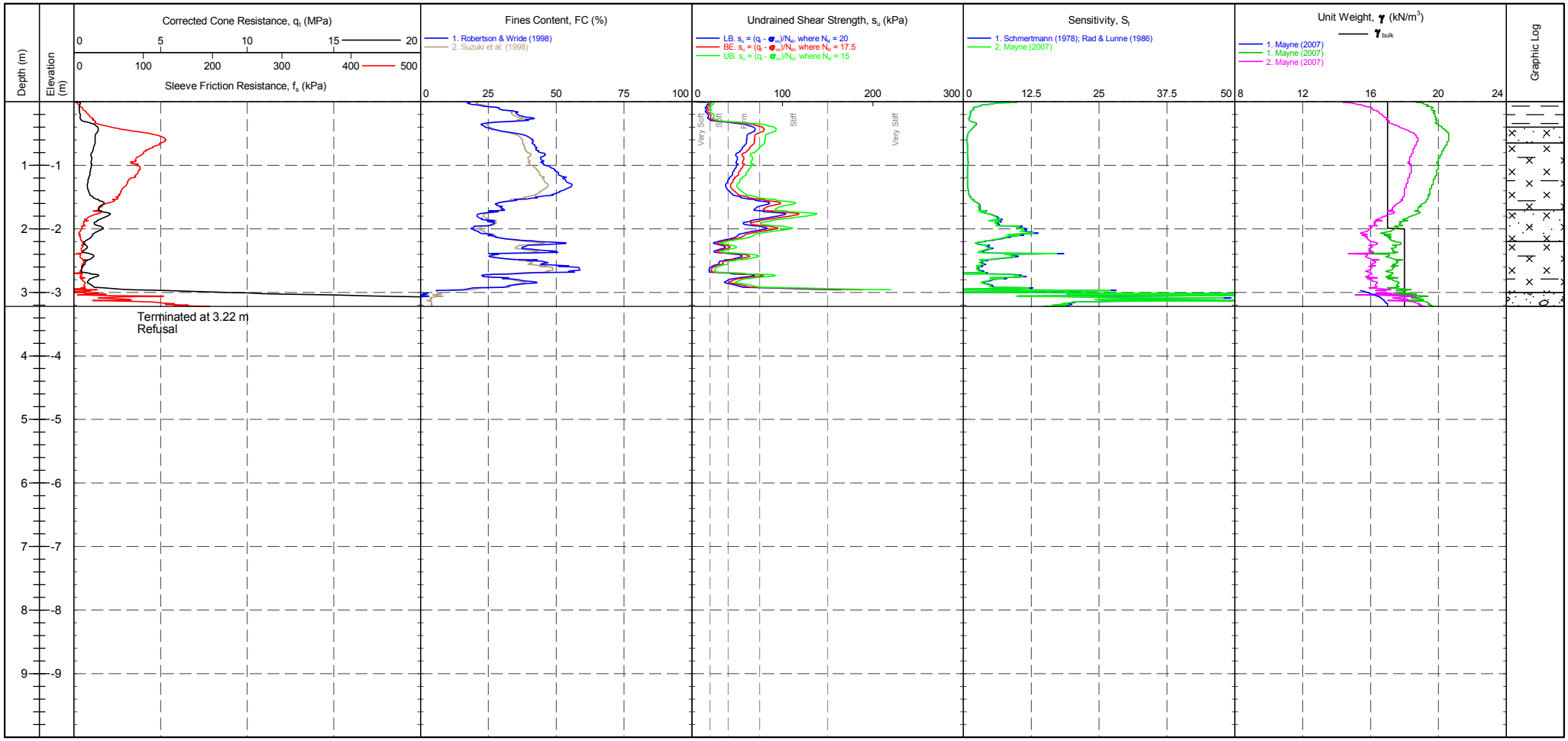
IN SITU SITE INVESTIGATION Working with:

CPT LOG 03

PointID

CPT 05A

CLIENT : Geotechnics Limited PROJECT : Newark LOCATION : Newark PROJECT No. : 1170175	EASTING : NORTHING : ELEVATION : 0.00 m CHECKED BY : Luisa Dhimitri TERMINATION REASON : Refusal	REMARK Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 16/03/2017 PLOT DATE : 20/03/2017 METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	283 mV	283 mV	0 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	278 mV	279 mV	0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 05A	Pore Pressure 2	257 mV	253 mV	-0.001 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2402 mV	2431 mV	

Groundwater Level

Dissipation Test

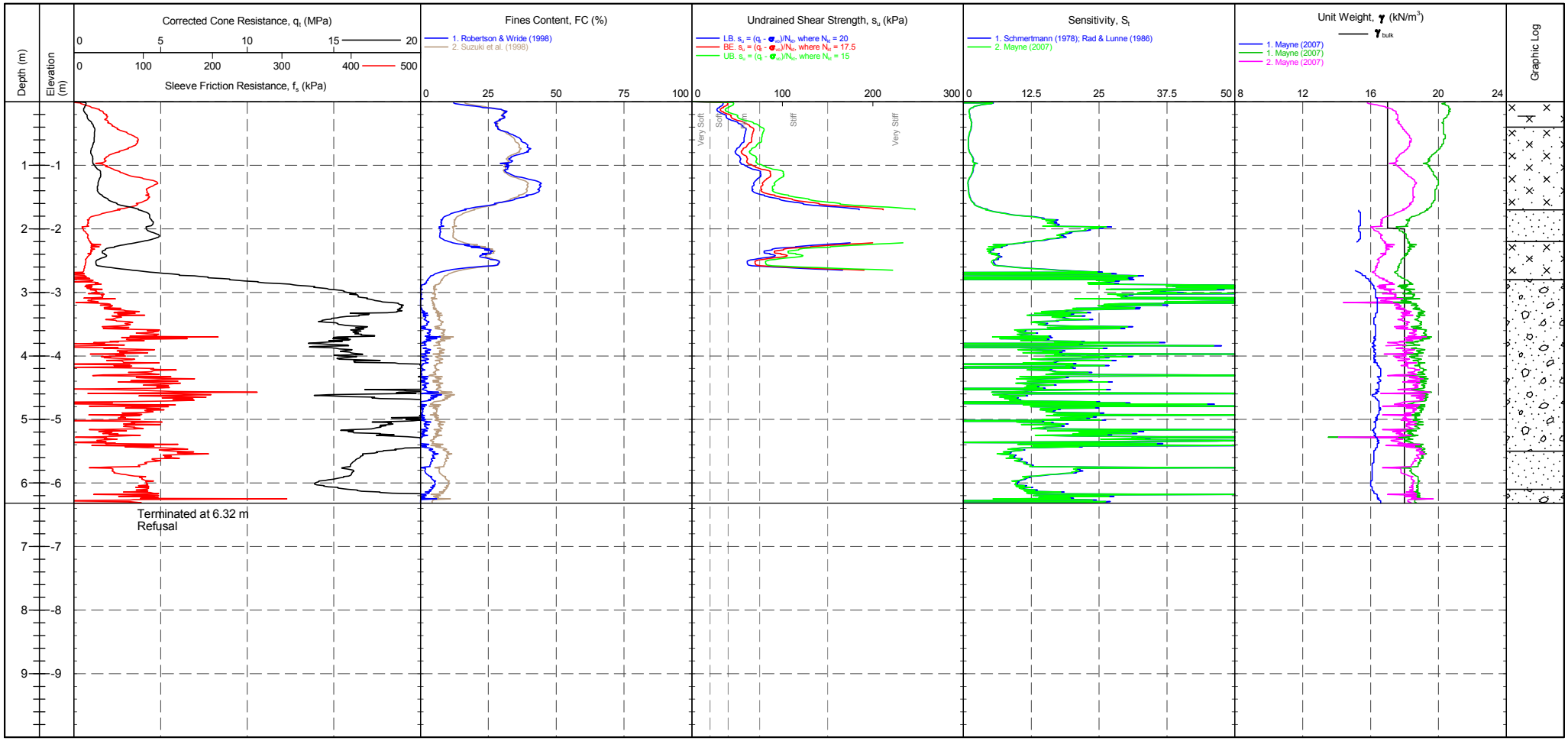
IN SITU SITE INVESTIGATION Working with:

CPT LOG 03

PointID

CPT 06

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	280 mV	-0.011 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	277 mV	276 mV	-0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 06	Pore Pressure 2	255 mV	255 mV	0 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2409 mV	2424 mV	

Groundwater Level

Dissipation Test

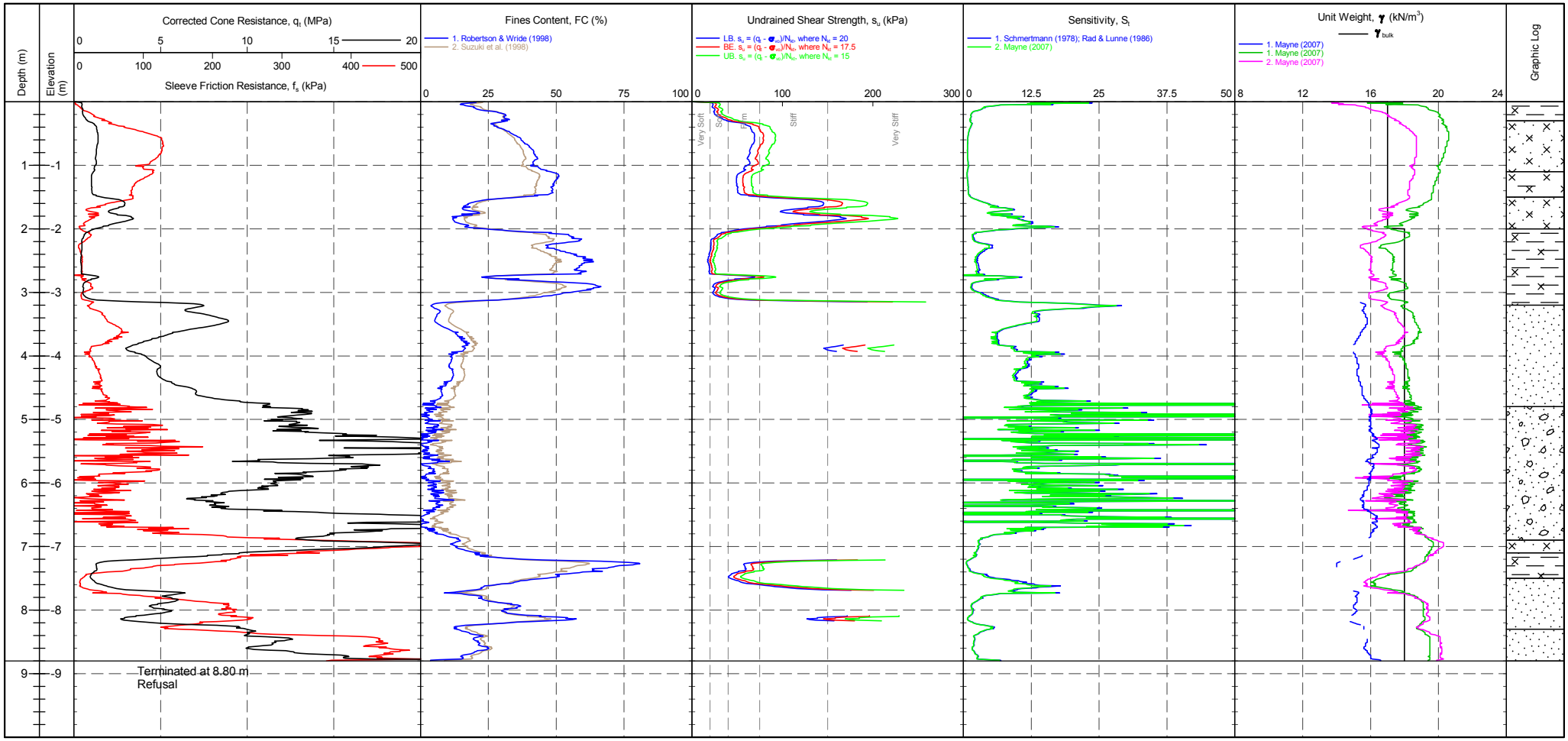
IN SITU SITE INVESTIGATION Working with:

CPT LOG 03

PointID

CPT 07

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Tip	282 mV	280 mV	-0.022 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	277 mV	274 mV	-0.002 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	260 mV	263 mV	0.001 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 07	X-Y Inclinometer	2417 mV	2419 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

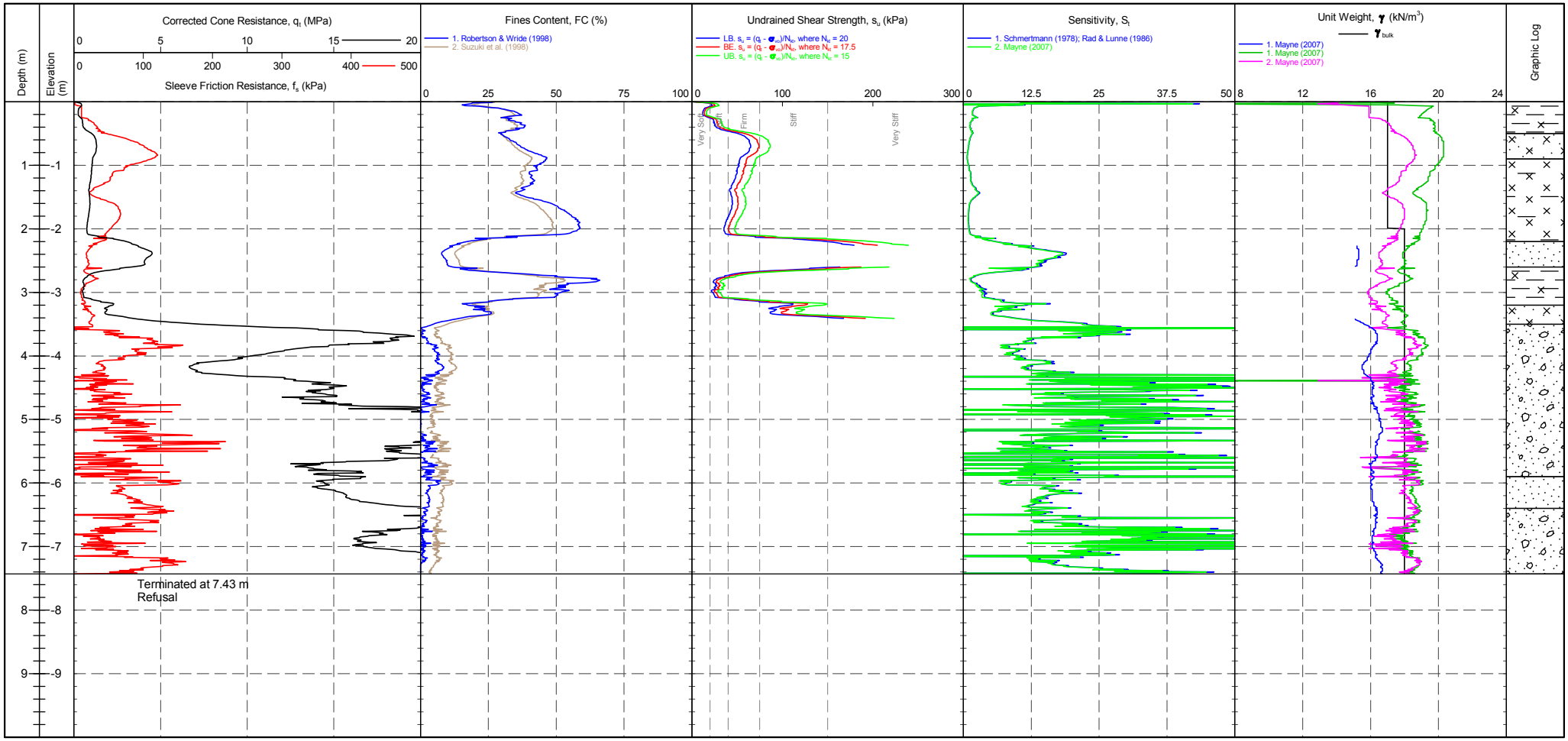
IN SITU SITE INVESTIGATION Working with:

CPT LOG 03

PointID

CPT 08

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Tip	281 mV	277 mV	-0.044 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	275 mV	273 mV	-0.001 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	255 mV	249 mV	-0.002 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 08	X-Y Inclinometer	2372 mV	2381 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

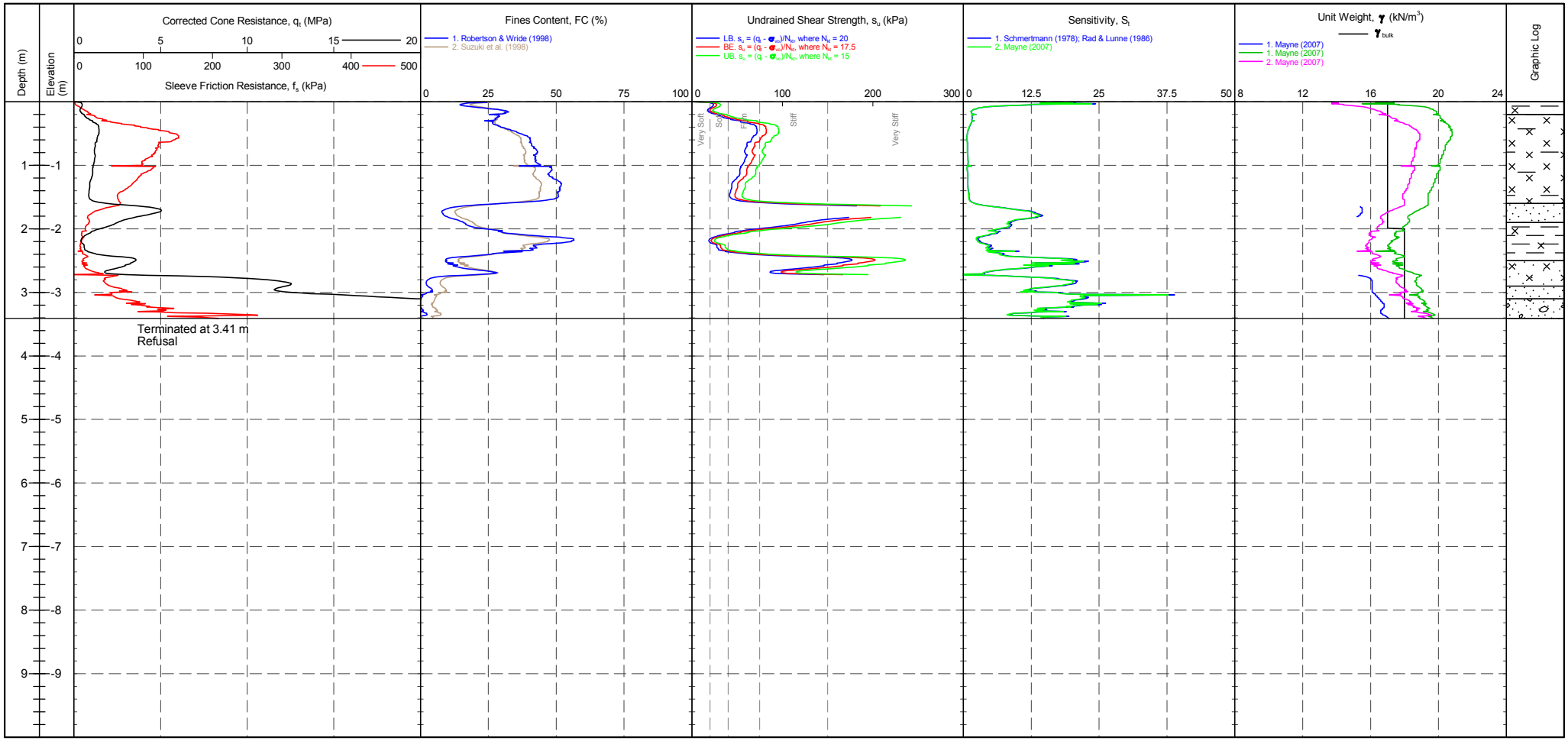
IN SITU SITE INVESTIGATION Working with:

CPT LOG 03

PointID

CPT 09

CLIENT : Geotechnics Limited PROJECT : Newark LOCATION : Newark PROJECT No. : 1170175	EASTING : NORTHING : ELEVATION : 0.00 m CHECKED BY : Luisa Dhimitri TERMINATION REASON : Refusal	REMARK Test refused on tip resistance.	SHEET : 1 OF 1 STATUS : Final TEST DATE : 16/03/2017 PLOT DATE : 20/03/2017 METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES		
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post / Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	284 mV / 0.033 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	267 mV	279 mV / 0.009 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 09	Pore Pressure 2	259 mV	254 mV / -0.001 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2457 mV	2437 mV

Groundwater Level

Dissipation Test

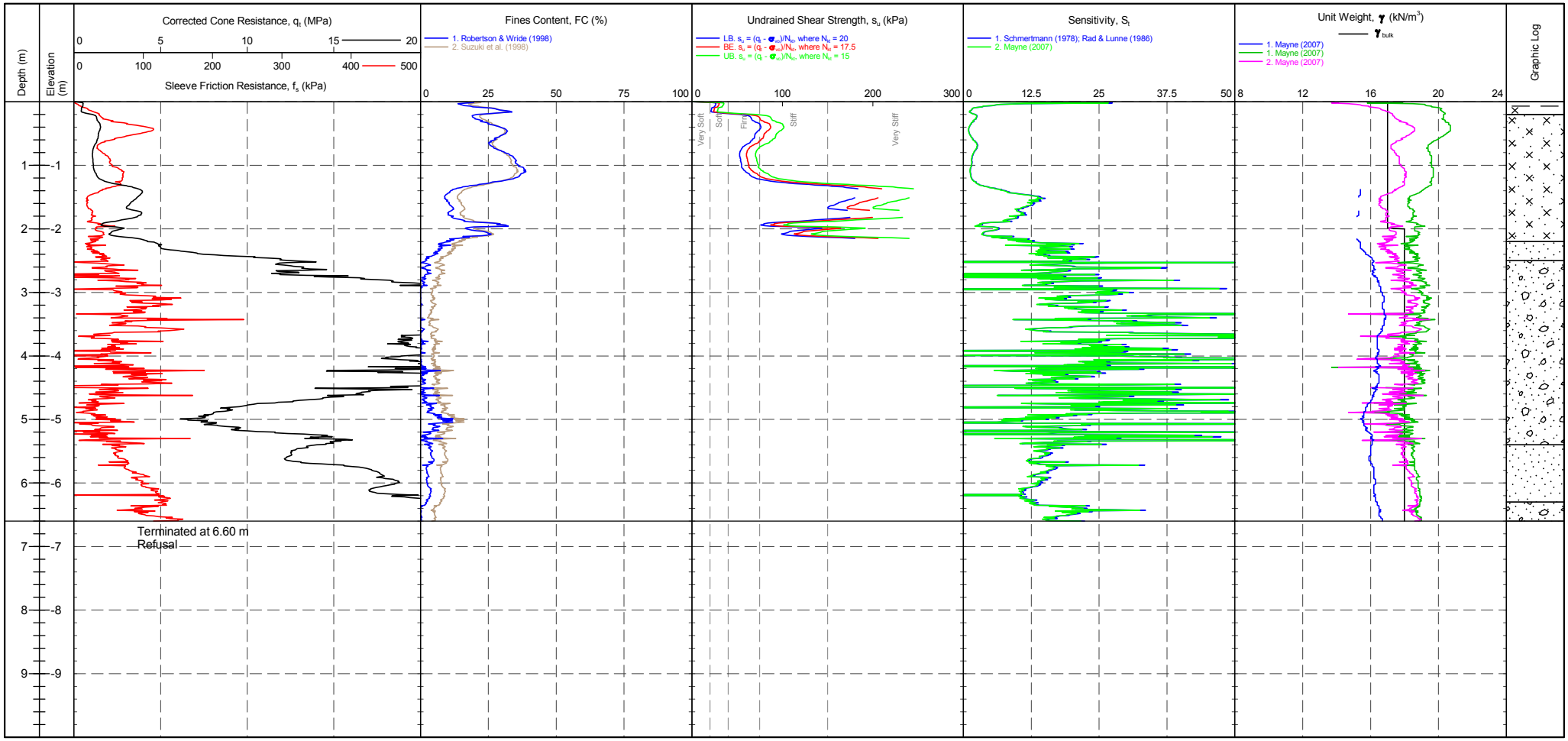
IN SITU SITE INVESTIGATION Working with:

CPT LOG 03

PointID

CPT 10

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



				CPTU ZERO VALUES			
CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	Transducer	Pre	Post	Difference
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Tip	280 mV	277 mV	-0.033 MPa
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Sleeve	273 mV	265 mV	-0.006 kPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Pore Pressure 2	266 mV	253 mV	-0.004 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 10	X-Y Inclinometer	2528 mV	2393 mV	
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild				

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION

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BOREHOLE LOG

Hole No. **CP01/17WM**

Project	Sheet
Cromwell North (Proposed) Quarry	1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	11-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480249.186 N 363296.684	7.115

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. 50 mm
0.00-0.40 0.00	B D						6.72	0.40	Grass over firm dark brown slightly sandy CLAY. (TOPSOIL)		TS	
0.40-0.80 0.40	B D						6.32	0.80	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
0.80-1.10 0.80	B D						5.42	(0.90) 1.70	Stiff dark orangish brown slightly sandy CLAY. (ALLUVIUM)		ALV	
1.70-2.10 1.70	B D						4.32	(1.10) 2.80	Stiff pale orangish brown slightly sandy CLAY. (ALLUVIUM)		ALV	
2.80-3.30 2.80	B D					1			Pale orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone. Occasional fine and medium angular lignite. (ALLUVIUM)			
4.80-5.20 4.80	B D							(4.70)			ALV	
6.30-6.75	SPT	4,8,10 7,9,10 N=36(C)							6.30 m bgl Dense			
6.80-7.30 6.80	B D						-0.39	7.50				
7.50-8.00 7.50	B D					2			Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Weathering Grade IVa. (MERCIA MUDSTONE)			
9.50-10.00 9.50	B D							(2.50)			MMG	
							-2.89	10.00				
									Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
2.8	6

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
11-04-17		4.80	20	4.60	4.80
11-04-17		9.00	20	8.70	9.00

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP02/17WM**

Project	Sheet
Cromwell North (Proposed) Quarry	1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	10-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480002.101 N 363098.128	7.151

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. 50 mm
0.00-0.30 0.10	B D						6.85	0.30	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.30-0.60 0.30	B D						6.05	(0.80) 1.10	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
1.10-1.60 1.10	B D						5.45	(0.60) 1.70	Firm light greyish brown very sandy CLAY. (ALLUVIUM)		ALV	
1.70-2.20 1.70	B D					1	4.25	(1.20) 2.90	Dark greyish brown fine and medium SAND. (ALLUVIUM)		ALV	
2.90-3.20 2.90	B D					1	3.95	3.20	Soft dark brown very organic silty CLAY. (ALLUVIUM)		ALV	
3.20-3.70 3.20	B D						2.15	(1.80) 5.00	Dark brownish grey fine to coarse SAND and fine to coarse subangular to subrounded GRAVEL of quartzite, flint and sandstone. (ALLUVIUM) 4.00 m bgl Medium dense		ALV	
4.00-4.45	SPT	1,2,3 4,5,5 N=17(C)										
5.00-5.50 5.00	B D						0.15	(2.00) 7.00	Dark brownish red MUDSTONE recovered as clay. Occasionally grey. Weathering Grade IVb. (MERCIA MUDSTONE)		MMG	
7.00	D						-2.85	(3.00) 10.00	Dark brownish red MUDSTONE recovered as firm gravelly clay. Occasionally grey. Weathering Grade III. (MERCIA MUDSTONE)		MMG	
									Borehole completed at 10m bgl.		END	

Boring Progress					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling			
From	To	Hours	Tool

Water Added	
From	To
3.2	5

Water Strikes					
Date	Time	Strike	Minutes	Standing	Casing
10-04-17		3.20	20	2.60	3.00

General Remarks
Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP03/17WM**

Project	Sheet
Cromwell North (Proposed) Quarry	1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	10-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480024.262 N 362962.428	7.587

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. 50 mm
0.00-0.30	B						7.29	0.30	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.00	D											
0.30-0.70	B								Firm pale brown slightly sandy CLAY. (ALLUVIUM)			
0.30	D							(1.20)			ALV	
							6.09	1.50				
1.50-2.20	B								Soft dark greyish brown very sandy CLAY. (ALLUVIUM)			
1.50	D							(0.70)			ALV	
							5.39	2.20				
2.20-3.00	B					1			Pale orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine to coarse angular to subangular lignite. (ALLUVIUM)			
2.20	D					1						
								(3.80)			ALV	
4.20-4.60	B											
4.20	D											
5.00-5.45	SPT	2,4,7 7,8,8 N=30(C)							5.00 m bgl Dense			
							1.59	6.00				
6.00-6.50	B								Dark brownish red MUDSTONE recovered as gravelly clay. Occasionally grey. Weathering Grade III. (MERCIA MUDSTONE)			
6.00	D											
								(4.00)			MMG	
8.00-8.50	B											
8.00	D											
							-2.41	10.00				
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
2.2	5

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
11-04-17		3.00	20	2.60	3.00

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP04/17WM**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	06-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480700.130 N 362996.617	6.820

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. 50 mm
0.00-0.40 0.10	B D						6.42	0.40	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.40	D						5.12	(1.30) 1.70	Firm very dark brown slightly sandy CLAY. (ALLUVIUM)		ALV	
1.70-2.00 1.70	B D						4.22	(0.90) 2.60	Firm light orangish brown sandy CLAY. (ALLUVIUM)		ALV	
2.60-3.00 2.60	B D					1	2.22	(2.00) 4.60	Soft dark greyish brown sandy CLAY. (ALLUVIUM)		ALV	
4.60-6.00 4.60	B D					1			Dark orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine to medium angular lignite. (ALLUVIUM)			
5.50-5.95	SPT	2,3,4 5,5,7 N=21(C)					0.22	(2.00) 6.60	5.50 m bgl Medium dense		ALV	
6.60-7.10 6.60	B D						-0.48	(0.70) 7.30	Orangish brownish fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine to medium angular lignite. (ALLUVIUM)		ALV	
7.30-7.80 7.30	B D						-2.48	(2.00) 9.30	Pale brownish red MUDSTONE recovered as firm slightly gravelly clay. Occasionally grey. Weathering Grade IVa. (MERCIA MUDSTONE)		MMG	
9.30-10.00 9.30	B D						-3.18	(0.70) 10.00	Dark brownish red MUDSTONE recovered as firm gravelly clay. Occasionally grey. Weathering Grade III. (MERCIA MUDSTONE)		MMG	
									Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
4.6	8

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
06-04-17		4.60	20	4.20	4.60

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP05/17WM**

Project	Cromwell North (Proposed) Quarry
Sheet	1 of 1
Job No	70030744
Client	Cemex UK Ltd
Date	05-04-17
Contractor / Driller	Geotechnics Ltd
Method/Plant Used	Dando 2000
Logged By	Will Allaway
Co-Ordinates (NGR)	E 481154.627 N 362953.845
Ground Level (m AOD)	7.305

SAMPLES & TESTS							STRATA						Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology		Dia. 50 mm
0.00-0.30	B						7.01	0.30	Grass over dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS		
0.10	D												
0.30-0.60	B								Pale brown slightly sandy CLAY. (ALLUVIUM)				
0.30	D							(1.50)			ALV		
							5.51	1.80					
1.80-2.80	B								Orangish brown slightly clayey fine and medium SAND. (ALLUVIUM)				
1.80	D							(1.40)			ALV		
							4.11	3.20					
3.20-3.70	B								Medium dense orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)				
3.20	D												
3.30-3.75	SPT	1,2,7 6,6,8 N=27(C)				1							
5.20-5.70	B												
5.20	D							(6.30)			ALV		
7.20-7.50	B												
7.20	D												
9.20-9.50	B						-2.20	9.50					
9.20	D												
9.50-10.00	B								Dark reddish brown MUDSTONE recovered as firm slightly gravelly clay. Occasionally grey. Weathering Grade IVa. (MERCIA MUDSTONE)				
9.50	D							(0.50)			MMG		
							-2.70	10.00					
10.00	D								Borehole completed at 10m bgl.		END		

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
3.2	8

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
07-04-17		4.50	20	4.20	4.50

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP06/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	03-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480500.099 N 362549.919	7.084

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
0.00-0.40 0.00	B D						6.68	0.40	Grass over firm dark brown slightly sandy CLAY. (TOPSOIL)		TS	
0.40-0.80 0.40	B D						6.28	0.80	Pale brown very clayey fine to coarse subangular to rounded smooth GRAVEL of quartzite, flint and sandstone. (ALLUVIUM)		ALV	
0.80-1.10 0.80	B D							(2.10)	Pale orangish brown sandy CLAY. (ALLUVIUM)		ALV	
2.90-3.40 2.90	B D					1	4.18	2.90	Orangish brown very gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded smooth of quartzite, flint and sandstone. (ALLUVIUM)			
4.90-5.40 4.90	B D							(4.30)			ALV	
6.00-6.45	SPT	3,7,8 11,10,10 N=39(C)							6.00 m bgl Dense			
6.90-7.20 6.90	B D						-0.12	7.20				
7.20-8.00 7.20	B D							(0.80)	Reddish brown fine and medium SAND. (ALLUVIUM)		ALV	
8.00-8.70 8.00	B D						-0.92	8.00	Reddish brown very gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded smooth of quartzite, flint and sandstone. (ALLUVIUM)		ALV	
8.70-9.20 8.70	B D						-1.62	(0.70) 8.70	Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Weathering Grade IVa. (MERCIA MUDSTONE)		MMG	
10.00	D						-2.92	(1.30) 10.00	Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
2.9	5

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
03-04-17		3.50	20	3.30	3.50

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP07/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	11-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480049.966 N 363249.930	6.837

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
0.00-0.40 0.00	B D						6.44	0.40	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.40-0.80 0.40	B D							(1.00)	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
							5.44	1.40				
								(1.10)	Firm pale orangish brown slightly sandy CLAY. (ALLUVIUM)		ALV	
							4.34	2.50				
2.50-3.00 2.50	B D					1			Pale orangish brown fine to coarse SAND and fine to coarse subangular to subrounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)			
4.50-5.00 4.50	B D							(4.00)			ALV	
5.00-5.45	SPT	3,5,7 9,10,10 N=36(C)							5.00 m bgl Dense			
						2	0.34	6.50				
6.50-7.00 6.50	B D								Dark brownish red MUDSTONE recovered as firm gravelly clay with occasional gypsum crystals. Weathering Grade III. (MERCIA MUDSTONE)			
								(3.50)			MMG	
8.50-9.00 8.50	B D											
							-3.16	10.00				
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
2.5	5

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
11-04-17		4.00	20	3.70	4.00
11-04-17		7.50	20	6.60	6.50

General Remarks
Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP08/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	12-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480199.945 N 363099.942	6.865

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. mm
0.00-0.45 0.00	B D						6.42	0.45	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.45-0.80 0.45	B D						5.47	(0.95) 1.40	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
1.50-1.80 1.50	B D						4.37	(1.10) 2.50	Firm pale orangish brown slightly sandy CLAY. (ALLUVIUM)		ALV	
2.50-3.00 2.50	B D						3.27	(1.10) 3.60	Orangish brown slightly clayey fine and medium SAND. (ALLUVIUM)		ALV	
3.60-4.00 3.60	B D					1		(3.30)	Orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)		ALV	
5.60-6.00 5.60	B D											
6.00-6.45	SPT	3,5,8 9,11,14 N=42(C)					-0.04	6.90	6.00 m bgl Dense			
6.90-7.40 6.90	B D					2	-2.04	(2.00) 8.90	Dark brownish red MUDSTONE recovered as firm clay. Weathering Grade IVb. (MERCIA MUDSTONE)		MMG	
8.90-9.40 8.90	B D					3	-2.64	(0.60) 9.50	Dark brownish red MUDSTONE recovered as firm gravelly clay. Occasionally grey. Weathering Grade III. (MERCIA MUDSTONE)		MMG	
							-3.14	(0.50) 10.00	Dark brownish red MUDSTONE recovered as slightly clayey fine to coarse angular gravel of mudstone. Weathering Grade II. (MERCIA MUDSTONE)		MMG	
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
3.6	4.3

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
12-04-17		4.30	20	4.10	
12-04-17		9.20	20	8.80	

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP09/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	07-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480249.970 N 362949.999	7.116

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. mm
0.00-0.40 B 0.00 D							6.72	0.40	Firm dark brown slightly sandy CLAY with frequent rootlets. (ALLUVIUM)		ALV	
0.40-0.80 B 0.40 D							5.92	(0.80) 1.20	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
1.20-1.50 B 1.20 D						1	4.02	(1.90) 3.10	Firm pale orangish brown slightly sandy CLAY. (ALLUVIUM)		ALV	
3.10 D						1	3.92	3.20	Soft dark greyish brown slightly sandy CLAY. (ALLUVIUM)		ALV	
3.20 D							3.72	3.40			ALV	
3.40-4.40 B 3.40 D								(1.00)	Firm dark brownish orange very sandy CLAY with occasional wood fragments. (ALLUVIUM) Orangish brown very gravelly fine and medium SAND. Gravel is fine and medium subangular to rounded smooth of quartzite, flint and sandstone. (ALLUVIUM)		ALV	
4.40-4.80 B 4.40 D							2.72	4.40	Orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)			
5.00-5.45 SPT		2,2,3 4,4,7 N=18(C)						(2.60)	5.00 m bgl Medium dense		ALV	
6.40-6.80 B 6.40 D							0.12	7.00				
7.00-7.50 B 7.00 D						2		(3.00)	Dark brownish red MUDSTONE recovered as firm clay. Weathering Grade IVb. (MERCIA MUDSTONE)		MMG	
9.00-9.50 B 9.00 D							-2.88	10.00				
10.00 D									Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
10-04-17		3.40	20	3.20	3.40
10-04-17		9.00			

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP10/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	05-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480899.930 N 362999.992	6.917

SAMPLES & TESTS							STRATA						Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology		Dia. mm
0.00-0.40 0.00	B D						6.52	0.40	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS		
0.40-0.70 0.40	B D							(1.60)	Firm brown slightly sandy CLAY. (ALLUVIUM)		ALV		
							4.92	2.00					
2.00-3.00 2.00	B D							(1.20)	Pale orangish brown slightly clayey fine and medium SAND. (ALLUVIUM)		ALV		
							3.72	3.20					
3.20-3.70 3.20	B D					1			Orangish brown fine to coarse SAND and fine to coarse subangular to subrounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)				
4.50-4.95	SPT	3,4,7 9,10,9 N=35(C)							4.50 m bgl Dense				
5.20-5.70 5.20	B D							(4.00)			ALV		
							-0.28	7.20					
7.20-7.70 7.20	B D					2		(2.00)	Light grey MUDSTONE recovered as firm slightly gravelly clay. Weathering Grade IVa. (MERCIA MUDSTONE)		MMG		
							-2.28	9.20					
9.20-9.70 9.20	B D					2		(0.80)	Light reddish grey MUDSTONE recovered as firm slightly gravelly clay. Weathering Grade IVa. (MERCIA MUDSTONE)		MMG		
							-3.08	10.00					
10.00	D								Borehole completed at 10m bgl.		END		

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
3.2	6

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
07-04-17		3.80	20	3.60	3.80
07-04-17		9.50	20	8.30	7.50

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP11/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	06-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Ltd	Dando 2000	Will Allaway	E 480500.084 N 362799.955	6.798

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
0.00-0.40 0.00	B D						6.40	0.40	Grass over dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.40-0.80 0.40	B D						5.40	(1.00) 1.40	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
1.40-1.80 1.40	B D						4.80	(0.60) 2.00	Firm orangish brown sandy CLAY. With fine sand layers. (ALLUVIUM)		ALV	
2.00-2.50 2.00	B D					1			Orangish brown sandy fine to coarse subrounded to rounded smooth GRAVEL of quartzite, flint and sandstone.			
4.00-4.50 4.00	B D						0.80	(4.00) 6.00			ALV	
6.00-6.50 6.00 6.00-6.45	B D SPT	2,5,8 10,11,12 N=41(C)							Dense orangish brown slightly sandy fine to coarse subrounded to rounded smooth GRAVEL of quartzite, flint and sandstone. 6.00 - 6.50 Some wood and peat amongst the gravel			
							-1.30	(2.10) 8.10			ALV	
8.10-8.60 8.10	B D								Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Occasionally grey. Weathering Grade IVa. (MERCIA MUDSTONE)			
							-3.20	(1.90) 10.00			MMG	
10.00	D								Borehole completed at 10m bgl.		END	

Water: 1 ▽ 1

Boring Progress						Water Strikes					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt	Date	Time	Strike	Minutes	Standing	Casing
						07-04-17		3.30	20	3.10	3.30

Chiselling				Water Added	
From	To	Hours	Tool	From	To
				2	6

General Remarks
Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP12/17**

Project: Cromwell North (Proposed) Quarry		Sheet: 1 of 1
Job No: 70030744	Client: Cemex UK Ltd	Date: 07-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480700.067 N 362800.046	6.933

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
0.00-0.40 0.10	B D						6.53	0.40	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.40-0.70 0.40	B D						5.23	(1.30) 1.70	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
1.70-2.00 1.70	B D						4.63	(0.60) 2.30	Dark orange fine to coarse SAND. (ALLUVIUM)		ALV	
2.30-2.80 2.30	B D								Pale orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone. Occasional fine angular lignite. (ALLUVIUM)			
3.00-3.45	SPT	1,3,6 4,5,7 N=22(C)				1			3.00 m bgl Medium dense			
4.30-4.60 4.30	B D					1		(4.30)			ALV	
6.20-6.60 6.20	B D						0.33	6.60				
6.60-7.10 6.60	B D								Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Occasionally grey. Weathering Grade IVa. (MERCIA MUDSTONE)			
8.60-9.10 8.60	B D						-3.07	(3.40) 10.00			MMG	
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
2.3	7

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
10-04-17		4.50	20	4.20	4.50

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP13/17**

Project	Sheet
Cromwell North (Proposed) Quarry	1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	04-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480900.040 N 362799.975	7.271

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
0.00-0.40 0.00	B D						6.87	0.40	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.40-0.70 0.40	B D						4.87	(2.00) 2.40	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
2.40-2.70 2.40	B D					1	3.27	(1.60) 4.00	Firm pale orangish brown slightly sandy CLAY. (ALLUVIUM)		ALV	
4.00-4.30 4.00	B D					1	2.77	(0.50) 4.50	Firm dark greyish brown very sandy CLAY. (ALLUVIUM)		ALV	
4.50-5.00 4.50 4.50-4.95	B D SPT	1,2,3 3,5,7 N=18(C)					0.77	(2.00) 6.50	Medium dense dark orangish brown fine to coarse SAND and fine and medium subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)		ALV	
6.50-7.00 6.50	B D						-1.63	(2.40) 8.90	Pale orangish brown very gravelly fine to coarse SAND with occasional fine angular lignite. Gravel is fine to coarse subangular to rounded smooth of quartzite, flint and sandstone. (ALLUVIUM)		ALV	
8.50-8.90 8.50	B D						-2.73	(1.10) 10.00	Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Occasionally grey. Weathering Grade IVa. (MERCIA MUDSTONE)		MMG	
8.90-10.00 8.90	B D											
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress						Water Strikes					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt	Date	Time	Strike	Minutes	Standing	Casing
						10-04-17		4.50	20	3.90	4.50

Chiselling				Water Added	
From	To	Hours	Tool	From	To
				4.5	7

General Remarks
Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP14/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	04-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480699.920 N 362600.873	7.114

SAMPLES & TESTS							STRATA						Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology		Dia. mm
0.00-0.50 0.10	B D						6.61	(0.50) 0.50	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS		
0.50-0.90 0.50	B D						5.11	(1.50) 2.00	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV		
2.00-2.50 2.00	B D						4.61	(0.50) 2.50	Orangish brown sandy CLAY. (ALLUVIUM)		ALV		
2.50-3.00 2.50	B D						4.11	(0.50) 3.00	Orangish brown slightly clayey fine and medium SAND. (ALLUVIUM)		ALV		
3.00-3.50 3.00	B D					1			Orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional lignite. (ALLUVIUM)				
5.00-5.50 5.00 5.00-5.45	B D SPT	2,3,4 7,8,9 N=28(C)							5.00 m bgl Medium dense				
								(5.90)			ALV		
7.00-7.50 7.00	B D						-1.79	8.90					
8.90-10.00 8.90	B D						-2.89	(1.10) 10.00	Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Weathering Grade IVa. (MERCIA MUDSTONE)		MMG		
10.00	D								Borehole completed at 10m bgl.		END		

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
3	6

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
04-04-17		4.50	20	4.20	4.50

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP15/17WM**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	12-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480358.863 N 362723.383	7.992

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
0.10-0.80 0.10	B D							(0.80)	Grass over dark brown slightly clayey gravelly fine and medium SAND with occasional rootlets. Gravel is fine and medium angular to rounded of quartzite, flint and sandstone with occasional fine angular lignite. (TOPSOIL)		TS	
							7.19	0.80				
0.80-1.10 0.80	B D								Pale brown slightly gravelly fine and medium SAND. Gravel is fine and medium subrounded to rounded of quartzite, flint and sandstone. (ALLUVIUM)		ALV	
							6.79	1.20				
1.20	D						6.69	1.30			ALV	
1.30-2.50 1.30	B D								Pale orangish brown slightly gravelly fine and medium SAND. Gravel is fine and medium subrounded to rounded of quartzite, flint and sandstone. (ALLUVIUM)			
								(1.20)			ALV	
									Pale orangish brown gravelly fine and medium SAND. Gravel is fine and medium subrounded to rounded of quartzite, flint and sandstone. (ALLUVIUM)			
							5.49	2.50				
2.50-3.20 2.50	B D								Pale orangish brown very gravelly fine and medium SAND. Gravel is fine and medium subrounded to rounded of quartzite, flint and sandstone. (ALLUVIUM)			
						1						
								(4.00)			ALV	
4.50-5.00 4.50	B D											
5.00-5.45	SPT	1,2,3 4,4,6 N=17/ 0(S)							5.00 m bgl Medium dense			
							1.49	6.50				
6.50-7.00 6.50	B D								Orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone. (ALLUVIUM)			
								(1.20)			ALV	
							0.29	7.70				
7.70-8.20 7.70	B D								Dark brownish red MUDSTONE recovered as firm clay. Weathering Grade IVb. (MERCIA MUDSTONE)			
								(2.30)			MMG	
						2						
9.70-10.00 9.70 10.00	B D D						-2.01	10.00				
									Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
1.3	6

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
12-04-17		4.50	20	4.30	4.50
12-04-17		9.50	20		

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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TRIAL PIT LOG

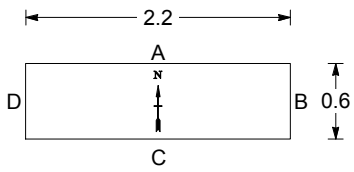
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
							(0.50)	Grass over firm dark brown slightly sandy CLAY with frequent rootlets to 0.2m bgl. (TOPSOIL)		TS	
						6.35	0.50				
1.00-1.50 1.00-1.50	B D						(1.30)	Firm orangish brown CLAY. (ALLUVIUM)		ALV	
						5.05	1.80				
								End of pit at 1.8m bgl.		END	

General Remarks
Hole terminated at 1.8m bgl due to sticky clay. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length: 2.20m	Logged By: Will Allaway	Client: Cemex UK Ltd	Sheet: 1 of 1
Width: 0.60m	Ground Level (m AOD): 6.851	Co-Ordinates (NGR): E 480150 N 363250	Date: 05-04-17
Orientation: 180 degrees from north	Method/Plant Used: JCB-3CX	Contractor: Collett Plant Hire	Scale: 1:30.0

Trial Hole No.

TP01/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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TRIAL PIT LOG

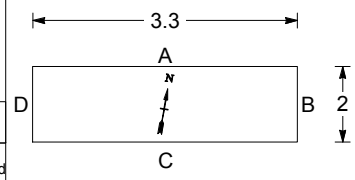
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
							(0.40)	Grass over dark brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded tabular smooth of quartzite, flint and sandstone. (TOPSOIL)		TS	
						7.31	0.40				
						7.11	0.60	Pale brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded tabular smooth of quartzite, flint and sandstone. (MADE GROUND)		GMG	
1.00-1.50 1.00-1.50	B D						(1.90)	Pale brown slightly gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded tabular smooth of quartzite, flint and sandstone. (ALLUVIUM)		ALV	
						5.21	2.50				
								End of pit at 2.5m bgl.		END	

General Remarks
Hole terminated at 2.5m bgl. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Pit wall collapse from surface

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
3.30m	Will Allaway	Cemex UK Ltd	1 of 1
Width 2.00m	**Ground Level (m AOD)** 7.713	**Co-Ordinates (NGR)** E 480050 N 363050	**Date** 05-04-17
Orientation 170 degrees from north	**Method/Plant Used** JCB-3CX	**Contractor** Collett Plant Hire	**Scale** 1:30.0

Trial Hole No.

TP02/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

WSP | Parsons Brinckerhoff
One Queens Drive,
Birmingham, B5 4PJ
Telephone: +44(0) 121 352 4801

TRIAL PIT LOG

Project	Job No
Cromwell North (Proposed) Quarry	70030744

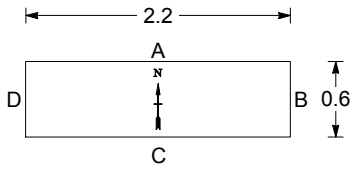
Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water
2.50-3.00	B				
2.50-3.00	D				

Elev. (mAOD)	Depth (Thickness)	STRATA Description	Legend	Geology	Install / Backfill
	(0.50)	Grass over firm dark brown slightly sandy CLAY with frequent rootlets to 0.3m bgl. (TOPSOIL)		TS	
6.58	0.50				
	(1.60)	Firm orangish brown CLAY. (ALLUVIUM)		ALV	
4.98	2.10				
	(1.40)	Pale brownish orange gravelly fine to coarse SAND. Gravel is fine and medium subangular tabular to rounded smooth of quartzite, flint and sandstone. (ALLUVIUM)		ALV	
3.58	3.50				
		End of pit at 3.5m bgl.		END	

General Remarks
Hole terminated at 3.5m bgl. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.20m	Will Allaway	Cemex UK Ltd	1 of 1

Width	Ground Level (m AOD)	Co-Ordinates (NGR)	Date	Trial Hole No.
0.60m	7.084	E 480200 N 363000	05-04-17	TP03/17

Orientation	Method/Plant Used	Contractor	Scale
180 degrees from north	JCB-3CX	Collett Plant Hire	1:30.0

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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Birmingham, B5 4PJ
Telephone: +44(0) 121 352 4801

TRIAL PIT LOG

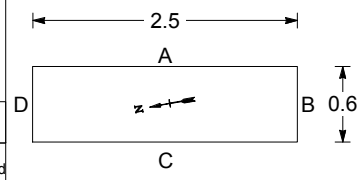
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
						6.51	(0.50) 0.50	Grass over firm dark brown slightly sandy CLAY with frequent rootlets to 0.3m bgl. (TOPSOIL)		TS	
1.50-2.00 1.50-2.00	B D					4.41	(2.10) 2.60	Firm pale brown slightly sandy CLAY with rare flint gravel. (ALLUVIUM) 2.20 m bgl Becoming very sandy		ALV	
						4.21	2.80	Grey and black laminated very sandy organic CLAY. (ALLUVIUM)		ALV	
						3.61	(0.60) 3.40	Pale brown slightly clayey gravelly fine to coarse SAND. Gravel is fine and medium subrounded of flint and quartzite. (ALLUVIUM)		ALV	
3.40-3.50 3.40-3.50	B D				1	3.51	3.50	Pale orangish brown gravelly fine to coarse SAND with occasional fine angular coal. Gravel is fine and medium subangular to rounded of quartzite, flint and sandstone. (ALLUVIUM) End of pit at 3.5m bgl.		ALV END	

General Remarks
Hole completed at 3.5m bgl. Groundwater seepage at 3.5m bgl. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.50m	Will Allaway	Cemex UK Ltd	1 of 1

Width	Ground Level (m AOD)	Co-Ordinates (NGR)	Date	Trial Hole No.
0.60m	7.006	E 481100 N 363000	05-04-17	TP04/17

Orientation	Method/Plant Used	Contractor	Scale
280 degrees from north	JCB-3CX	Collette Plant Hire	1:30.0

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

WSP | Parsons Brinckerhoff
One Queens Drive,
Birmingham, B5 4PJ
Telephone: +44(0) 121 352 4801

TRIAL PIT LOG

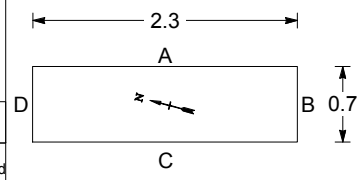
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
						6.31	(0.40) 0.40	Grass over firm dark brown slightly sandy CLAY. Frequent rootlets to 0.3m bgl. (TOPSOIL)		TS	
1.00-1.50	B							Firm pale brown slightly sandy CLAY. (ALLUVIUM)			
1.00-1.50	D						(1.90)			ALV	
						4.41	2.30				
								Brownish orange fine to coarse SAND. (ALLUVIUM)			
							(1.00)			ALV	
						3.41	3.30				
3.30-3.60	B							Pale brownish orange gravelly fine to coarse SAND. Gravel is fine and medium subangular to rounded of quartzite, flint and sandstone. (ALLUVIUM)			
3.30-3.60	D				1		(0.30)			ALV	
						3.11	3.60				
								End of pit at 3.6m bgl.		END	

General Remarks
Hole completed at 3.6m bgl. Groundwater seepage at 3.6m bgl. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Side and end wall collapse at 2.3m bgl

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.30m	Will Allaway	Cemex UK Ltd	1 of 1
Width 0.70m	**Ground Level (m AOD)** 6.706	**Co-Ordinates (NGR)** E 480600 N 362850	**Date** 05-04-17
Orientation 255 degrees from north	**Method/Plant Used** JCB-3CX	**Contractor** Collett Plant Hire	**Scale** 1:30.0

Trial Hole No.

TP05/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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One Queens Drive,
Birmingham, B5 4PJ
Telephone: +44(0) 121 352 4801

TRIAL PIT LOG

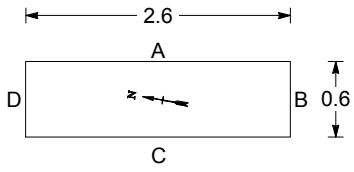
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
						6.66	(0.60) 0.60	Grass over firm dark brown slightly sandy CLAY. Frequent rootlets to 0.2m bgl. (TOPSOIL)		TS	
0.60-1.00 0.60-1.00	B D					5.46	(1.20) 1.80	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
3.00-3.30 3.00-3.30	B D					3.96	(1.50) 3.30	Brownish orange fine to coarse SAND. (ALLUVIUM)		ALV	
								End of pit at 3.3m bgl.		END	

General Remarks
Hole completed at 3.3m bgl. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Side wall collapse at 2.0m bgl

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.60m	Will Allaway	Cemex UK Ltd	1 of 1
Width 0.60m	**Ground Level (m AOD)** 7.259	**Co-Ordinates (NGR)** E 480900 N 362900	**Date** 05-04-17
Orientation 260 degrees from north	**Method/Plant Used** JCB-3CX	**Contractor** Collett Plant Hire	**Scale** 1:30.0

Trial Hole No.

TP06/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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TRIAL PIT LOG

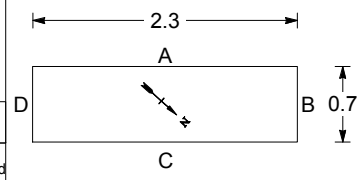
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
						6.68	(0.40) 0.40	Grass over firm dark brown slightly sandy CLAY. Frequent rootlets to 0.3m bgl. (TOPSOIL)		TS	
0.50-1.00 0.50-1.00	B D							Firm pale brown slightly sandy CLAY. (ALLUVIUM)			
						4.98	(1.70) 2.10			ALV	
3.00-3.20 3.00-3.20	B D					3.88	(1.10) 3.20	Pale brownish orange slightly clayey gravelly fine to coarse SAND. Gravel is medium angular of flint and occasional fine angular lignite. (ALLUVIUM)		ALV	
								End of pit at 3.2m bgl.		END	

General Remarks
Hole completed at 3.2m bgl. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.30m	Will Allaway	Cemex UK Ltd	1 of 1
Width 0.70m	**Ground Level (m AOD)** 7.079	**Co-Ordinates (NGR)** E 480699 N 362700	**Date** 05-04-17
Orientation 48 degrees from north	**Method/Plant Used** JCB-3CX	**Contractor** Collett Plant Hire	**Scale** 1:30.0

Trial Hole No.

TP07/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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One Queens Drive,
Birmingham, B5 4PJ
Telephone: +44(0) 121 352 4801

TRIAL PIT LOG

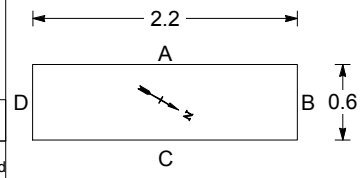
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
						6.34	(0.60) 0.60	Grass over firm dark brown slightly sandy CLAY. Frequent rootlets to 0.3m bgl. (TOPSOIL)		TS	
0.60-1.00 0.60-1.00	B D					4.74	(1.60) 2.20	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
2.50-3.00 2.50-3.00	B D					3.74	(1.00) 3.20	Pale brownish orange fine to coarse SAND with rare medium angular flint gravel. (ALLUVIUM)		ALV	
								End of pit at 3.2m bgl.		END	

General Remarks
Hole completed at 3.2m bgl. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.20m	Will Allaway	Cemex UK Ltd	1 of 1
Width 0.60m	**Ground Level (m AOD)** 6.940	**Co-Ordinates (NGR)** E 480500 N 362650	**Date** 05-04-17
Orientation 60 degrees from north	**Method/Plant Used** JCB-3CX	**Contractor** Collett Plant Hire	**Scale** 1:30.0

Trial Hole No.

TP08/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

Date Modified:

Drawn By:

File:

CP01/17WM
CP07/17
TP01/17
CPT01/17
CP02/17WM
CP08/17
TP02/17
CPT02/17
TP03/17
CP04/17WM
CP10/17
CPT03/17
TP04/17
Spittle Bridge
CP03/17WM
CP09/17
CPT04/17
CP05/17WM
CPT05/17
TP06/17
CPT06/17
TP05/17
Wharf Cottage
CP11/17
CP12/17
CP13/17
Access Point
Access Point (bridge capacity tbc)
CPT07/17
TP07/17
CPT08/17
CPT09/17
TP08/17
River Trent
CP14/17
Filling Station
CP06/17WM
CPT10/17
Access Point
Access Point
363400N
479900E
362400N
481300E
W

Contains Ordnance Survey data © Crown copyright and database right 2017.

0 0.025 0.05 0.1 0.15 0.2 Kilometres

DRAWING STATUS: ENTER DRAWING STATUS

WSP, One Queens Drive
Birmingham
B5 4PJ
T+44 (0) 121-352-4801

CLIENT: CEMEX

ARCHITECT: N/A

PROJECT: CROMWELL NORTH QUARRY

TITLE: EXPLORATORY LOCATION PLAN

SCALE @ A1:	CHECKED:	APPROVED:
NTS	WA	WA
CAD FILE:	DESIGN-DRAWN:	DATE:
WSP - A3 Landscape	NB	DATE
PROJECT No:	DRAWING No:	REV:
70030744	70030744-CNQ-001	

Your Ref: Cromwell North

Our Ref: 70030744-L01

09 May 2017

Steve Hopkins
CEMEX
CEMEX House
Evreux Way
Rugby
CV21 2DT

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Birmingham
B5 4PJ

Tel: +44 (0)121 634 5419
Mobile: +44 (0)7980 687802

www.wsp-pb.com

Dear Steve,

Subject: Soil Analytical Results, Cromwell North Quarry

Thank you for requesting WSP | Parsons Brinckerhoff to review and comment upon soil analytical data for the Cromwell North site. Our understanding is that the Land Drainage Consultancy Ltd. (LDCL), acting on behalf of CEMEX, has collected soil samples as part of an agricultural survey of the site and they have been analysed for a limited number of metals. In order to provide a preliminary assessment of the suitability of surface materials (<150mm) to be reused as part of a future site restoration scheme we have reviewed the data and can make the following comments / observations.

We have carried out this assessment on the basis of the scope and commercial terms provided in our proposal letter dated 02 May 2017 (70030744-P02).

SOURCE OF DATA

The soil analytical data has been provided to us as part of a LDCL drawing (reference LDCL_Cemex_CromwellNorth_Appendix1_(RevA), appended), and we have not seen the original laboratory analytical data nor any sample descriptions. The data provided are for a limited suite of metals, from six sampling locations, reported in mg/kg. Only soil analytical values are provided and no soil leachability data is available. We have assumed that the sample locations marked on the plans are reasonably accurate.

DATA ASSESSMENT

The following assessment has been made on the basis of a number of assumptions:

- The soils sampled are representative of the materials present at the site;
- The assessment takes account of the potential for contamination within the soils to affect human health receptors only, i.e. the potential impact of the materials on controlled water (the River Trent / groundwater) has not been considered;
- The excavated soils will be stripped prior to extraction of underlying sand and gravel resources and stockpiled. The materials will then be re-placed within the site boundary as part of an approved restoration scheme once extraction has been completed. It is assumed that the stockpiled materials will be stored in a manner which will prevent contamination;

The soil analytical data have been compared to Generic Assessment Criteria (GAC) which are applicable to a public open space land use. This assumes a setting where a range of activities could take place such as family visits, picnics, dog walking and unofficial sports. It is also assumed that the site is not in close proximity to residential housing. These GAC have been developed by WSP | Parsons Brinckerhoff using CLEA v.1.071 in accordance with the guidance and methodology provided by CL:AIRE[1] and the Environment Agency / Defra[2, 3 & 4], and are considered to be a good conceptual fit with the anticipated post-restoration end use.

SUMMARY

The analytical data have been compared to the relevant GACs, and no exceedances were identified. This assessment indicates that the upper 150mm of materials sampled from the site area are unlikely to represent a potential risk to human health (future site users), on the basis of the available analysis. The data screening is summarised in the table below.

Table 1: Summary of soil analytical data and GAC screening

	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
GAC (mg/kg):	**555**	**58,000**	**44,400**	**808**	**242**	**804**	**173,000**
Area 1	3.36	51.5	87.4	302	0.3	45.8	547
Area 2	0.71	34.9	27.3	74.4	<0.2	20.4	133
Area 3	4.54	67.1	126	337	0.38	59.1	574
Area 4	2.22	52.2	48	262	<0.2	44.6	329
Area 5	2.16	46.9	39.5	238	<0.2	40.4	293
Area 6	6.54	88.5	157	304	<0.2	73.3	664

It should be noted that WSP | Parsons Brinckerhoff has not reviewed the sample logs / descriptions nor the original laboratory data and therefore it has been necessary to rely solely upon information provided by LDCL. However, given the site's environmental setting and absence of previous development it is considered unlikely that there is significant widespread contamination in the shallow soils.

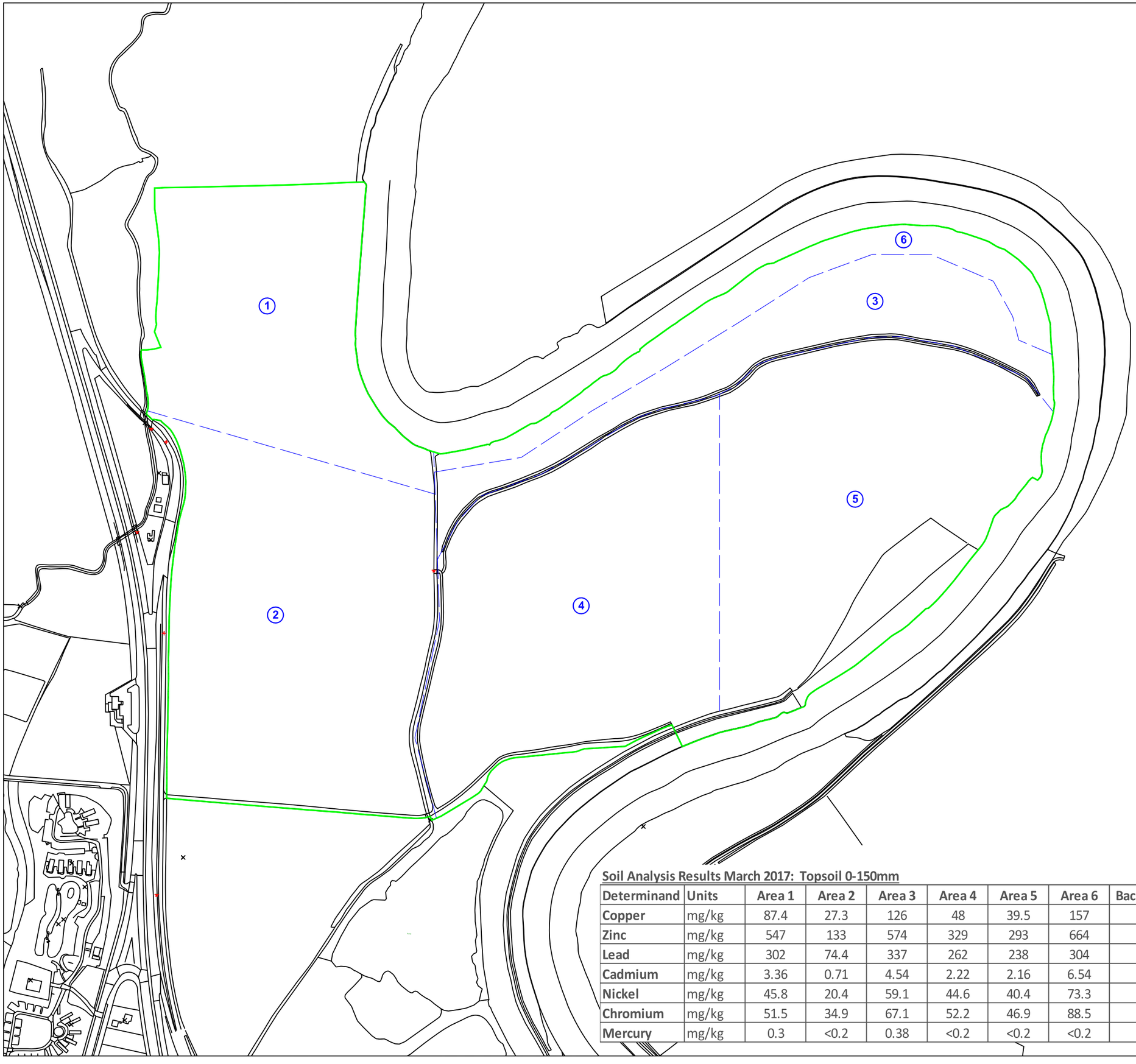
Please do not hesitate to contact the undersigned if you require additional information.

Yours sincerely,

Dr Catriona Woods
Associate, Ground Risk & Remediation

Encl. LDCL figure (Reference LDCL_Cemex_CromwellNorth_Appendix1_(RevA))

[1] CL:AIRE. 2014. SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination. (Revision 2).
[2] Environment Agency '*Human Health Toxicological Assessment of Contaminants in Soil*', Report SC050021/SR2. January 2009.
[3] Environment Agency '*Updated Technical Background to the CLEA Model*,' Report SC050021/SR3. January 2009.
[4] Environment Agency '*CLEA Software (Version 1.05) Handbook (and Software)*', Report SC050021/SR4. September 2009.



Soil Analysis Results March 2017: Topsoil 0-150mm

Determinand	Units	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Background*
Copper	mg/kg	87.4	27.3	126	48	39.5	157	23
Zinc	mg/kg	547	133	574	329	293	664	97
Lead	mg/kg	302	74.4	337	262	238	304	74
Cadmium	mg/kg	3.36	0.71	4.54	2.22	2.16	6.54	0.8
Nickel	mg/kg	45.8	20.4	59.1	44.6	40.4	73.3	25
Chromium	mg/kg	51.5	34.9	67.1	52.2	46.9	88.5	41
Mercury	mg/kg	0.3	<0.2	0.38	<0.2	<0.2	<0.2	<1

PROJECT

CROMWELL NORTH

TITLE

APPENDIX 1

LOCATION OF AUGER BORINGS
SOIL SAMPLES AND SOIL PROFILE PITS

CLIENT

CEMEX HOUSE
COLDHARBOUR LANE
THORPE
EGHAM
SURREY
TW20 8TD

KEY

SITE BOUNDARY

2 LOCATION OF TOPSOIL SAMPLE

N
W E
S

Land Drainage Consultancy Ltd
Cowslip Offices
Fimber
DRIFFIELD
East Yorkshire
YO25 9LY
Tel: 01377 236010
Email: mail@ldcl.co.uk

REV	AMENDMENT	DATE
B	Addition of sample analysis results	25.04.17
C		
D		

SCALE	1:5000	ORIG SIZE	A3	SHEET	1 of 1
DRAWN	BW	CHECKED	DR	APPROVED	
REVISION	B	DATE	25.04.17		

DRAWING NO. LDCL_Cemex_CromwellNorth_Appendix1_(RevA)

LABORATORY RESULTS - Particle Size Distribution

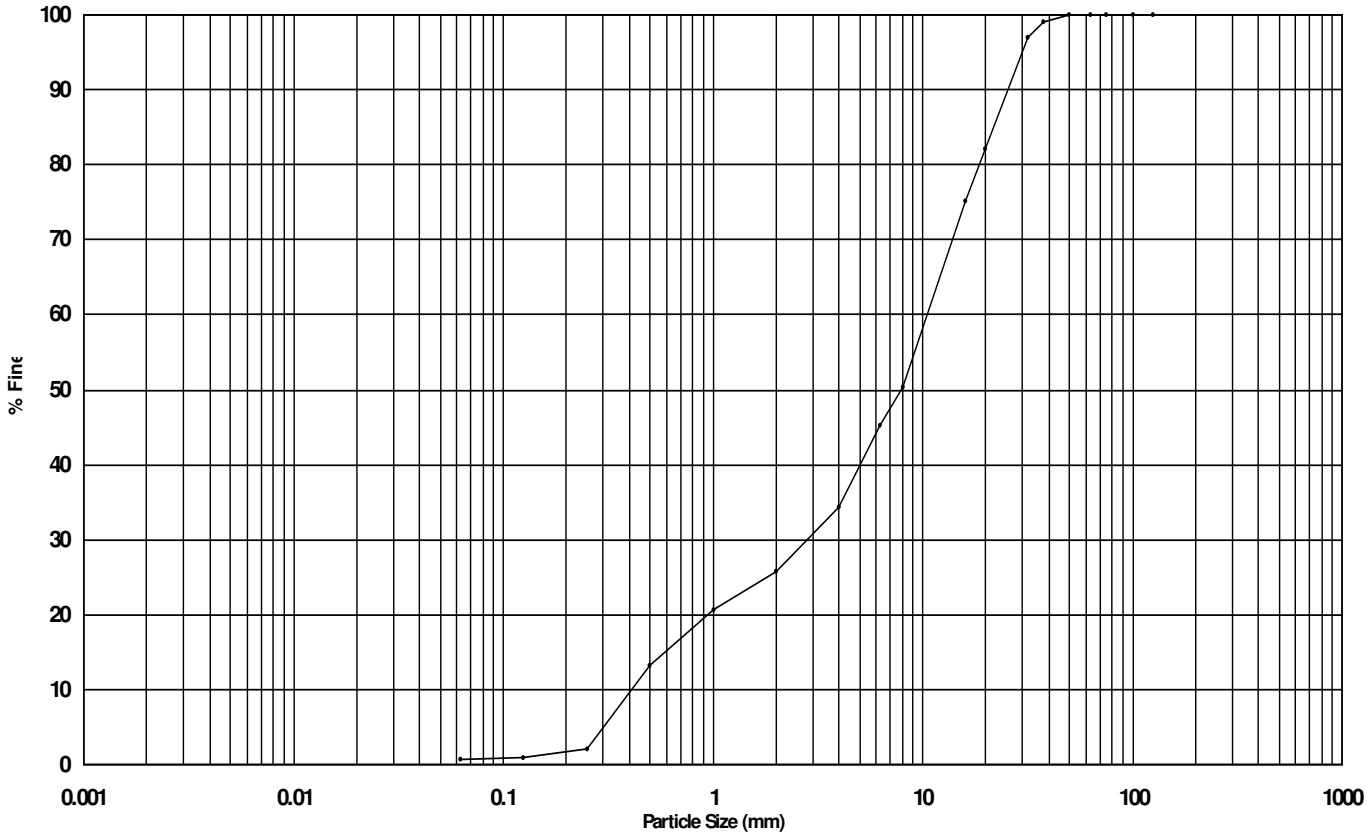
Project: CROMWELL NORTH

Project No: PC176655

Hole CP01/17WM
Sample Depth 4.80-5.20m
Sample Type B
Sample Ref C64547

Sample Description

Brown sandy GRAVEL. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	1
SAND	25
GRAVEL	74
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	99
31.5 mm	97
20 mm	82
16 mm	75
8 mm	50
6.3 mm	45
4 mm	34
2 mm	26
1 mm	21
500 µm	13
250 µm	2

Size	% Finer
125 µm	1
63 µm	1

Uniformity Coefficient
25.70
Sieving Method
Wet sieve

Fine Particle Analysis	
Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

24/05/2017

GEOTECHNICS
geotechnical and geoenvironmental specialists

LABORATORY RESULTS - Particle Size Distribution

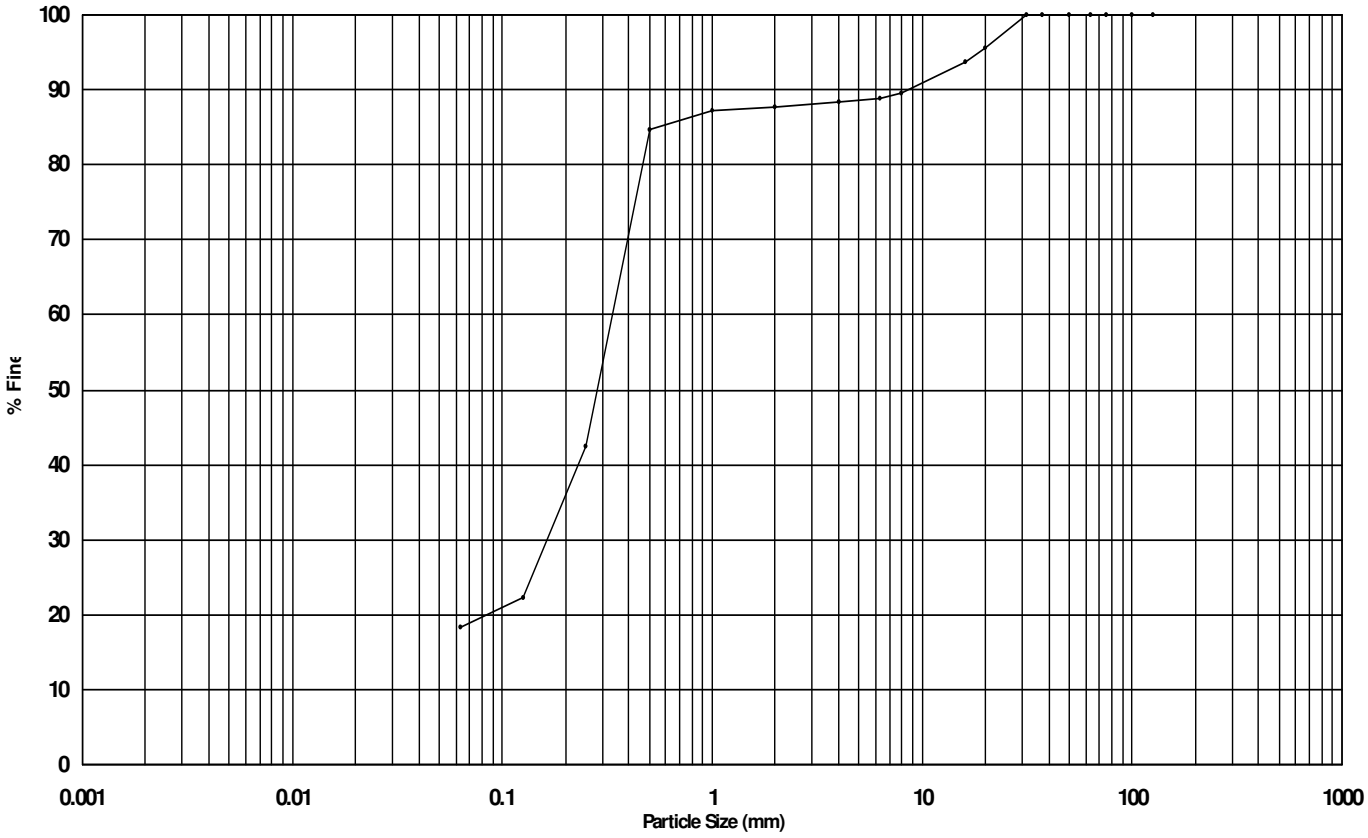
Project: CROMWELL NORTH

Project No: PC176655

Hole CP02/17/WM
Sample Depth 1.70-2.20m
Sample Type B
Sample Ref C64489

Sample Description

Dark grey sandy gravelly CLAY. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	18
SAND	70
GRAVEL	12
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	100
20 mm	96
16 mm	94
8 mm	90
6.3 mm	89
4 mm	88
2 mm	88
1 mm	87
500 µm	85
250 µm	42

Size	% Finer
125 µm	22
63 µm	18

Uniformity Coefficient
Not Available
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks AGS Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

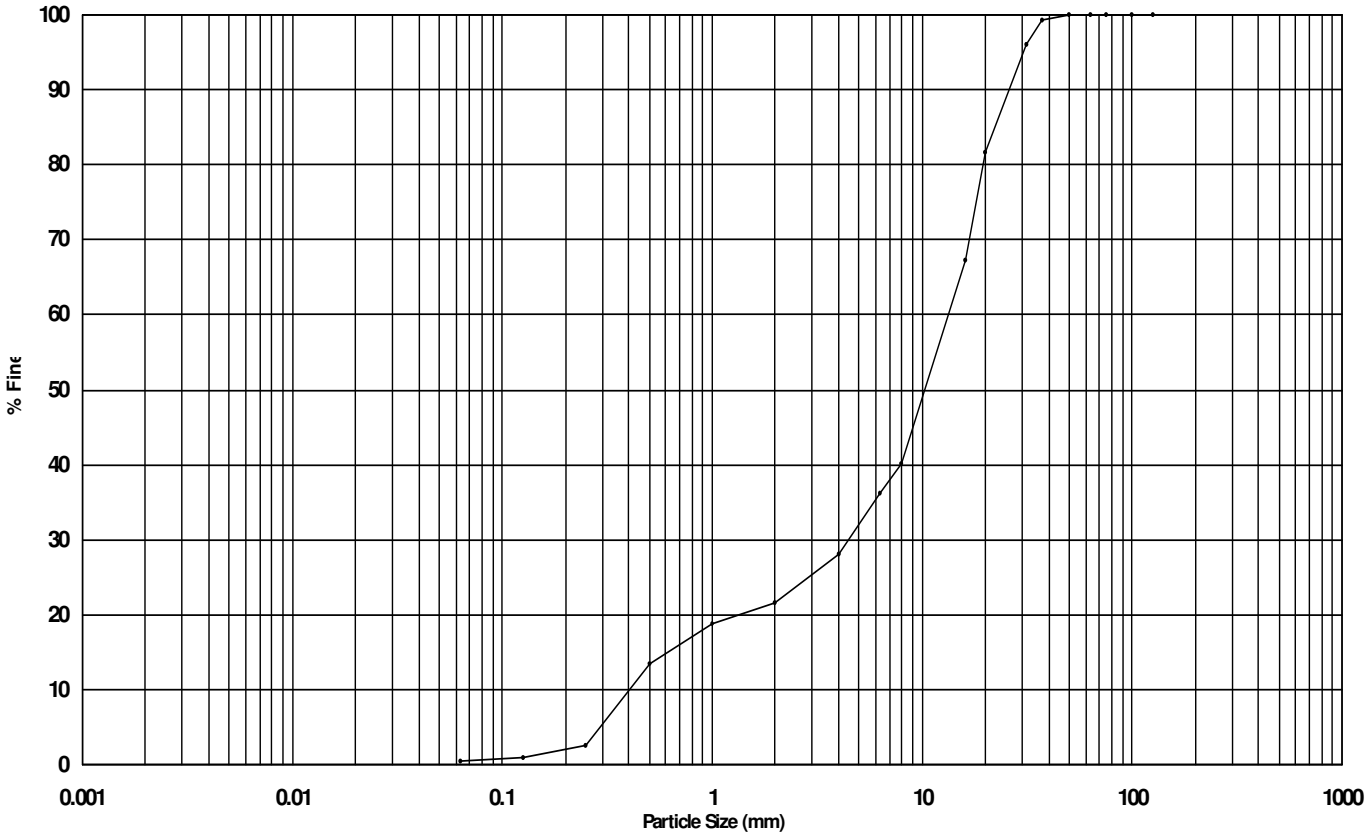
Project: CROMWELL NORTH

Project No: PC176655

Hole CP03/17/WM
Sample Depth 4.20-4.60m
Sample Type B
Sample Ref C64452

Sample Description

Brown gravelly SAND. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	1
SAND	21
GRAVEL	78
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	99
31.5 mm	96
20 mm	82
16 mm	67
8 mm	40
6.3 mm	36
4 mm	28
2 mm	22
1 mm	19
500 µm	14
250 µm	3

Size	% Finer
125 µm	1
63 µm	1

Uniformity Coefficient
33.27
Sieving Method
Wet sieve

Fine Particle Analysis	
Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

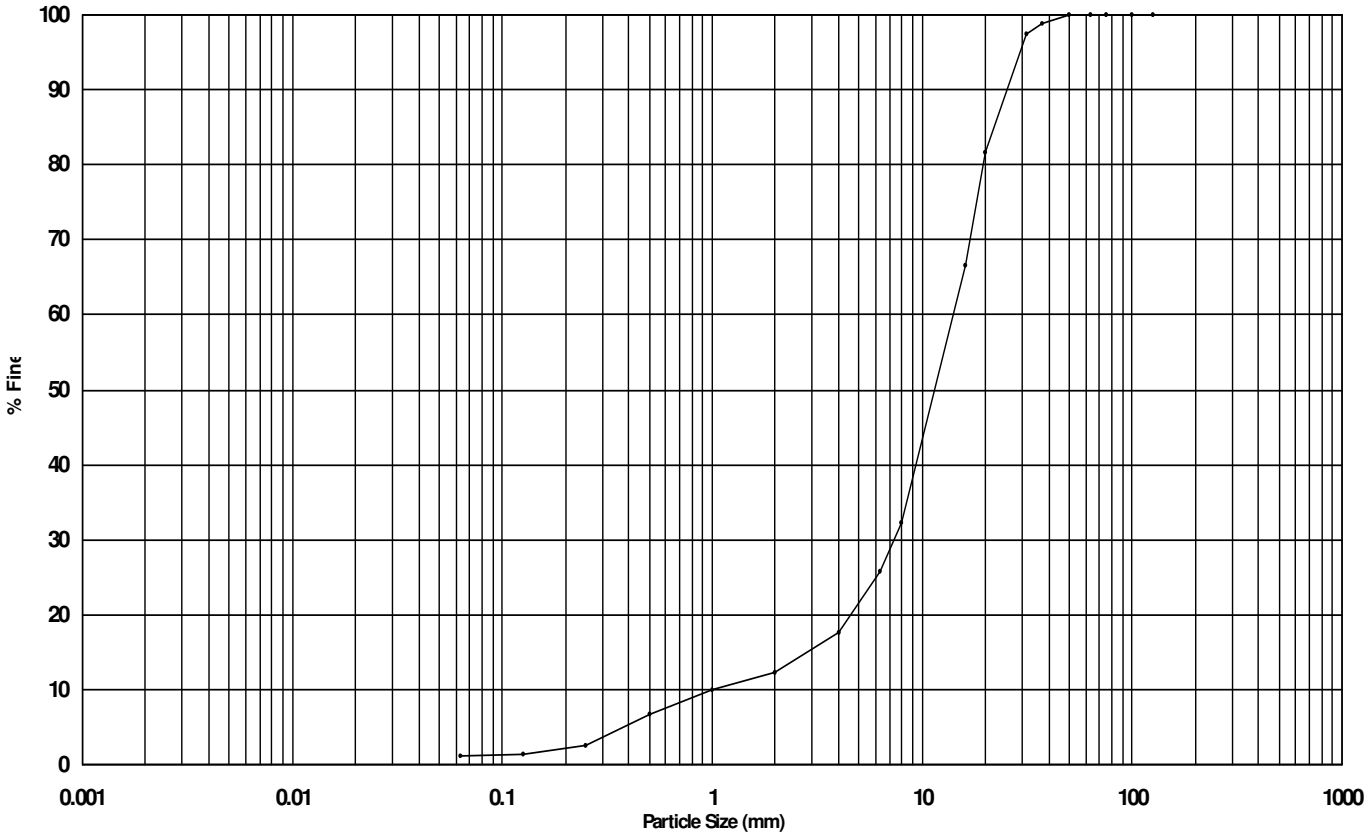
Project: CROMWELL NORTH

Project No: PC176655

Hole CP04/17/WM
Sample Depth 4.60-6.00m
Sample Type B
Sample Ref C64475

Sample Description

Dark brown clayey sandy GRAVEL. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	1
SAND	11
GRAVEL	88
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	99
31.5 mm	97
20 mm	82
16 mm	67
8 mm	32
6.3 mm	26
4 mm	18
2 mm	12
1 mm	10
500 µm	7
250 µm	3

Size	% Finer
125 µm	1
63 µm	1

Uniformity Coefficient
13.83
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

24/05/2017

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LABORATORY RESULTS - Particle Size Distribution

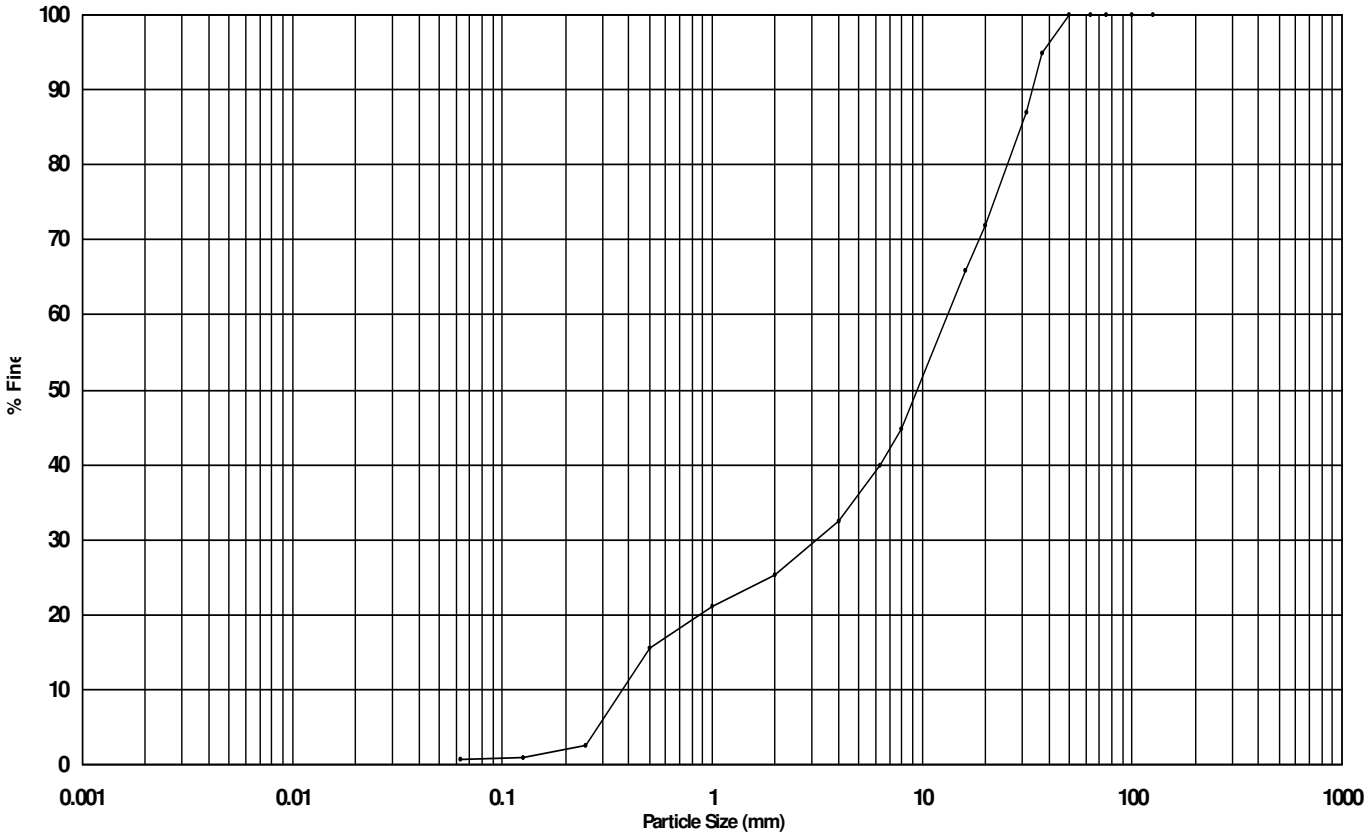
Project: CROMWELL NORTH

Project No: PC176655

Hole CP05/17/WM
Sample Depth 5.20-5.70m
Sample Type B
Sample Ref C64512

Sample Description

Brown gravelly SAND. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	1
SAND	24
GRAVEL	75
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	95
31.5 mm	87
20 mm	72
16 mm	66
8 mm	45
6.3 mm	40
4 mm	32
2 mm	25
1 mm	21
500 µm	16
250 µm	2

Size	% Finer
125 µm	1
63 µm	1

Uniformity Coefficient
35.36
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

24/05/2017

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LABORATORY RESULTS - Particle Size Distribution

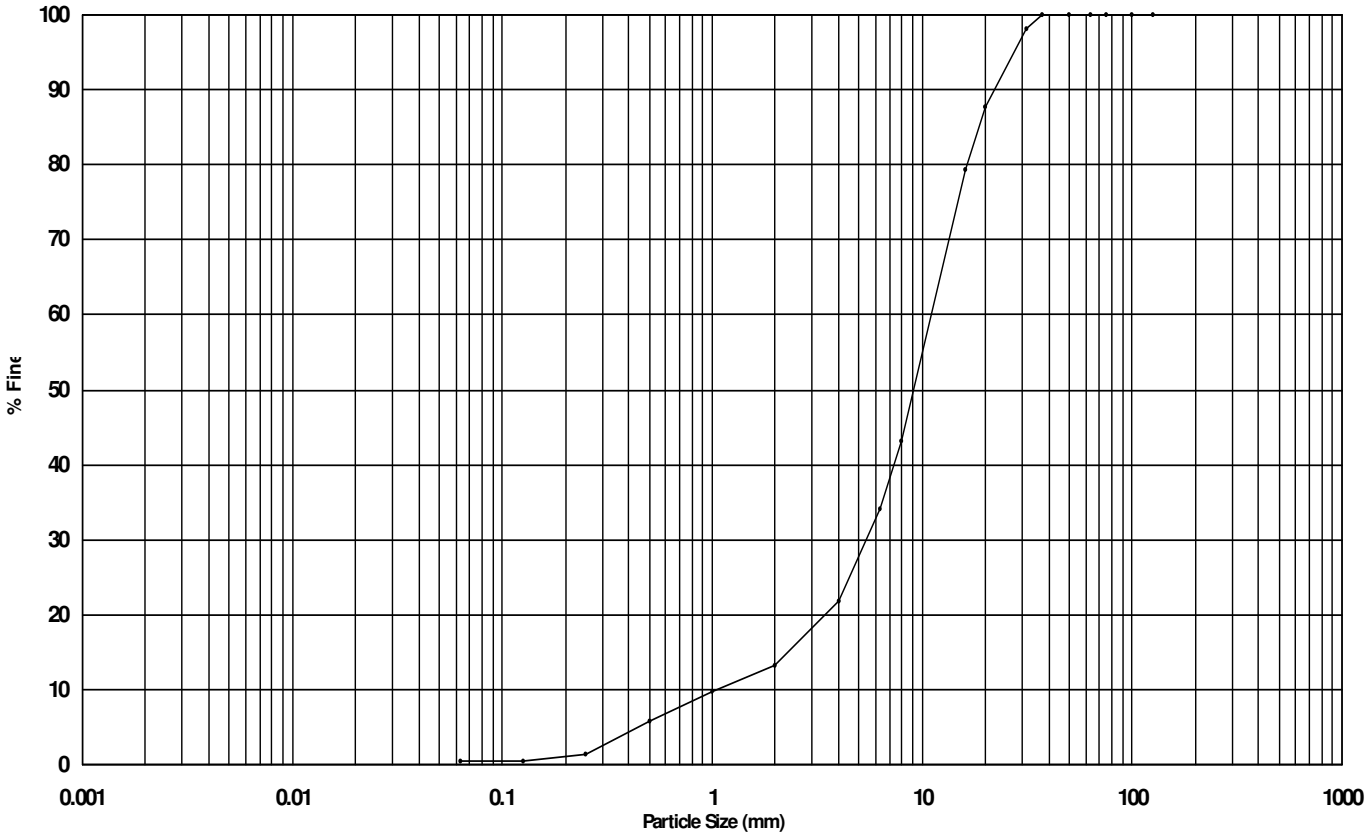
Project: CROMWELL NORTH

Project No: PC176655

Hole CP06/17/WM
Sample Depth 4.90-5.40m
Sample Type B
Sample Ref C64443

Sample Description

Brown gravelly SAND. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	0
SAND	13
GRAVEL	87
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	98
20 mm	88
16 mm	79
8 mm	43
6.3 mm	34
4 mm	22
2 mm	13
1 mm	10
500 µm	6
250 µm	1

Size	% Finer
125 µm	1
63 µm	0

Uniformity Coefficient
10.34
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

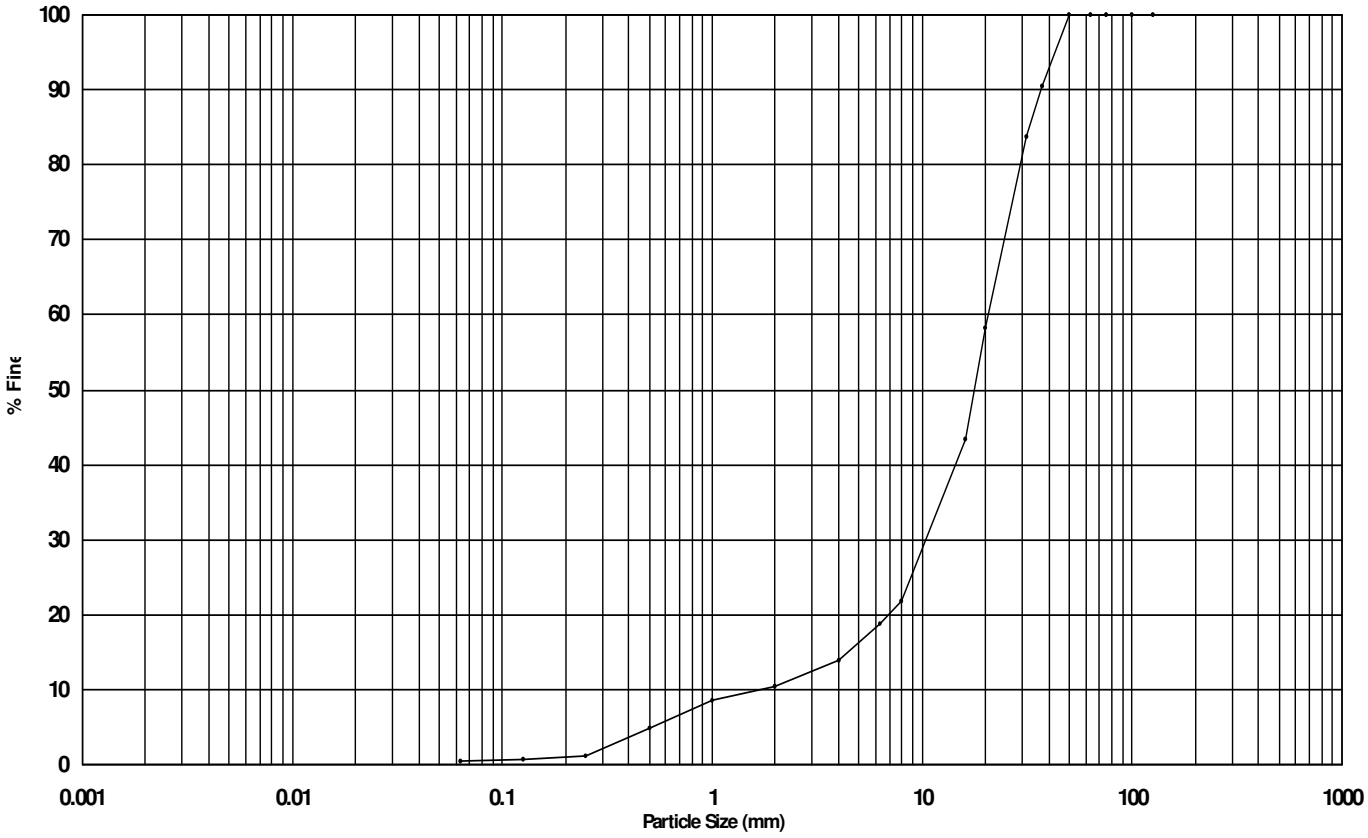
Project: CROMWELL NORTH

Project No: PC176655

Hole CP08/17/WM
Sample Depth 5.60-6.00m
Sample Type B
Sample Ref C64501

Sample Description

Brown sandy GRAVEL. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	0
SAND	10
GRAVEL	90
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	90
31.5 mm	84
20 mm	58
16 mm	43
8 mm	22
6.3 mm	19
4 mm	14
2 mm	10
1 mm	9
500 µm	5
250 µm	1

Size	% Finer
125 µm	1
63 µm	0

Uniformity Coefficient
12.47
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

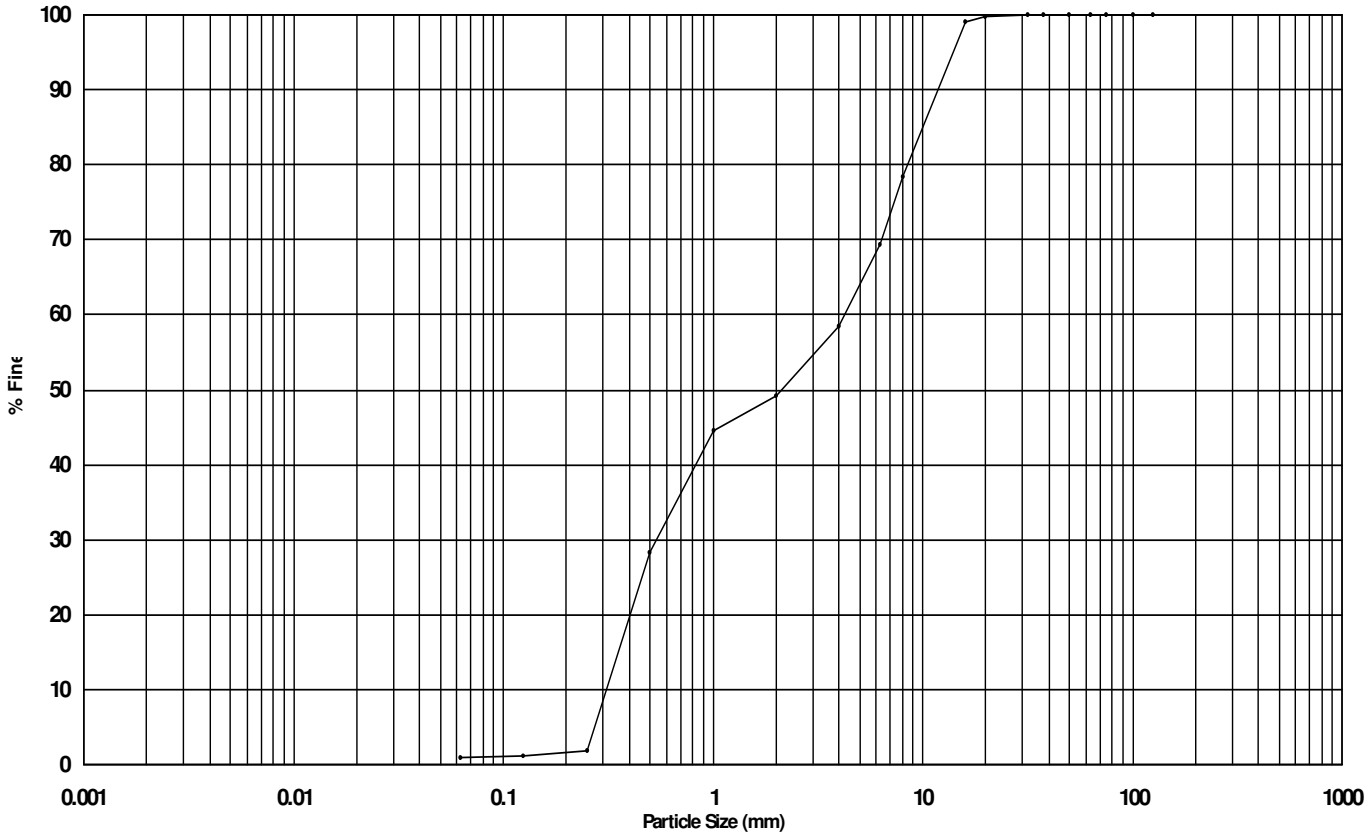
Project: CROMWELL NORTH

Project No: PC176655

Hole CP09/17/WM
Sample Depth 4.40-4.80m
Sample Type B
Sample Ref C64463

Sample Description

Brown gravelly SAND. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	1
SAND	48
GRAVEL	51
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	100
20 mm	100
16 mm	99
8 mm	78
6.3 mm	69
4 mm	58
2 mm	49
1 mm	44
500 µm	28
250 µm	2

Size	% Finer
125 µm	1
63 µm	1

Uniformity Coefficient
13.81
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

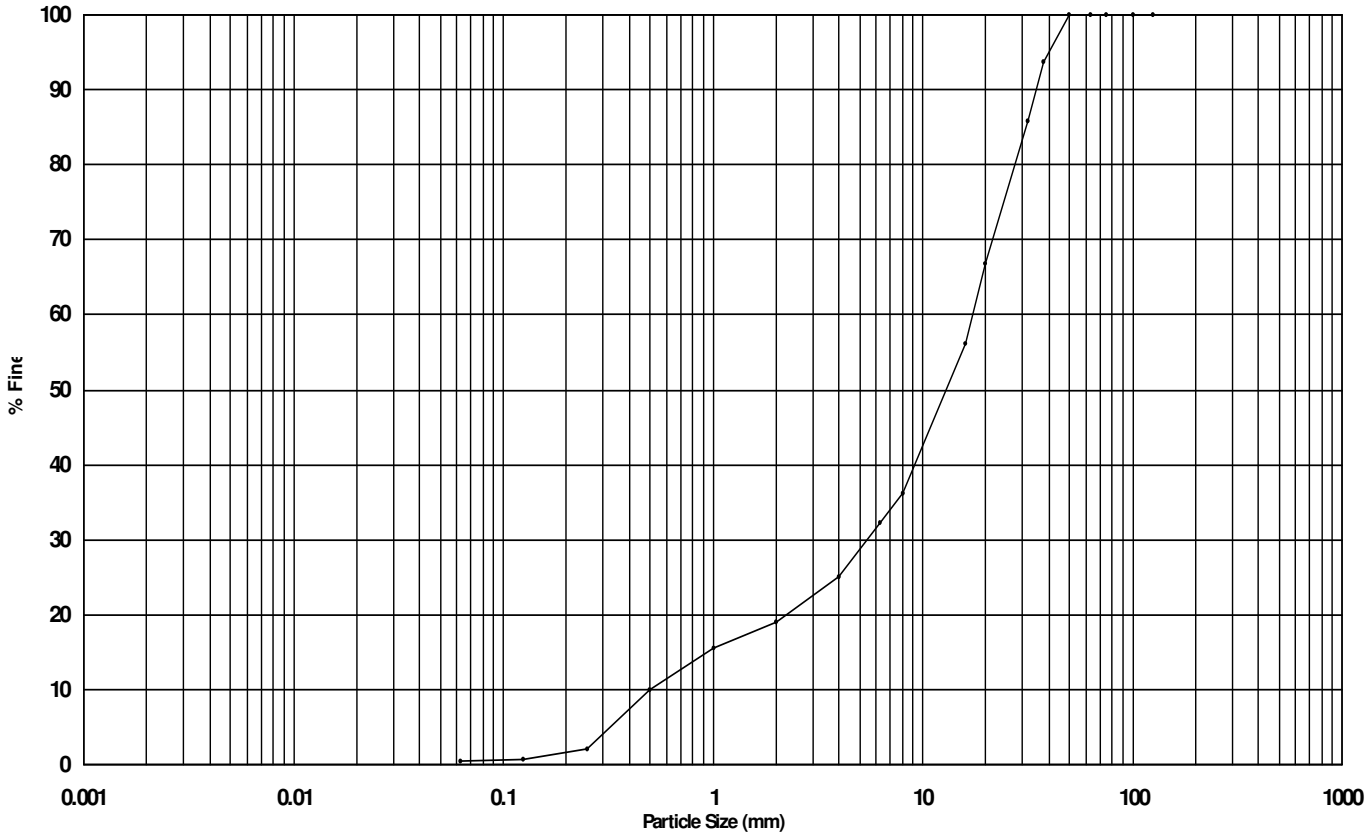
Project: CROMWELL NORTH

Project No: PC176655

Hole CP10/17/WM
Sample Depth 5.20-5.70m
Sample Type B
Sample Ref C64560

Sample Description

Brown sandy GRAVEL. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	0
SAND	19
GRAVEL	81
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	94
31.5 mm	86
20 mm	67
16 mm	56
8 mm	36
6.3 mm	32
4 mm	25
2 mm	19
1 mm	16
500 µm	10
250 µm	2

Size	% Finer
125 µm	1
63 µm	0

Uniformity Coefficient
34.98
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

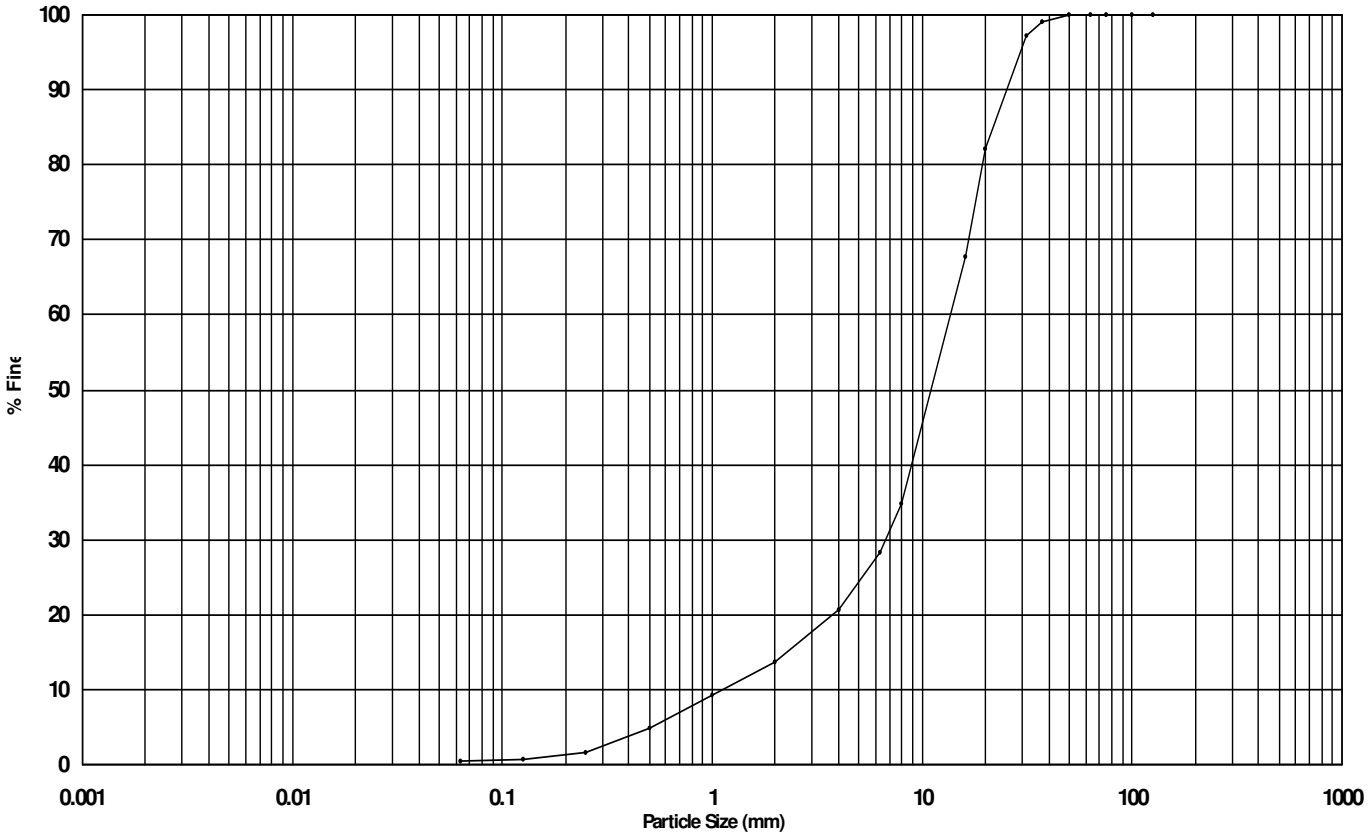
Project: CROMWELL NORTH

Project No: PC176655

Hole CP11/17WM
Sample Depth 4.00-4.50m
Sample Type B
Sample Ref C64535

Sample Description

Brown sandy GRAVEL. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	0
SAND	14
GRAVEL	86
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	99
31.5 mm	97
20 mm	82
16 mm	68
8 mm	35
6.3 mm	28
4 mm	21
2 mm	14
1 mm	9
500 µm	5
250 µm	2

Size	% Finer
125 µm	1
63 µm	0

Uniformity Coefficient
12.27

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

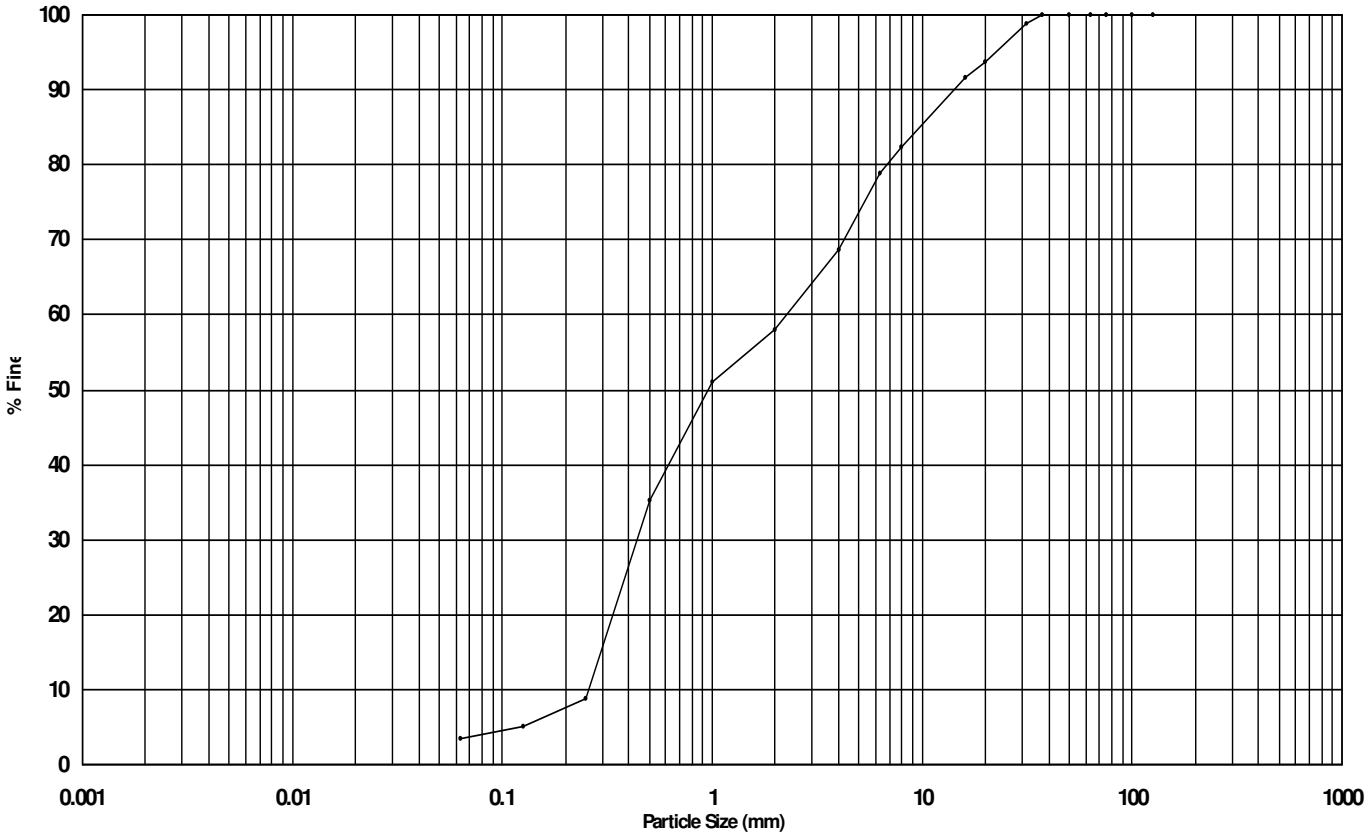
Project: CROMWELL NORTH

Project No: PC176655

Hole CP12/17WM
Sample Depth 4.30-4.60m
Sample Type B
Sample Ref C64541

Sample Description

Brown gravelly SAND. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	4
SAND	54
GRAVEL	42
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	99
20 mm	94
16 mm	92
8 mm	82
6.3 mm	79
4 mm	69
2 mm	58
1 mm	51
500 µm	35
250 µm	9

Size	% Finer
125 µm	5
63 µm	4

Uniformity Coefficient
8.83
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

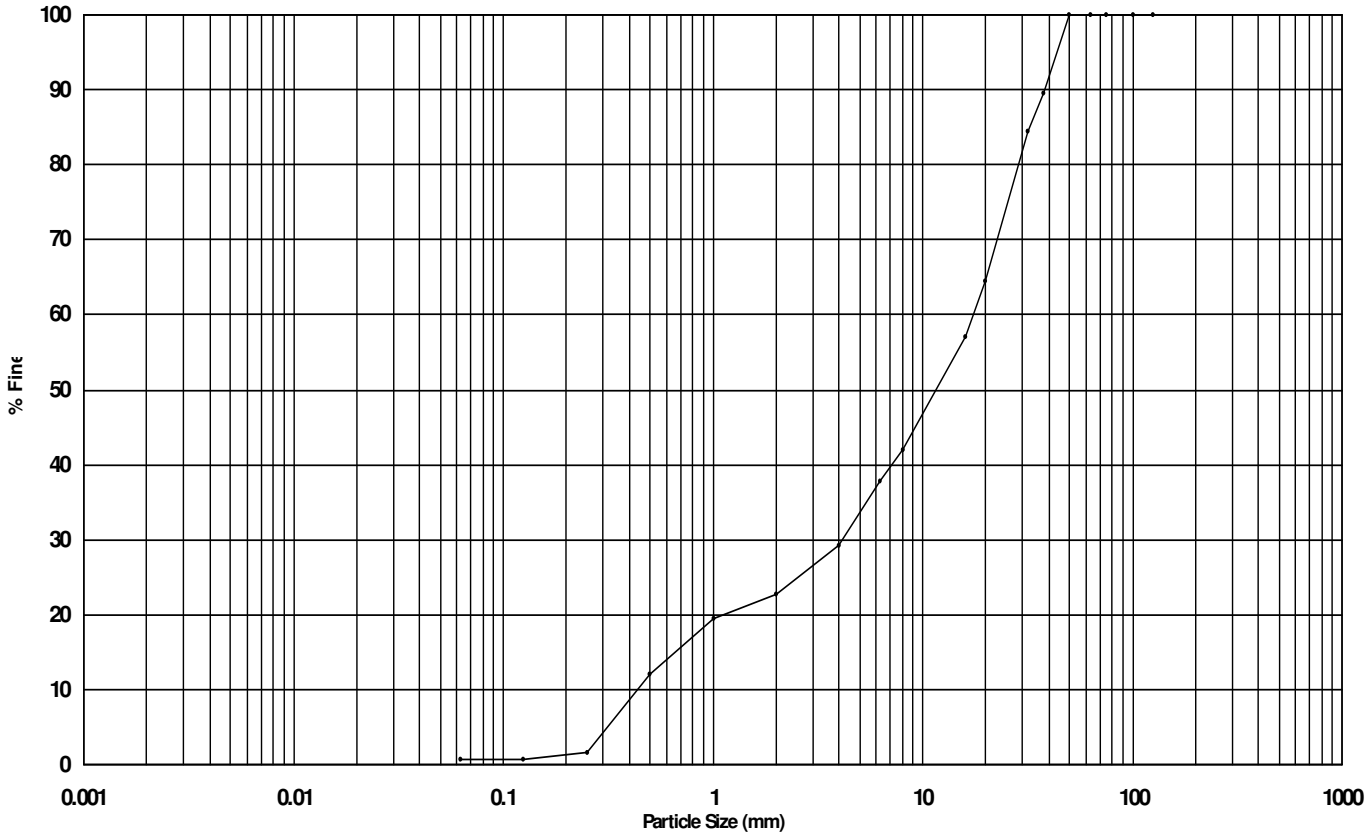
Project: CROMWELL NORTH

Project No: PC176655

Hole CP13/17/WM
Sample Depth 6.50-7.00m
Sample Type B
Sample Ref C64497

Sample Description

Dark brown sandy GRAVEL. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	1
SAND	22
GRAVEL	77
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	90
31.5 mm	84
20 mm	65
16 mm	57
8 mm	42
6.3 mm	38
4 mm	29
2 mm	23
1 mm	20
500 µm	12
250 µm	2

Size	% Finer
125 µm	1
63 µm	1

Uniformity Coefficient
39.90
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

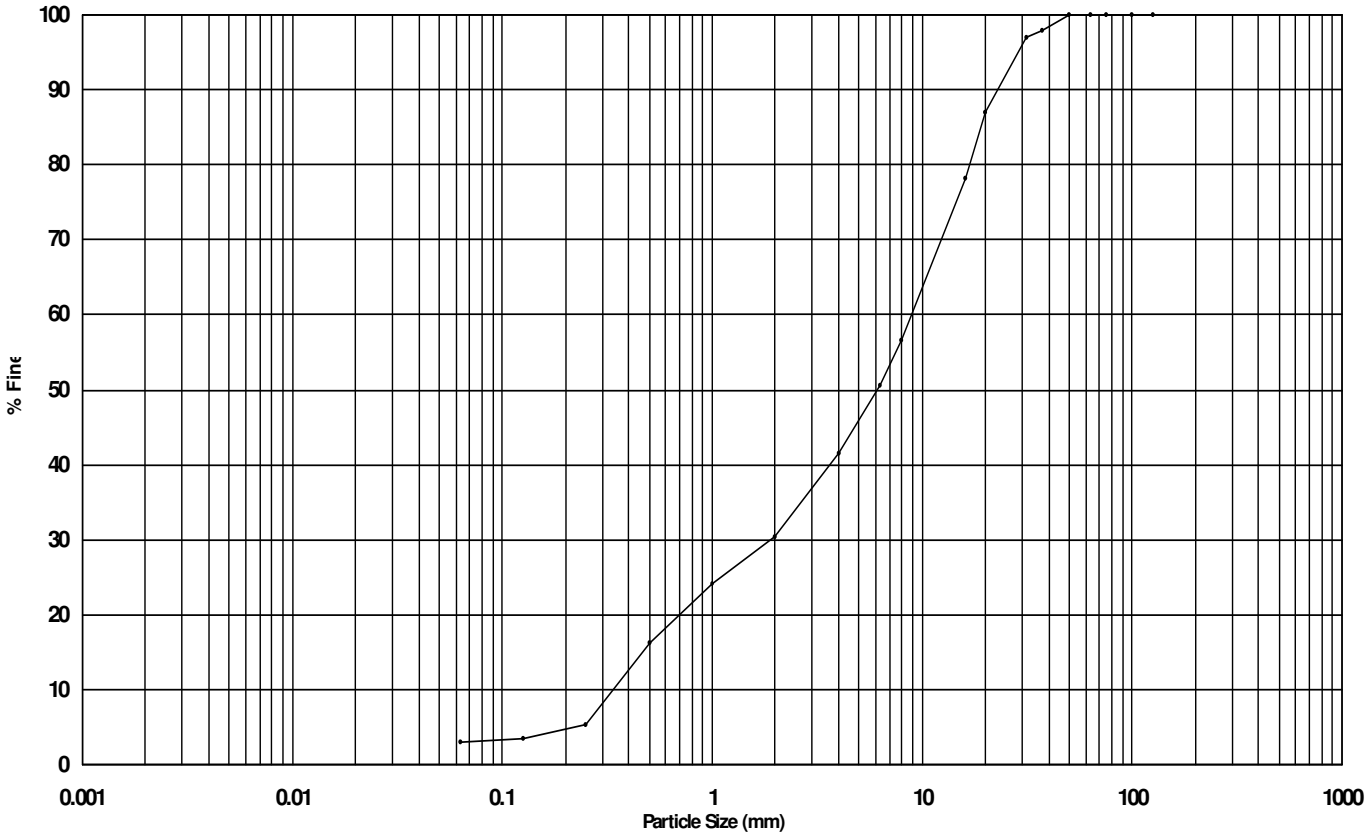
Project: CROMWELL NORTH

Project No: PC176655

Hole CP14/17WM
Sample Depth 5.00-5.50m
Sample Type B
Sample Ref C64528

Sample Description

Brown sandy GRAVEL. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	3
SAND	27
GRAVEL	70
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	98
31.5 mm	97
20 mm	87
16 mm	78
8 mm	57
6.3 mm	50
4 mm	42
2 mm	30
1 mm	24
500 µm	16
250 µm	5

Size	% Finer
125 µm	3
63 µm	3

Uniformity Coefficient
26.48
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

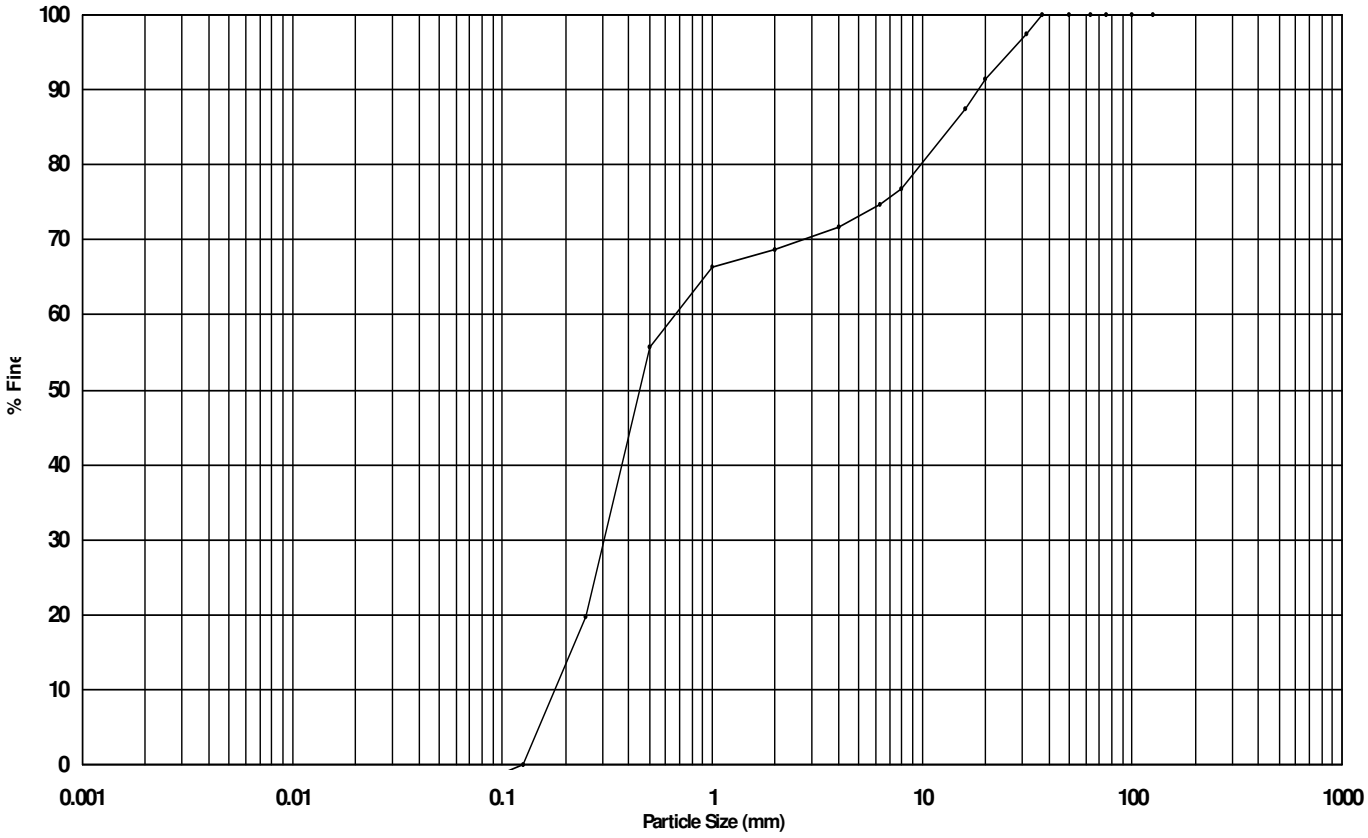
Project: CROMWELL NORTH

Project No: PC176655

Hole CP15/17/WM
Sample Depth 4.50-5.00m
Sample Type B
Sample Ref C64521

Sample Description

Dark brown gravelly SAND. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	-4
SAND	73
GRAVEL	31
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	97
20 mm	91
16 mm	87
8 mm	77
6.3 mm	75
4 mm	72
2 mm	69
1 mm	66
500 µm	56
250 µm	20

Size	% Finer
125 µm	0
63 µm	-4

Uniformity Coefficient
3.71
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks AGS Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

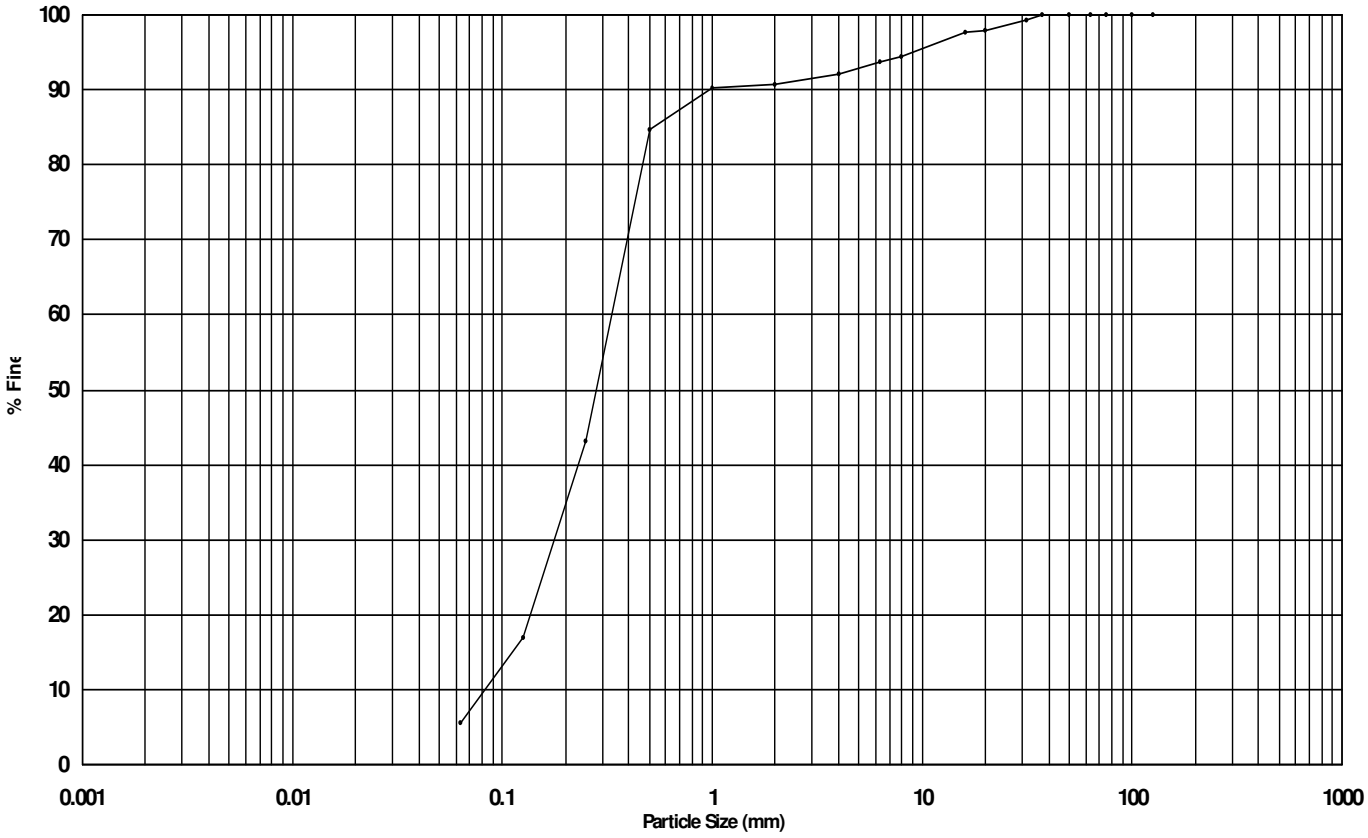
Project: CROMWELL NORTH

Project No: PC176655

Hole TP02
Sample Depth 1.00-1.50m
Sample Type B
Sample Ref C64562

Sample Description

Brown slightly gravelly SAND with clay pockets. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	6
SAND	85
GRAVEL	9
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	99
20 mm	98
16 mm	98
8 mm	94
6.3 mm	94
4 mm	92
2 mm	91
1 mm	90
500 µm	85
250 µm	43

Size	% Finer
125 µm	17
63 µm	6

Uniformity Coefficient
4.01
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

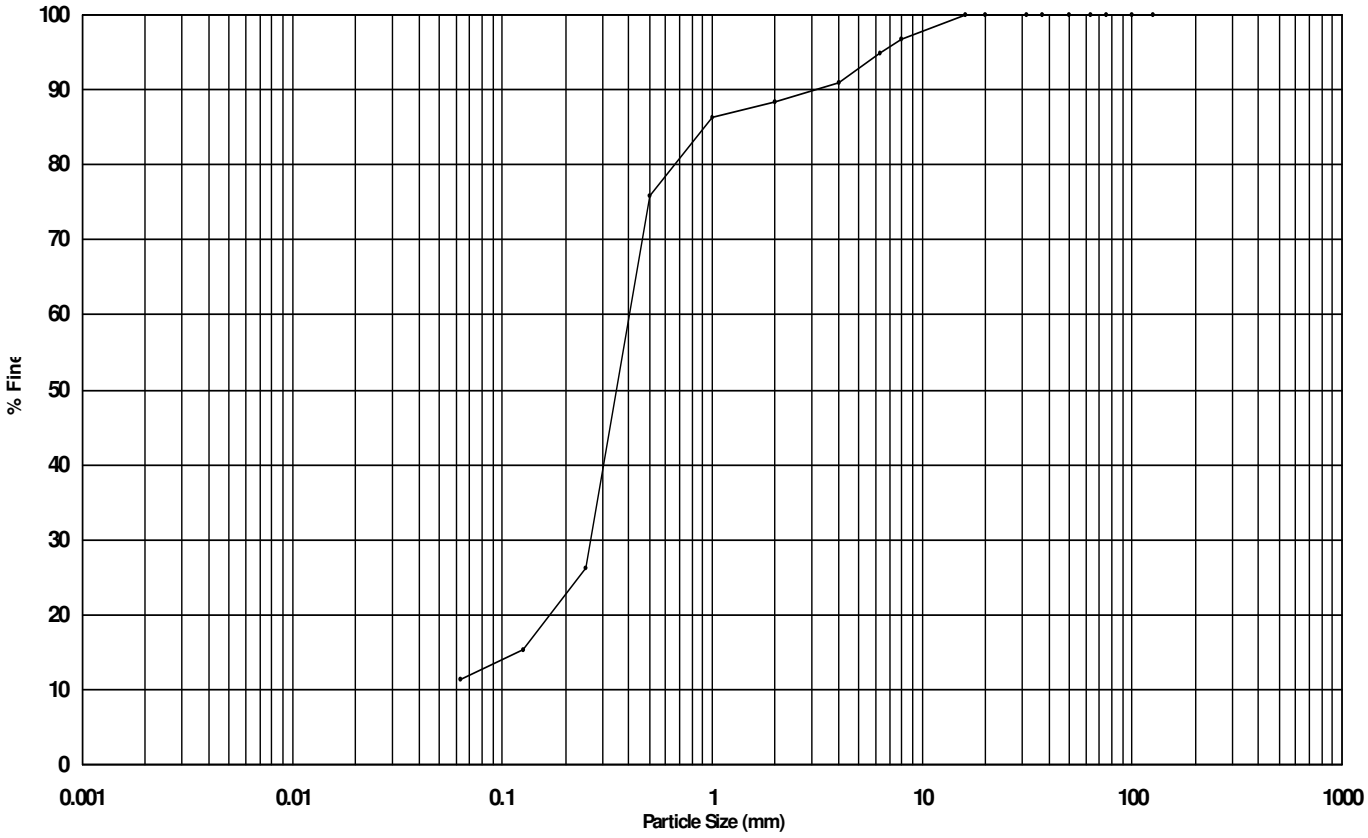
Project: CROMWELL NORTH

Project No: PC176655

Hole TP03
Sample Depth 3.00-3.50m
Sample Type B
Sample Ref C64563

Sample Description

Brown slightly gravelly SAND with clay pockets. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	11
SAND	77
GRAVEL	12
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	100
20 mm	100
16 mm	100
8 mm	97
6.3 mm	95
4 mm	91
2 mm	88
1 mm	86
500 µm	76
250 µm	26

Size	% Finer
125 µm	15
63 µm	11

Uniformity Coefficient
Not Available

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

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LABORATORY RESULTS - Particle Size Distribution

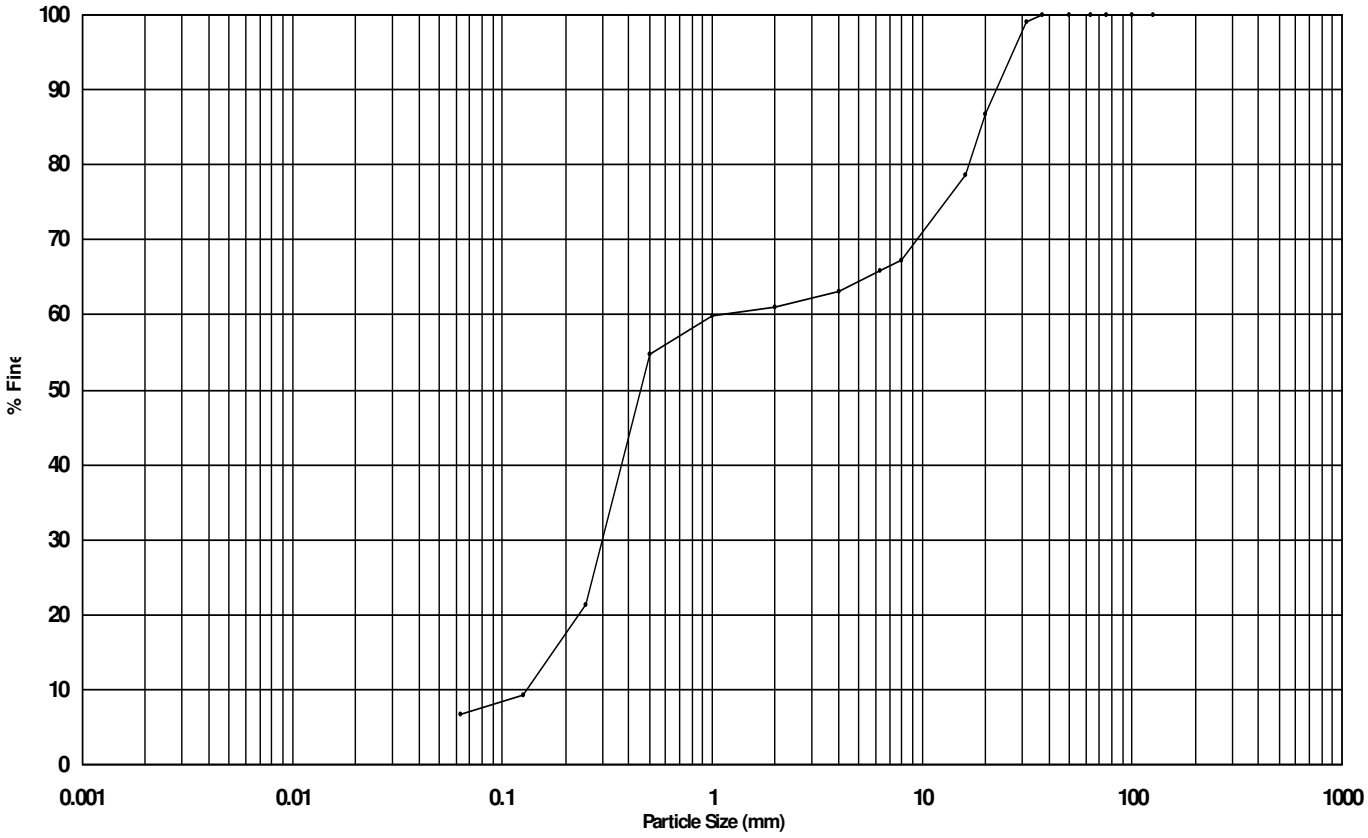
Project: CROMWELL NORTH

Project No: PC176655

Hole TP04
Sample Depth 3.40-3.50m
Sample Type B
Sample Ref C64565

Sample Description

Brown gravelly SAND with clay pockets. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	7
SAND	54
GRAVEL	39
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	99
20 mm	87
16 mm	79
8 mm	67
6.3 mm	66
4 mm	63
2 mm	61
1 mm	60
500 µm	55
250 µm	21

Size	% Finer
125 µm	9
63 µm	7

Uniformity Coefficient
8.58
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

24/05/2017

GEOTECHNICS
geotechnical and geoenvironmental specialists

LABORATORY RESULTS - Particle Size Distribution

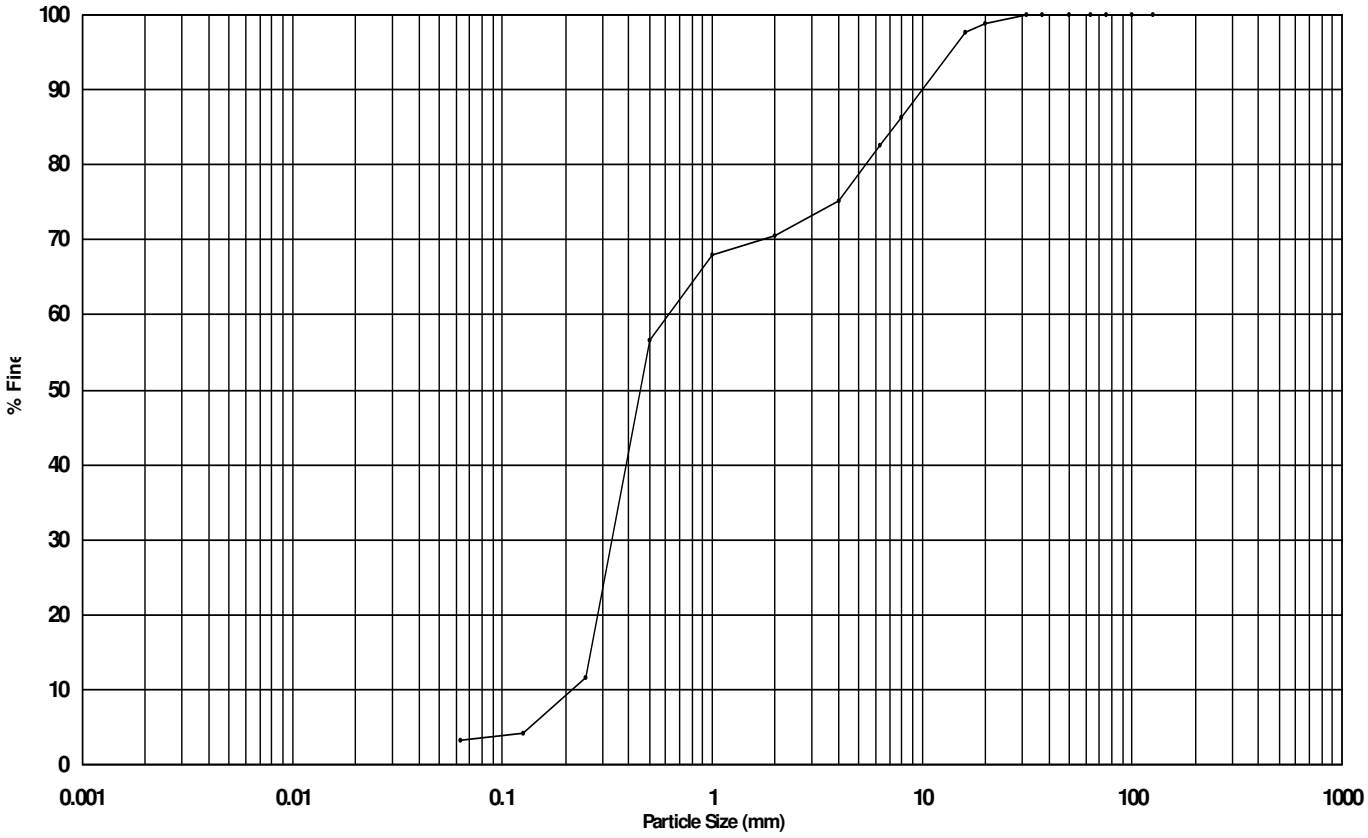
Project: CROMWELL NORTH

Project No: PC176655

Hole TP05
Sample Depth 3.30-3.60m
Sample Type B
Sample Ref C64567

Sample Description

Brown gravelly SAND with clay pockets. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	3
SAND	68
GRAVEL	29
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	100
20 mm	99
16 mm	98
8 mm	86
6.3 mm	83
4 mm	75
2 mm	71
1 mm	68
500 µm	57
250 µm	12

Size	% Finer
125 µm	4
63 µm	3

Uniformity Coefficient
2.89

Sieving Method
Wet sieve

Fine Particle Analysis	
Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

24/05/2017

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LABORATORY RESULTS - *Particle Size Distribution*

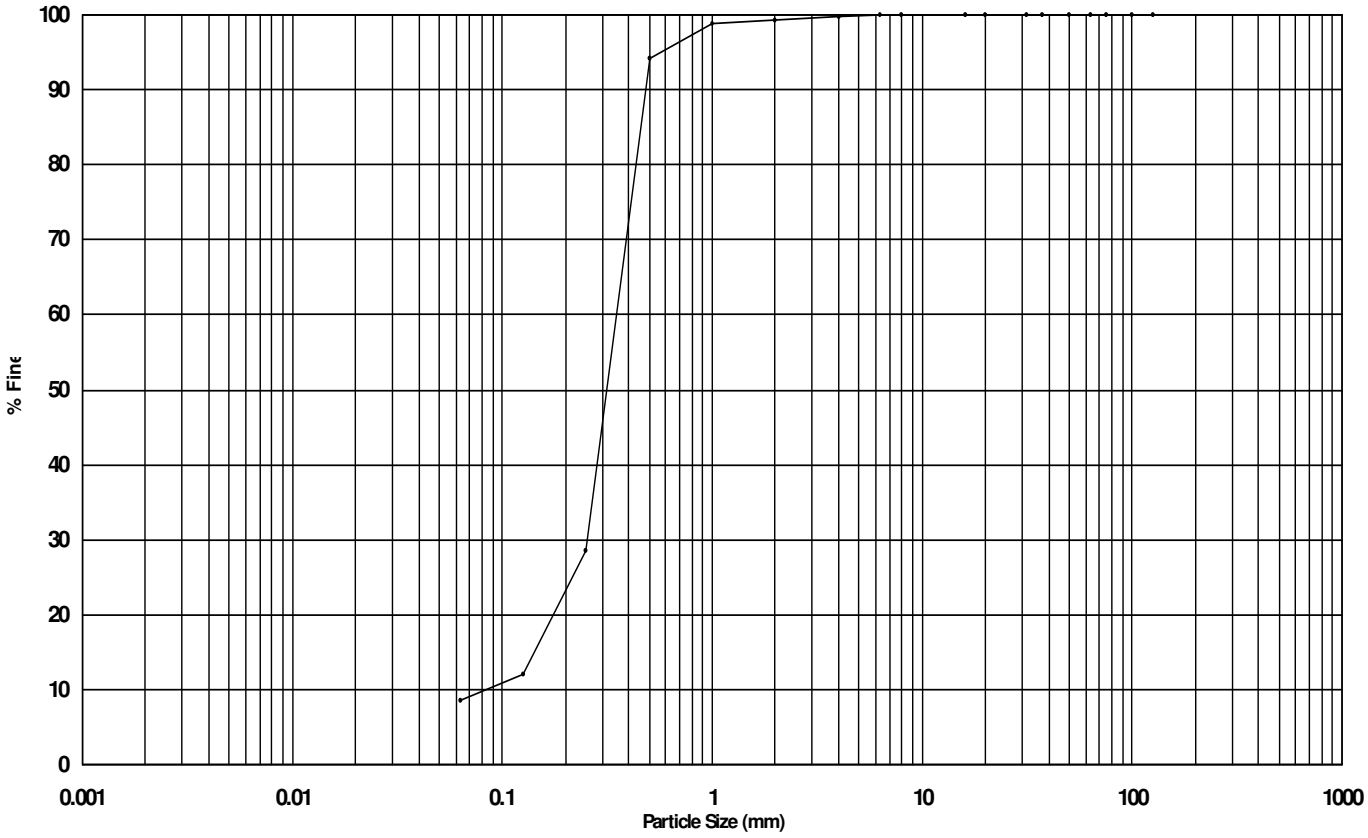
Project: CROMWELL NORTH

Project No: PC176655

Hole TP06
Sample Depth 3.00-3.30m
Sample Type B
Sample Ref C64569

Sample Description

Brown SAND with occasional clay pockets and very occasional gravel. **



Classification	CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
		SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	9
SAND	90
GRAVEL	1
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	100
20 mm	100
16 mm	100
8 mm	100
6.3 mm	100
4 mm	100
2 mm	99
1 mm	99
500 µm	94
250 µm	29

Size	% Finer
125 µm	12
63 µm	9

Uniformity Coefficient
4.20
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

24/05/2017

GEOTECHNICS
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LABORATORY RESULTS - Particle Size Distribution

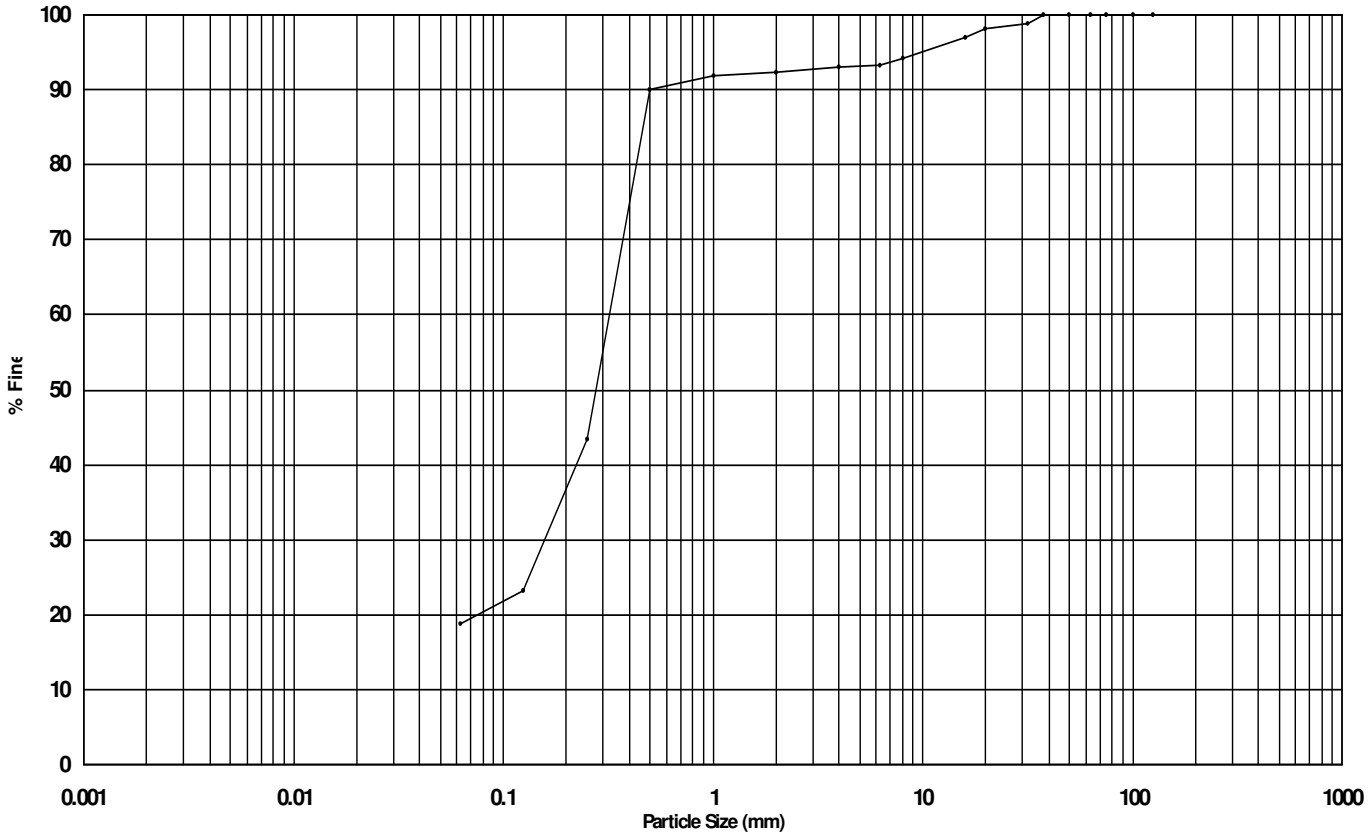
Project: CROMWELL NORTH

Project No: PC176655

Hole TP07
Sample Depth 3.00-3.50m
Sample Type B
Sample Ref C64571

Sample Description

Brown SAND with clay pockets and very gravel. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	19
SAND	73
GRAVEL	8
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	99
20 mm	98
16 mm	97
8 mm	94
6.3 mm	93
4 mm	93
2 mm	92
1 mm	92
500 µm	90
250 µm	43

Size	% Finer
125 µm	23
63 µm	19

Uniformity Coefficient
Not Available
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks AGS Test performed in accordance with BS EN 933-1:2012

24/05/2017

GEOTECHNICS
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LABORATORY RESULTS - Particle Size Distribution

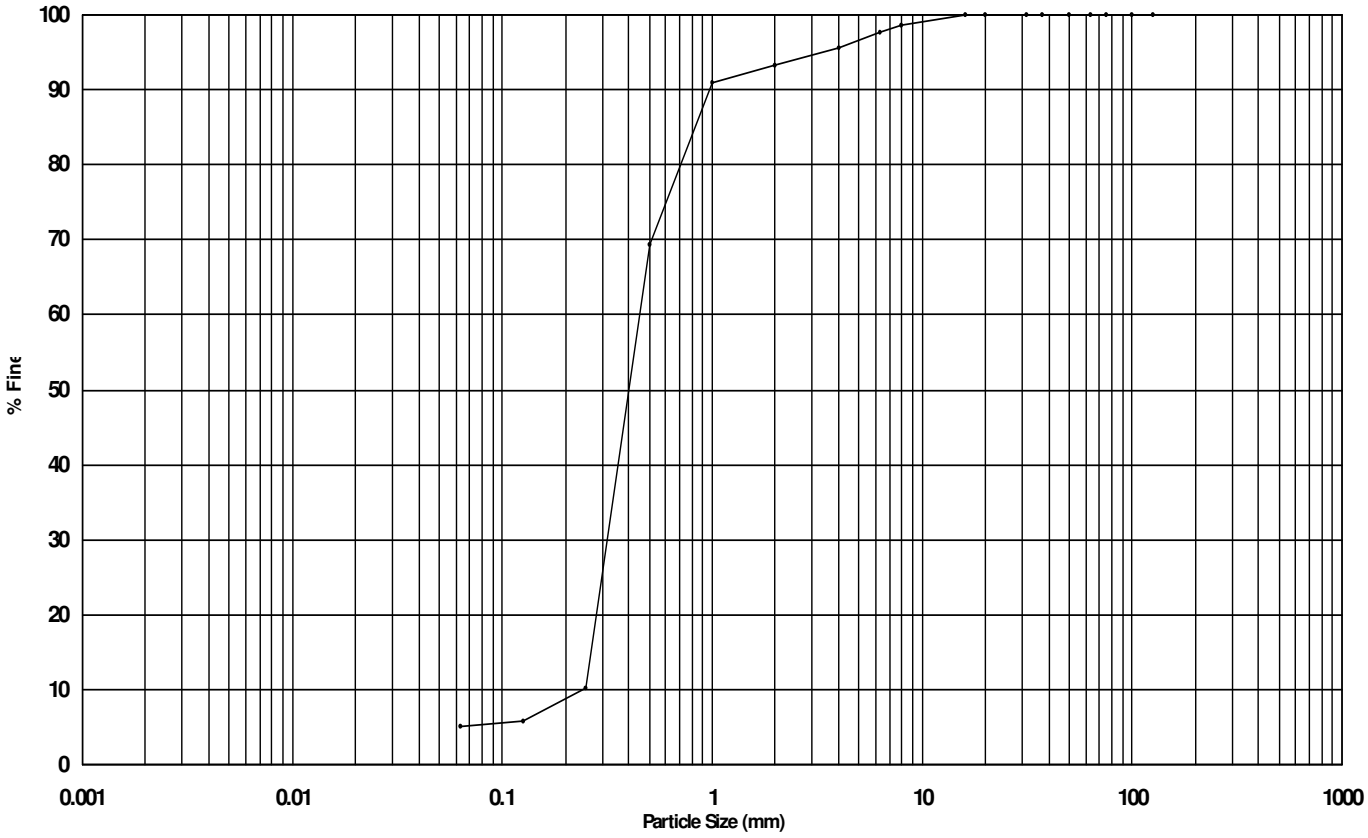
Project: CROMWELL NORTH

Project No: PC176655

Hole TP08
Sample Depth 2.50-3.00m
Sample Type B
Sample Ref C64572

Sample Description

Brown SAND with occasional gravel. **



Classification		Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulders
	CLAY	SILT			SAND			Gravel				

Classification	% of each
SILT (including CLAY)	5
SAND	88
GRAVEL	7
COBBLES	0
BOULDERS	0

Size	% Finer
125 mm	100
100 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
31.5 mm	100
20 mm	100
16 mm	100
8 mm	99
6.3 mm	98
4 mm	96
2 mm	93
1 mm	91
500 µm	69
250 µm	10

Size	% Finer
125 µm	6
63 µm	5

Uniformity Coefficient
1.84
Sieving Method
Wet sieve
Fine Particle Analysis

Method	
Pre-treated with	
% loss on Pre-treatment	
Particle Density	

Remarks Test performed in accordance with BS EN 933-1:2012

24/05/2017

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480000E
480250E
480500E
480750E
481000E
481250E
363250N
363000N
362750N
362500N
362250N

CP01/17(WM)
50mm GW Installation
Plain and bentonite seal: 0-2.8m
Slotted and gravel pack: 2.8-7.5m
Soils & clay (OB): 2.80m
Sand and gravel (MIN): 4.70m

CP07/17
Soils & clay (OB): 2.50m
Sand and gravel (MIN): 4.00m

TP01/17
Soils and Clay (OB): 1.80m
(end within overburden)

CPT01/17
Soils & clay (OB): 2.65m
Sand and gravel (MIN): 4.05m

CP02/17(WM)
50mm GW Installation
Plain and bentonite seal: 0-2.8m
Slotted and gravel pack: 2.8-7.5m
Soils & clay (OB): 3.20m
Sand and gravel (MIN): 1.80m

CP08/17
Soils & clay (OB): 2.20m
Fine-medium sand (OB): 1.10m
Sand and gravel (MIN): 3.30m

TP02/17
Soils and Clay (OB): 0.60m
Sand and Gravel: 1.90m_

CPT02/17
Soils & clay (OB): 3.60m
Sand and gravel (MIN): 4.30m

TP03/17
Soils and Clay (OB): 2.10m
Sand and Gravel: 1.40m_

CP03/17(WM)
50mm GW Installation
Plain and bentonite seal: 0-2.2m
Slotted and gravel pack: 2.2-6.0m
Soils & clay (OB): 2.20m
Sand and gravel (MIN): 3.80m

CP09/17
Soils & clay (OB): 1.40m
Sand and gravel (MIN): 2.30m

CP04/17 (WM)
50mm GW Installation
Plain and bentonite seal: 0-4.6m
Slotted and gravel pack: 4.6-10.0m
Soils & clay (OB): 4.60m
Sand and gravel (MIN): 2.70m

CPT03/17
Soils & clay (OB): 2.20m
Sand and gravel (MIN): 4.40m_

CP10/17
Soils & clay (OB): 2.00m
Fine-medium sand (OB): 1.20m
Sand and gravel (MIN): 5.00m

TP04/17
Soils and Clay (OB): 2.80m
Sand and Gravel: 0.70m_

CP05/17 (WM)
50mm GW Installation
Plain and bentonite seal: 0-3.2m
Slotted and gravel pack: 3.2-10.0m
Soils & clay (OB): 1.80m
Fine-medium sand (OB): 1.40m
Sand and gravel (MIN): 6.30m

CPT04/17
Soils & clay (OB): 3.10m
Sand and gravel (MIN): 3.60m

CPT05/17 CPT05A/17
Soils & clay (OB): 2.70m
Sand and gravel (MIN): 5.00m
Soils & clay (OB): 3.00m
Sand and gravel (MIN): 0.22m_

TP05/17
Soils and Clay (OB): 2.30m
Sand and Gravel: 1.30m_

TP06/17
Soils and Clay (OB): 1.20m
Sand and Gravel: 1.50m_

CPT06/17
Soils & clay (OB): 2.60m
Sand and gravel (MIN): 3.50m_

CP11/17
Soils & clay (OB): 2.00m
Sand and gravel (MIN): 6.10m

CP12/17
Soils & clay (OB): 1.70m
Fine-medium sand (OB): 0.80m
Sand and gravel (MIN): 4.30m

CP13/17
Soils & clay (OB): 4.90m
Sand and gravel (MIN): 2.40m

CP15/17 (WM)
50mm GW Installation
Plain and bentonite seal: 0.0-2.5m
Slotted and gravel pack: 2.5-7.7m
Soils & clay (OB): 0.80m
Sand and gravel (MIN): 6.90m

CPT07/17
Soils & clay (OB): 3.20m
Sand and gravel (MIN): 5.00m

TP07/17
Soils and Clay (OB): 2.10m
Sand and Gravel: 0.20m_

CPT08/17
Soils & clay (OB): 3.50m
Sand and gravel (MIN): 3.90m

CPT09/17
Soils & clay (OB): 2.90m
Sand and gravel (MIN): 0.50m_

TP08/17
Soils and Clay (OB): 2.20m
Sand and Gravel: 1.00m_

CP14/17
Soils & clay (OB): 3.00m
Sand and gravel (MIN): 5.90m

CP06/17
Soils & clay (OB): 1.80m
Sand and gravel (MIN): 5.80m

CPT10/17
Soils & clay (OB): 2.40m
Sand and gravel (MIN): 3.60m

Legend and Notes

- Area under CEMEX's control
- CP Borehole Location - Installed with monitoring standpipe
- CP Borehole Location - Backfilled on completion
- Cone Penetration Test Location
- Trial Pit Location

Models	Plotted from: 1701-S016 FINAL EXPLORATORY HOLE LOCATIONS.LSS
	Overlay 1: 2015 Aerial Photography
	Overlay 2: 1701-S002 Green Line Boundary
	Overlay 3:

CEMEX

National Reserves Department
CEMEX UK Operations Limited
Rugby House, Evreux Way
Rugby, Warwickshire
CV21 2DT
Telephone 01788 517000
Facsimile N/A

Drawn By: Steven Hopkins	Company:
Date: 30.August.2017	Site: Cromwell North
Scale(S): 1:5000 (A3)	Project: Ground Investigation
Checked / Approved by: SLH	Title: Exploratory Hole Plan
OS Ref.: NY0778	Drawing No.: 1701-S016-CRN-D-201

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TRIAL PIT LOG

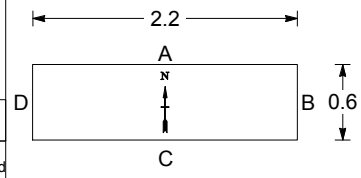
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
						6.35	(0.50) 0.50	Grass over firm dark brown slightly sandy CLAY with frequent rootlets to 0.2m bgl. (TOPSOIL)		TS	
1.00-1.50 1.00-1.50	B D					5.05	(1.30) 1.80	Firm orangish brown CLAY. (ALLUVIUM)		ALV	
								End of pit at 1.8m bgl.		END	

General Remarks
Hole terminated at 1.8m bgl due to sticky clay. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.20m	Will Allaway	Cemex UK Ltd	1 of 1
Width 0.60m	**Ground Level (m AOD)** 6.851	**Co-Ordinates (NGR)** E 480150 N 363250	**Date** 05-04-17
Orientation 180 degrees from north	**Method/Plant Used** JCB-3CX	**Contractor** Collett Plant Hire	**Scale** 1:30.0

Trial Hole No.

TP01/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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TRIAL PIT LOG

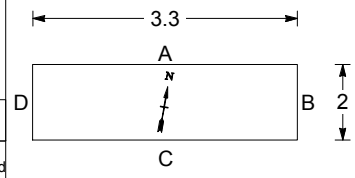
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
							(0.40)	Grass over dark brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded tabular smooth of quartzite, flint and sandstone. (TOPSOIL)		TS	
						7.31	0.40				
						7.11	0.60	Pale brown slightly clayey gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded tabular smooth of quartzite, flint and sandstone. (MADE GROUND)		GMG	
1.00-1.50	B							Pale brown slightly gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded tabular smooth of quartzite, flint and sandstone. (ALLUVIUM)			
1.00-1.50	D						(1.90)			ALV	
						5.21	2.50				
								End of pit at 2.5m bgl.		END	

General Remarks
Hole terminated at 2.5m bgl. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Pit wall collapse from surface

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
3.30m	Will Allaway	Cemex UK Ltd	1 of 1
Width 2.00m	**Ground Level (m AOD)** 7.713	**Co-Ordinates (NGR)** E 480050 N 363050	**Date** 05-04-17
Orientation 170 degrees from north	**Method/Plant Used** JCB-3CX	**Contractor** Collett Plant Hire	**Scale** 1:30.0

Trial Hole No.

TP02/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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TRIAL PIT LOG

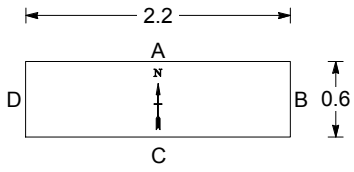
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
							(0.50)	Grass over firm dark brown slightly sandy CLAY with frequent rootlets to 0.3m bgl. (TOPSOIL)		TS	
						6.58	0.50				
							(1.60)	Firm orangish brown CLAY. (ALLUVIUM)		ALV	
						4.98	2.10				
2.50-3.00 2.50-3.00	B D						(1.40)	Pale brownish orange gravelly fine to coarse SAND. Gravel is fine and medium subangular tabular to rounded smooth of quartzite, flint and sandstone. (ALLUVIUM)		ALV	
						3.58	3.50				
								End of pit at 3.5m bgl.		END	

General Remarks
Hole terminated at 3.5m bgl. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.20m	Will Allaway	Cemex UK Ltd	1 of 1

Width	Ground Level (m AOD)	Co-Ordinates (NGR)	Date	Trial Hole No.
0.60m	7.084	E 480200 N 363000	05-04-17	TP03/17

Orientation	Method/Plant Used	Contractor	Scale
180 degrees from north	JCB-3CX	Collett Plant Hire	1:30.0

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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TRIAL PIT LOG

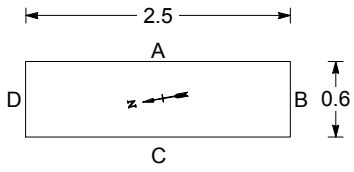
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
							(0.50)	Grass over firm dark brown slightly sandy CLAY with frequent rootlets to 0.3m bgl. (TOPSOIL)		TS	
						6.51	0.50				
1.50-2.00 1.50-2.00	B D						(2.10)	Firm pale brown slightly sandy CLAY with rare flint gravel. (ALLUVIUM) 2.20 m bgl Becoming very sandy		ALV	
						4.41	2.60				
						4.21	2.80	Grey and black laminated very sandy organic CLAY. (ALLUVIUM)		ALV	
							(0.60)	Pale brown slightly clayey gravelly fine to coarse SAND. Gravel is fine and medium subrounded of flint and quartzite. (ALLUVIUM)		ALV	
						3.61	3.40				
3.40-3.50 3.40-3.50	B D				1	3.51	3.50	Pale orangish brown gravelly fine to coarse SAND with occasional fine angular coal. Gravel is fine and medium subangular to rounded of quartzite, flint and sandstone. (ALLUVIUM) End of pit at 3.5m bgl.		ALV END	

General Remarks
Hole completed at 3.5m bgl. Groundwater seepage at 3.5m bgl. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.50m	Will Allaway	Cemex UK Ltd	1 of 1

Width	Ground Level (m AOD)	Co-Ordinates (NGR)	Date	Trial Hole No.
0.60m	7.006	E 481100 N 363000	05-04-17	TP04/17

Orientation	Method/Plant Used	Contractor	Scale
280 degrees from north	JCB-3CX	Collette Plant Hire	1:30.0

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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TRIAL PIT LOG

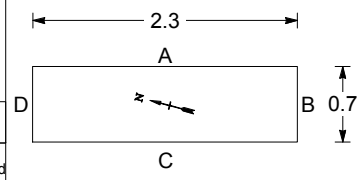
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
						6.31	(0.40) 0.40	Grass over firm dark brown slightly sandy CLAY. Frequent rootlets to 0.3m bgl. (TOPSOIL)		TS	
1.00-1.50	B							Firm pale brown slightly sandy CLAY. (ALLUVIUM)			
1.00-1.50	D						(1.90)			ALV	
						4.41	2.30				
								Brownish orange fine to coarse SAND. (ALLUVIUM)			
							(1.00)			ALV	
						3.41	3.30				
3.30-3.60	B							Pale brownish orange gravelly fine to coarse SAND. Gravel is fine and medium subangular to rounded of quartzite, flint and sandstone. (ALLUVIUM)			
3.30-3.60	D				1		(0.30)			ALV	
						3.11	3.60				
								End of pit at 3.6m bgl.		END	

General Remarks
Hole completed at 3.6m bgl. Groundwater seepage at 3.6m bgl. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Side and end wall collapse at 2.3m bgl

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length: 2.30m	Logged By: Will Allaway	Client: Cemex UK Ltd	Sheet: 1 of 1
Width: 0.70m	Ground Level (m AOD): 6.706	Co-Ordinates (NGR): E 480600 N 362850	Date: 05-04-17
Orientation: 255 degrees from north	Method/Plant Used: JCB-3CX	Contractor: Collett Plant Hire	Scale: 1:30.0

Trial Hole No.

TP05/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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TRIAL PIT LOG

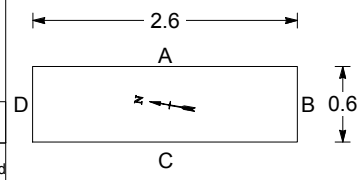
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
						6.66	(0.60) 0.60	Grass over firm dark brown slightly sandy CLAY. Frequent rootlets to 0.2m bgl. (TOPSOIL)		TS	
0.60-1.00	B										
0.60-1.00	D										
						5.46	(1.20) 1.80	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
3.00-3.30	B										
3.00-3.30	D										
						3.96	(1.50) 3.30	Brownish orange fine to coarse SAND. (ALLUVIUM)		ALV	
								End of pit at 3.3m bgl.		END	

General Remarks
Hole completed at 3.3m bgl. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Side wall collapse at 2.0m bgl

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.60m	Will Allaway	Cemex UK Ltd	1 of 1
Width 0.60m	**Ground Level (m AOD)** 7.259	**Co-Ordinates (NGR)** E 480900 N 362900	**Date** 05-04-17
Orientation 260 degrees from north	**Method/Plant Used** JCB-3CX	**Contractor** Collett Plant Hire	**Scale** 1:30.0

Trial Hole No.

TP06/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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TRIAL PIT LOG

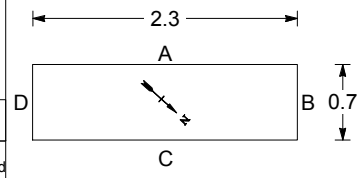
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
						6.68	(0.40) 0.40	Grass over firm dark brown slightly sandy CLAY. Frequent rootlets to 0.3m bgl. (TOPSOIL)		TS	
0.50-1.00	B							Firm pale brown slightly sandy CLAY. (ALLUVIUM)			
0.50-1.00	D						(1.70)			ALV	
						4.98	2.10				
								Pale brownish orange slightly clayey gravelly fine to coarse SAND. Gravel is medium angular of flint and occasional fine angular lignite. (ALLUVIUM)			
3.00-3.20	B						(1.10)			ALV	
3.00-3.20	D					3.88	3.20				
								End of pit at 3.2m bgl.		END	

General Remarks
Hole completed at 3.2m bgl. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.30m	Will Allaway	Cemex UK Ltd	1 of 1
Width 0.70m	**Ground Level (m AOD)** 7.079	**Co-Ordinates (NGR)** E 480699 N 362700	**Date** 05-04-17
Orientation 48 degrees from north	**Method/Plant Used** JCB-3CX	**Contractor** Collett Plant Hire	**Scale** 1:30.0

Trial Hole No.

TP07/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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TRIAL PIT LOG

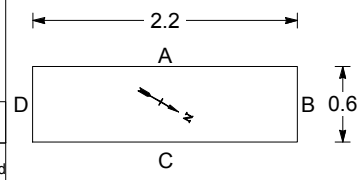
Project	Job No
Cromwell North (Proposed) Quarry	70030744

Depth	Type	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	STRATA Description	Legend	Geology	Install / Backfill
						6.34	(0.60) 0.60	Grass over firm dark brown slightly sandy CLAY. Frequent rootlets to 0.3m bgl. (TOPSOIL)		TS	
0.60-1.00	B										
0.60-1.00	D										
						4.74	(1.60) 2.20	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
2.50-3.00	B										
2.50-3.00	D										
						3.74	(1.00) 3.20	Pale brownish orange fine to coarse SAND with rare medium angular flint gravel. (ALLUVIUM)		ALV	
								End of pit at 3.2m bgl.		END	

General Remarks
Hole completed at 3.2m bgl. No groundwater encountered. No visual or olfactory signs of contamination.

Shoring/Support: None
Stability: Stable

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.



Length	Logged By	Client	Sheet
2.20m	Will Allaway	Cemex UK Ltd	1 of 1
Width 0.60m	**Ground Level (m AOD)** 6.940	**Co-Ordinates (NGR)** E 480500 N 362650	**Date** 05-04-17
Orientation 60 degrees from north	**Method/Plant Used** JCB-3CX	**Contractor** Collett Plant Hire	**Scale** 1:30.0

Trial Hole No.

TP08/17

08 WSP TP LOG LS 2 PHOTO 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

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BOREHOLE LOG

Hole No. **CP01/17WM**

Project	Cromwell North (Proposed) Quarry
Sheet	1 of 1
Job No	70030744
Client	Cemex UK Ltd
Date	11-04-17
Contractor / Driller	Geotechnics Ltd
Method/Plant Used	Dando 2000
Logged By	Will Allaway
Co-Ordinates (NGR)	E 480249.186 N 363296.684
Ground Level (m AOD)	7.115

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. 50 mm
0.00-0.40	B											
0.00	D						6.72	0.40	Grass over firm dark brown slightly sandy CLAY. (TOPSOIL)		TS	
0.40-0.80	B											
0.40	D						6.32	0.80	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
0.80-1.10	B											
0.80	D							(0.90)	Stiff dark orangish brown slightly sandy CLAY. (ALLUVIUM)		ALV	
							5.42	1.70				
1.70-2.10	B											
1.70	D							(1.10)	Stiff pale orangish brown slightly sandy CLAY. (ALLUVIUM)		ALV	
							4.32	2.80				
2.80-3.30	B											
2.80	D					1			Pale orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone. Occasional fine and medium angular lignite. (ALLUVIUM)			
4.80-5.20	B							(4.70)			ALV	
4.80	D											
6.30-6.75	SPT	4,8,10 7,9,10 N=36(C)							6.30 m bgl Dense			
6.80-7.30	B											
6.80	D						-0.39	7.50				
7.50-8.00	B											
7.50	D					2			Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Weathering Grade IVa. (MERCIA MUDSTONE)			
								(2.50)			MMG	
9.50-10.00	B											
9.50	D						-2.89	10.00				
									Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
2.8	6

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
11-04-17		4.80	20	4.60	4.80
11-04-17		9.00	20	8.70	9.00

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP02/17WM**

Project: Cromwell North (Proposed) Quarry		Sheet: 1 of 1
Job No: 70030744	Client: Cemex UK Ltd	Date: 10-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480002.101 N 363098.128	7.151

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. 50 mm
0.00-0.30	B						6.85	0.30	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.10	D											
0.30-0.60	B								Firm pale brown slightly sandy CLAY. (ALLUVIUM)			
0.30	D							(0.80)			ALV	
							6.05	1.10				
1.10-1.60	B								Firm light greyish brown very sandy CLAY. (ALLUVIUM)			
1.10	D							(0.60)			ALV	
							5.45	1.70				
1.70-2.20	B								Dark greyish brown fine and medium SAND. (ALLUVIUM)			
1.70	D					1						
								(1.20)			ALV	
							4.25	2.90				
2.90-3.20	B					1	3.95	3.20	Soft dark brown very organic silty CLAY. (ALLUVIUM)		ALV	
2.90	D											
3.20-3.70	B								Dark brownish grey fine to coarse SAND and fine to coarse subangular to subrounded GRAVEL of quartzite, flint and sandstone. (ALLUVIUM)			
3.20	D											
4.00-4.45	SPT	1,2,3 4,5,5 N=17(C)						(1.80)	4.00 m bgl Medium dense		ALV	
							2.15	5.00				
5.00-5.50	B								Dark brownish red MUDSTONE recovered as clay. Occasionally grey. Weathering Grade IVb. (MERCIA MUDSTONE)			
5.00	D							(2.00)			MMG	
							0.15	7.00				
7.00	D								Dark brownish red MUDSTONE recovered as firm gravelly clay. Occasionally grey. Weathering Grade III. (MERCIA MUDSTONE)			
								(3.00)			MMG	
							-2.85	10.00				
									Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
3.2	5

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
10-04-17		3.20	20	2.60	3.00

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP03/17WM**

Project	Sheet
Cromwell North (Proposed) Quarry	1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	10-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480024.262 N 362962.428	7.587

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. 50 mm
0.00-0.30	B						7.29	0.30	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.00	D											
0.30-0.70	B								Firm pale brown slightly sandy CLAY. (ALLUVIUM)			
0.30	D							(1.20)			ALV	
							6.09	1.50				
1.50-2.20	B								Soft dark greyish brown very sandy CLAY. (ALLUVIUM)			
1.50	D							(0.70)			ALV	
							5.39	2.20				
2.20-3.00	B					1			Pale orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine to coarse angular to subangular lignite. (ALLUVIUM)			
2.20	D					1						
								(3.80)			ALV	
4.20-4.60	B											
4.20	D											
5.00-5.45	SPT	2,4,7 7,8,8 N=30(C)							5.00 m bgl Dense			
							1.59	6.00				
6.00-6.50	B								Dark brownish red MUDSTONE recovered as gravelly clay. Occasionally grey. Weathering Grade III. (MERCIA MUDSTONE)			
6.00	D											
								(4.00)			MMG	
8.00-8.50	B											
8.00	D											
							-2.41	10.00				
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
2.2	5

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
11-04-17		3.00	20	2.60	3.00

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP04/17WM**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	06-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480700.130 N 362996.617	6.820

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. 50 mm
0.00-0.40	B						6.42	0.40	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.10	D											
0.40	D						5.12	(1.30) 1.70	Firm very dark brown slightly sandy CLAY. (ALLUVIUM)		ALV	
1.70-2.00	B						4.22	(0.90) 2.60	Firm light orangish brown sandy CLAY. (ALLUVIUM)		ALV	
1.70	D											
2.60-3.00	B						2.22	(2.00) 4.60	Soft dark greyish brown sandy CLAY. (ALLUVIUM)		ALV	
2.60	D					1						
4.60-6.00	B					1	0.22	(2.00) 6.60	Dark orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine to medium angular lignite. (ALLUVIUM)		ALV	
4.60	D											
5.50-5.95	SPT	2,3,4 5,5,7 N=21(C)							5.50 m bgl Medium dense			
6.60-7.10	B						-0.48	(0.70) 7.30	Orangish brownish fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine to medium angular lignite. (ALLUVIUM)		ALV	
6.60	D											
7.30-7.80	B						-2.48	(2.00) 9.30	Pale brownish red MUDSTONE recovered as firm slightly gravelly clay. Occasionally grey. Weathering Grade IVa. (MERCIA MUDSTONE)		MMG	
7.30	D											
9.30-10.00	B						-3.18	(0.70) 10.00	Dark brownish red MUDSTONE recovered as firm gravelly clay. Occasionally grey. Weathering Grade III. (MERCIA MUDSTONE)		MMG	
9.30	D											
									Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
4.6	8

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
06-04-17		4.60	20	4.20	4.60

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP05/17WM**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	05-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 481154.627 N 362953.845	7.305

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. 50 mm
0.00-0.30	B						7.01	0.30	Grass over dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.10	D											
0.30-0.60	B								Pale brown slightly sandy CLAY. (ALLUVIUM)			
0.30	D							(1.50)			ALV	
							5.51	1.80				
1.80-2.80	B								Orangish brown slightly clayey fine and medium SAND. (ALLUVIUM)			
1.80	D							(1.40)			ALV	
							4.11	3.20				
3.20-3.70	B								Medium dense orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)			
3.20	D											
3.30-3.75	SPT	1,2,7 6,6,8 N=27(C)				1						
5.20-5.70	B											
5.20	D							(6.30)			ALV	
7.20-7.50	B											
7.20	D											
9.20-9.50	B						-2.20	9.50				
9.20	D											
9.50-10.00	B							(0.50)	Dark reddish brown MUDSTONE recovered as firm slightly gravelly clay. Occasionally grey. Weathering Grade IVa. (MERCIA MUDSTONE)		MMG	
9.50	D						-2.70	10.00				
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
3.2	8

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
07-04-17		4.50	20	4.20	4.50

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP06/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	03-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480500.099 N 362549.919	7.084

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
0.00-0.40 0.00	B D						6.68	0.40	Grass over firm dark brown slightly sandy CLAY. (TOPSOIL)		TS	
0.40-0.80 0.40	B D						6.28	0.80	Pale brown very clayey fine to coarse subangular to rounded smooth GRAVEL of quartzite, flint and sandstone. (ALLUVIUM)		ALV	
0.80-1.10 0.80	B D							(2.10)	Pale orangish brown sandy CLAY. (ALLUVIUM)		ALV	
2.90-3.40 2.90	B D					1	4.18	2.90	Orangish brown very gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded smooth of quartzite, flint and sandstone. (ALLUVIUM)		ALV	
4.90-5.40 4.90	B D							(4.30)				
6.00-6.45	SPT	3,7,8 11,10,10 N=39(C)							6.00 m bgl Dense			
6.90-7.20 6.90	B D						-0.12	7.20				
7.20-8.00 7.20	B D						-0.92	(0.80) 8.00	Reddish brown fine and medium SAND. (ALLUVIUM)		ALV	
8.00-8.70 8.00	B D						-1.62	(0.70) 8.70	Reddish brown very gravelly fine to coarse SAND. Gravel is fine to coarse subangular to rounded smooth of quartzite, flint and sandstone. (ALLUVIUM)		ALV	
8.70-9.20 8.70	B D						-2.92	(1.30) 10.00	Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Weathering Grade IVa. (MERCIA MUDSTONE)		MMG	
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
2.9	5

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
03-04-17		3.50	20	3.30	3.50

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP07/17**

Project	Sheet
Cromwell North (Proposed) Quarry	1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	11-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480049.966 N 363249.930	6.837

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
0.00-0.40 0.00	B D						6.44	0.40	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.40-0.80 0.40	B D							(1.00)	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
							5.44	1.40				
								(1.10)	Firm pale orangish brown slightly sandy CLAY. (ALLUVIUM)		ALV	
							4.34	2.50				
2.50-3.00 2.50	B D					1			Pale orangish brown fine to coarse SAND and fine to coarse subangular to subrounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)			
						1		(4.00)			ALV	
4.50-5.00 4.50	B D											
5.00-5.45	SPT	3,5,7 9,10,10 N=36(C)							5.00 m bgl Dense			
						2	0.34	6.50				
6.50-7.00 6.50	B D								Dark brownish red MUDSTONE recovered as firm gravelly clay with occasional gypsum crystals. Weathering Grade III. (MERCIA MUDSTONE)			
						2		(3.50)			MMG	
8.50-9.00 8.50	B D											
							-3.16	10.00				
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
2.5	5

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
11-04-17		4.00	20	3.70	4.00
11-04-17		7.50	20	6.60	6.50

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP08/17**

Project	Sheet
Cromwell North (Proposed) Quarry	1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	12-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480199.945 N 363099.942	6.865

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. mm
0.00-0.45	B								Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.00	D						6.42	0.45				
0.45-0.80	B								Firm pale brown slightly sandy CLAY. (ALLUVIUM)			
0.45	D							(0.95)			ALV	
							5.47	1.40				
1.50-1.80	B								Firm pale orangish brown slightly sandy CLAY. (ALLUVIUM)			
1.50	D							(1.10)			ALV	
							4.37	2.50				
2.50-3.00	B								Orangish brown slightly clayey fine and medium SAND. (ALLUVIUM)			
2.50	D							(1.10)			ALV	
							3.27	3.60				
3.60-4.00	B					1			Orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)			
3.60	D							(3.30)			ALV	
5.60-6.00	B											
5.60	D											
6.00-6.45	SPT	3,5,8 9,11,14 N=42(C)							6.00 m bgl Dense			
							-0.04	6.90				
6.90-7.40	B								Dark brownish red MUDSTONE recovered as firm clay. Weathering Grade IVb. (MERCIA MUDSTONE)			
6.90	D							(2.00)			MMG	
						2	-2.04	8.90				
8.90-9.40	B					2			Dark brownish red MUDSTONE recovered as firm gravelly clay. Occasionally grey. Weathering Grade III. (MERCIA MUDSTONE)			
8.90	D							(0.60)			MMG	
							-2.64	9.50				
								(0.50)	Dark brownish red MUDSTONE recovered as slightly clayey fine to coarse angular gravel of mudstone. Weathering Grade II. (MERCIA MUDSTONE)		MMG	
							-3.14	10.00				
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling			
From	To	Hours	Tool

Water Added	
From	To
3.6	4.3

Water Strikes					
Date	Time	Strike	Minutes	Standing	Casing
12-04-17		4.30	20	4.10	
12-04-17		9.20	20	8.80	

General Remarks
Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP09/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	07-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480249.970 N 362949.999	7.116

SAMPLES & TESTS							STRATA						Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description		Legend	Geology	Dia. mm
0.00-0.40	B						6.72	0.40	Firm dark brown slightly sandy CLAY with frequent rootlets. (ALLUVIUM)			ALV	
0.00	D												
0.40-0.80	B							(0.80)	Firm pale brown slightly sandy CLAY. (ALLUVIUM)			ALV	
0.40	D						5.92	1.20					
1.20-1.50	B							(1.90)	Firm pale orangish brown slightly sandy CLAY. (ALLUVIUM)			ALV	
1.20	D												
						1	4.02	3.10					
3.10	D					1	3.92	3.20	Soft dark greyish brown slightly sandy CLAY. (ALLUVIUM)			ALV	
3.20	D						3.72	3.40	Firm dark brownish orange very sandy CLAY with occasional wood fragments. (ALLUVIUM)			ALV	
3.40-4.40	B							(1.00)	Orangish brown very gravelly fine and medium SAND. Gravel is fine and medium subangular to rounded smooth of quartzite, flint and sandstone. (ALLUVIUM)			ALV	
3.40	D						2.72	4.40					
4.40-4.80	B							(2.60)	Orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)			ALV	
4.40	D								5.00 m bgl Medium dense				
5.00-5.45	SPT	2,2,3 4,4,7 N=18(C)											
6.40-6.80	B												
6.40	D						0.12	7.00					
7.00-7.50	B							(3.00)	Dark brownish red MUDSTONE recovered as firm clay. Weathering Grade IVb. (MERCIA MUDSTONE)			MMG	
7.00	D												
						2							
9.00-9.50	B												
9.00	D						-2.88	10.00					
10.00	D								Borehole completed at 10m bgl.			END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
10-04-17		3.40	20	3.20	3.40
10-04-17		9.00			

Chiselling

From	To	Hours	Tool

Water Added

From	To

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP10/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	05-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480899.930 N 362999.992	6.917

SAMPLES & TESTS							STRATA						Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology		Dia. mm
0.00-0.40	B						6.52	0.40	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS		
0.00	D												
0.40-0.70	B								Firm brown slightly sandy CLAY. (ALLUVIUM)				
0.40	D							(1.60)			ALV		
							4.92	2.00					
2.00-3.00	B								Pale orangish brown slightly clayey fine and medium SAND. (ALLUVIUM)				
2.00	D							(1.20)			ALV		
							3.72	3.20					
3.20-3.70	B					1			Orangish brown fine to coarse SAND and fine to coarse subangular to subrounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)				
3.20	D					1							
4.50-4.95	SPT	3,4,7 9,10,9 N=35(C)							4.50 m bgl Dense				
5.20-5.70	B							(4.00)			ALV		
5.20	D												
							-0.28	7.20					
7.20-7.70	B								Light grey MUDSTONE recovered as firm slightly gravelly clay. Weathering Grade IVa. (MERCIA MUDSTONE)				
7.20	D					2		(2.00)			MMG		
							-2.28	9.20					
9.20-9.70	B					2			Light reddish grey MUDSTONE recovered as firm slightly gravelly clay. Weathering Grade IVa. (MERCIA MUDSTONE)				
9.20	D							(0.80)			MMG		
							-3.08	10.00					
10.00	D								Borehole completed at 10m bgl.		END		

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
3.2	6

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
07-04-17		3.80	20	3.60	3.80
07-04-17		9.50	20	8.30	7.50

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP11/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	06-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnical Ltd	Dando 2000	Will Allaway	E 480500.084 N 362799.955	6.798

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
0.00-0.40 0.00	B D						6.40	0.40	Grass over dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.40-0.80 0.40	B D						5.40	(1.00) 1.40	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV	
1.40-1.80 1.40	B D						4.80	(0.60) 2.00	Firm orangish brown sandy CLAY. With fine sand layers. (ALLUVIUM)		ALV	
2.00-2.50 2.00	B D					1			Orangish brown sandy fine to coarse subrounded to rounded smooth GRAVEL of quartzite, flint and sandstone.			
4.00-4.50 4.00	B D							(4.00)			ALV	
6.00-6.50 6.00 6.00-6.45	B D SPT	2,5,8 10,11,12 N=41(C)					0.80	6.00				
									Dense orangish brown slightly sandy fine to coarse subrounded to rounded smooth GRAVEL of quartzite, flint and sandstone. 6.00 - 6.50 Some wood and peat amongst the gravel			
								(2.10)			ALV	
8.10-8.60 8.10	B D						-1.30	8.10	Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Occasionally grey. Weathering Grade IVa. (MERCIA MUDSTONE)			
								(1.90)			MMG	
10.00	D						-3.20	10.00	Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
2	6

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
07-04-17		3.30	20	3.10	3.30

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP12/17**

Project	Sheet
Cromwell North (Proposed) Quarry	1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	07-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480700.067 N 362800.046	6.933

SAMPLES & TESTS							STRATA					Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Dia. mm
0.00-0.40	B						6.53	0.40	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.10	D											
0.40-0.70	B								Firm pale brown slightly sandy CLAY. (ALLUVIUM)			
0.40	D							(1.30)			ALV	
							5.23	1.70				
1.70-2.00	B								Dark orange fine to coarse SAND. (ALLUVIUM)			
1.70	D							(0.60)			ALV	
							4.63	2.30				
2.30-2.80	B								Pale orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone. Occasional fine angular lignite. (ALLUVIUM)			
2.30	D											
3.00-3.45	SPT	1,3,6 4,5,7 N=22(C)							3.00 m bgl Medium dense			
						1						
4.30-4.60	B					1		(4.30)			ALV	
4.30	D											
6.20-6.60	B											
6.20	D						0.33	6.60				
6.60-7.10	B								Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Occasionally grey. Weathering Grade IVa. (MERCIA MUDSTONE)			
6.60	D							(3.40)			MMG	
8.60-9.10	B											
8.60	D						-3.07	10.00				
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress						Water Strikes					
Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt	Date	Time	Strike	Minutes	Standing	Casing
						10-04-17		4.50	20	4.20	4.50

Chiselling				Water Added	
From	To	Hours	Tool	From	To
				2.3	7

General Remarks
Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP13/17**

Project	Cromwell North (Proposed) Quarry
Sheet	1 of 1
Job No	70030744
Client	Cemex UK Ltd
Date	04-04-17
Contractor / Driller	Geotechnics Ltd
Method/Plant Used	Dando 2000
Logged By	Will Allaway
Co-Ordinates (NGR)	E 480900.040 N 362799.975
Ground Level (m AOD)	7.271

SAMPLES & TESTS							STRATA						Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology		Dia. mm
0.00-0.40	B						6.87	0.40	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS		
0.00	D												
0.40-0.70	B							(2.00)	Firm pale brown slightly sandy CLAY. (ALLUVIUM)		ALV		
0.40	D						4.87	2.40					
2.40-2.70	B							(1.60)	Firm pale orangish brown slightly sandy CLAY. (ALLUVIUM)		ALV		
2.40	D					1	3.27	4.00					
4.00-4.30	B							(0.50)	Firm dark greyish brown very sandy CLAY. (ALLUVIUM)		ALV		
4.00	D					1	2.77	4.50					
4.50-5.00	B							(2.00)	Medium dense dark orangish brown fine to coarse SAND and fine and medium subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional fine angular lignite. (ALLUVIUM)		ALV		
4.50	D						0.77	6.50					
4.50-4.95	SPT	1,2,3 3,5,7 N=18(C)											
6.50-7.00	B							(2.40)	Pale orangish brown very gravelly fine to coarse SAND with occasional fine angular lignite. Gravel is fine to coarse subangular to rounded smooth of quartzite, flint and sandstone. (ALLUVIUM)		ALV		
6.50	D						-1.63	8.90					
8.50-8.90	B							(1.10)	Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Occasionally grey. Weathering Grade IVa. (MERCIA MUDSTONE)		MMG		
8.50	D						-2.73	10.00					
8.90-10.00	B												
8.90	D												
10.00	D								Borehole completed at 10m bgl.		END		

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
10-04-17		4.50	20	3.90	4.50

Chiselling

From	To	Hours	Tool

Water Added

From	To
4.5	7

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP14/17**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	04-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480699.920 N 362600.873	7.114

SAMPLES & TESTS							STRATA					
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology	Install / Backfill Dia. mm
0.00-0.50	B											
0.10	D						6.61	(0.50) 0.50	Grass over firm dark brown slightly sandy CLAY with frequent rootlets. (TOPSOIL)		TS	
0.50-0.90	B											
0.50	D								Firm pale brown slightly sandy CLAY. (ALLUVIUM)			
								(1.50)			ALV	
							5.11	2.00				
2.00-2.50	B											
2.00	D							(0.50)	Orangish brown sandy CLAY. (ALLUVIUM)		ALV	
							4.61	2.50				
2.50-3.00	B											
2.50	D							(0.50)	Orangish brown slightly clayey fine and medium SAND. (ALLUVIUM)		ALV	
							4.11	3.00				
3.00-3.50	B											
3.00	D					1			Orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone with occasional lignite. (ALLUVIUM)			
						1						
5.00-5.50	B								5.00 m bgl Medium dense			
5.00	D											
5.00-5.45	SPT	2,3,4 7,8,9 N=28(C)						(5.90)			ALV	
7.00-7.50	B											
7.00	D											
							-1.79	8.90				
8.90-10.00	B											
8.90	D								Dark brownish red MUDSTONE recovered as firm slightly gravelly clay. Weathering Grade IVa. (MERCIA MUDSTONE)			
								(1.10)			MMG	
							-2.89	10.00				
10.00	D								Borehole completed at 10m bgl.		END	

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Chiselling

From	To	Hours	Tool

Water Added

From	To
3	6

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
04-04-17		4.50	20	4.20	4.50

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

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BOREHOLE LOG

Hole No. **CP15/17WM**

Project: Cromwell North (Proposed) Quarry

Sheet: 1 of 1

Job No	Client	Date
70030744	Cemex UK Ltd	12-04-17

Contractor / Driller	Method/Plant Used	Logged By	Co-Ordinates (NGR)	Ground Level (m AOD)
Geotechnics Ltd	Dando 2000	Will Allaway	E 480358.863 N 362723.383	7.992

SAMPLES & TESTS							STRATA						Install / Backfill
Depth	Type	Test Result	PID (ppmV)	HSV (kN/m2)	P.Pen (kN/m2)	Water	Elev. (mAOD)	Depth (Thick-ness)	Description	Legend	Geology		Dia. mm
0.10-0.80 0.10	B D						7.19	(0.80) 0.80	Grass over dark brown slightly clayey gravelly fine and medium SAND with occasional rootlets. Gravel is fine and medium angular to rounded of quartzite, flint and sandstone with occasional fine angular lignite. (TOPSOIL)		TS		
0.80-1.10 0.80	B D						6.79	1.20	Pale brown slightly gravelly fine and medium SAND. Gravel is fine and medium subrounded to rounded of quartzite, flint and sandstone. (ALLUVIUM)		ALV		
1.20 1.30-2.50 1.30	D B D						6.69	1.30	Pale orangish brown slightly gravelly fine and medium SAND. Gravel is fine and medium subrounded to rounded of quartzite, flint and sandstone. (ALLUVIUM)		ALV		
								(1.20)			ALV		
							5.49	2.50	Pale orangish brown gravelly fine and medium SAND. Gravel is fine and medium subrounded to rounded of quartzite, flint and sandstone. (ALLUVIUM)				
2.50-3.20 2.50	B D								Pale orangish brown very gravelly fine and medium SAND. Gravel is fine and medium subrounded to rounded of quartzite, flint and sandstone. (ALLUVIUM)				
4.50-5.00 4.50	B D					1		(4.00)			ALV		
5.00-5.45	SPT	1,2,3 4,4,6 N=17/ 0(S)							5.00 m bgl Medium dense				
							1.49	6.50					
6.50-7.00 6.50	B D								Orangish brown fine to coarse SAND and fine to coarse subangular to rounded GRAVEL of quartzite, flint and sandstone. (ALLUVIUM)				
								(1.20)			ALV		
							0.29	7.70					
7.70-8.20 7.70	B D								Dark brownish red MUDSTONE recovered as firm clay. Weathering Grade IVb. (MERCIA MUDSTONE)				
								(2.30)			MMG		
9.70-10.00 9.70 10.00	B D D					2	-2.01	10.00					
									Borehole completed at 10m bgl.		END		

Boring Progress

Date	Time	Depth	Casing Dpt	Dia. (mm)	Water Dpt

Water Strikes

Date	Time	Strike	Minutes	Standing	Casing
12-04-17		4.50	20	4.30	4.50
12-04-17		9.50	20		

Chiselling

From	To	Hours	Tool

Water Added

From	To
1.3	6

General Remarks

Hole completed at 10m bgl. Hand dug pit to 1.2m bgl. No visual or olfactory signs of contamination.

Scale 1:65.625

Notes: All dimensions in metres. Logs should be read in accordance with the provided Key. Descriptions are based on visual and manual identification.

08 WSP BH LOG 70030744-CROMWELL NORTH - COPY.GPJ WSPETEMPLATE1.03.GDT 28/4/17

IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

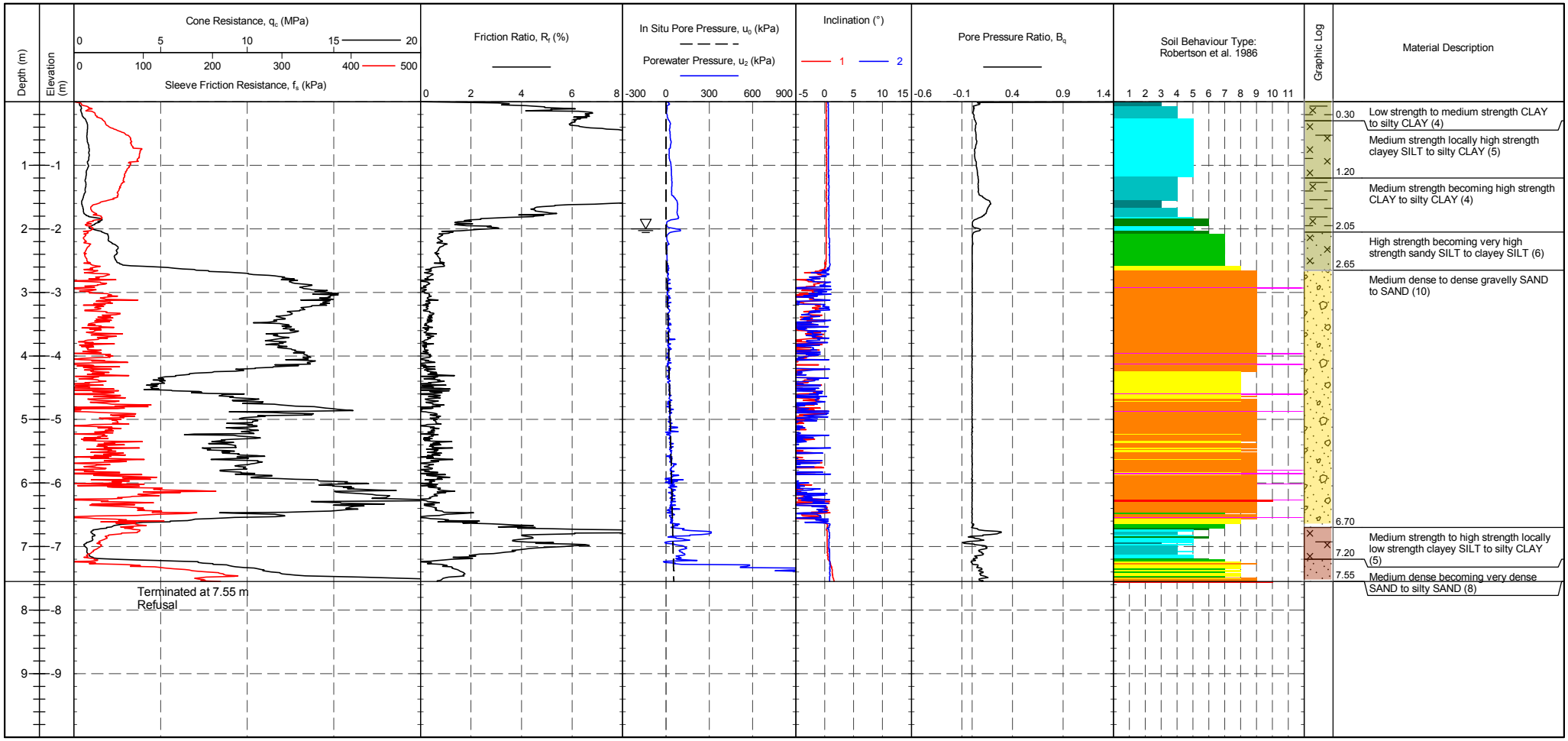
CPT 01

CLIENT : Geotechnics Limited
PROJECT : Newark
LOCATION : Newark
PROJECT No. : 1170175

EASTING :
NORTHING :
ELEVATION : 0.00 m
CHECKED BY : Luisa Dhimitri
TERMINATION REASON : Refusal

REMARK
Test refused on tip resistance.

SHEET : 1 OF 1
STATUS : Final
TEST DATE : 16/03/2017
PLOT DATE : 20/03/2017
METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2		
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2		
CONE AREA RATIO	: 0.79	RIG	: CPT 006		
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough		
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 01		
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild		

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	295 mV	281 mV	-0.154 MPa
Sleeve	292 mV	276 mV	-0.011 kPa
Pore Pressure 2	266 mV	268 mV	0.001 kPa
X-Y Inclinometer	2470 mV	2450 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level
Dissipation Test

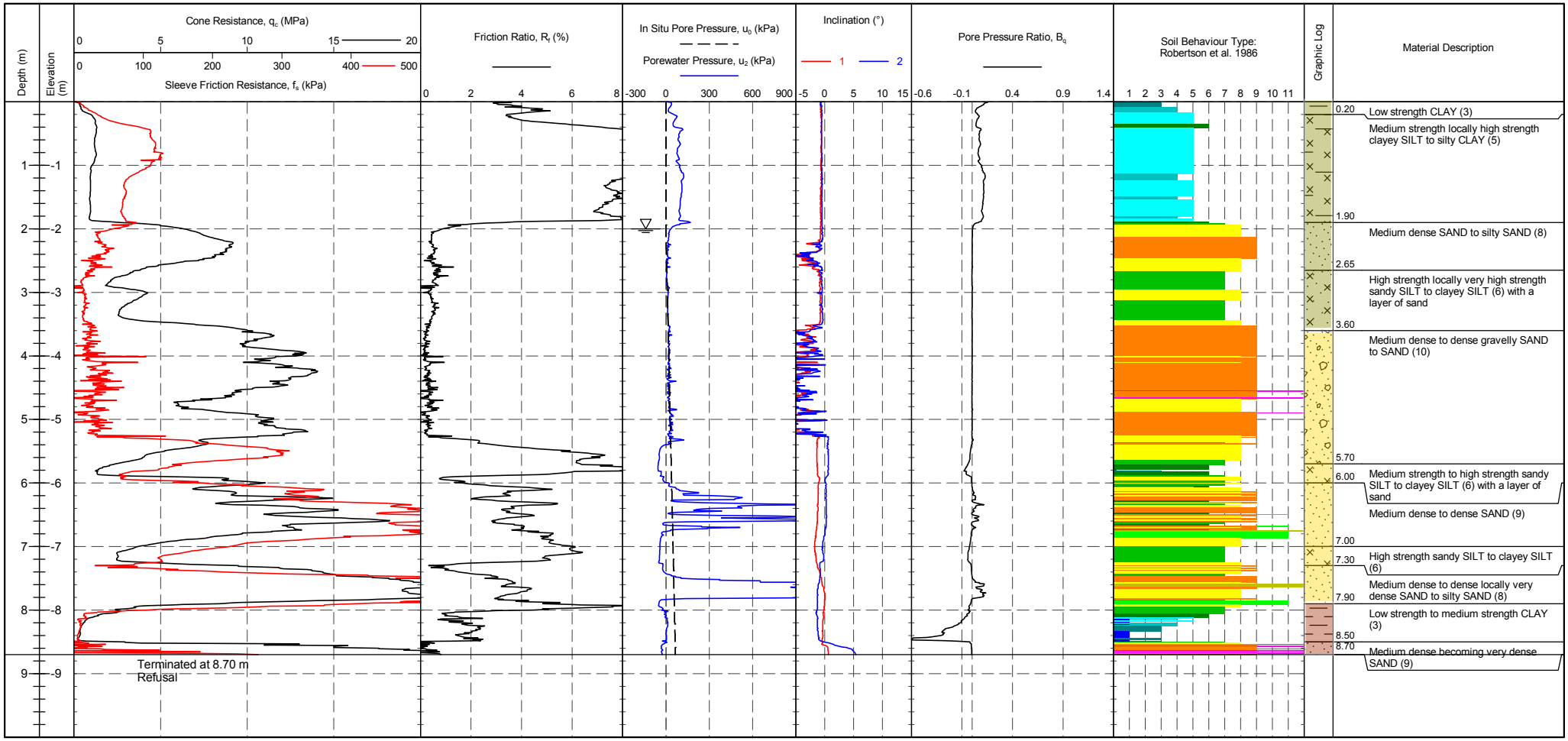
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 02

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES	
CONE AREA	: 15cm²	APPLICATION CLASS	: 2	Transducer	Pre / Post / Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV / 280 mV / -0.011 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	275 mV / 271 mV / -0.003 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 02	Pore Pressure 2	275 mV / 259 mV / -0.005 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2367 mV / 2352 mV

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

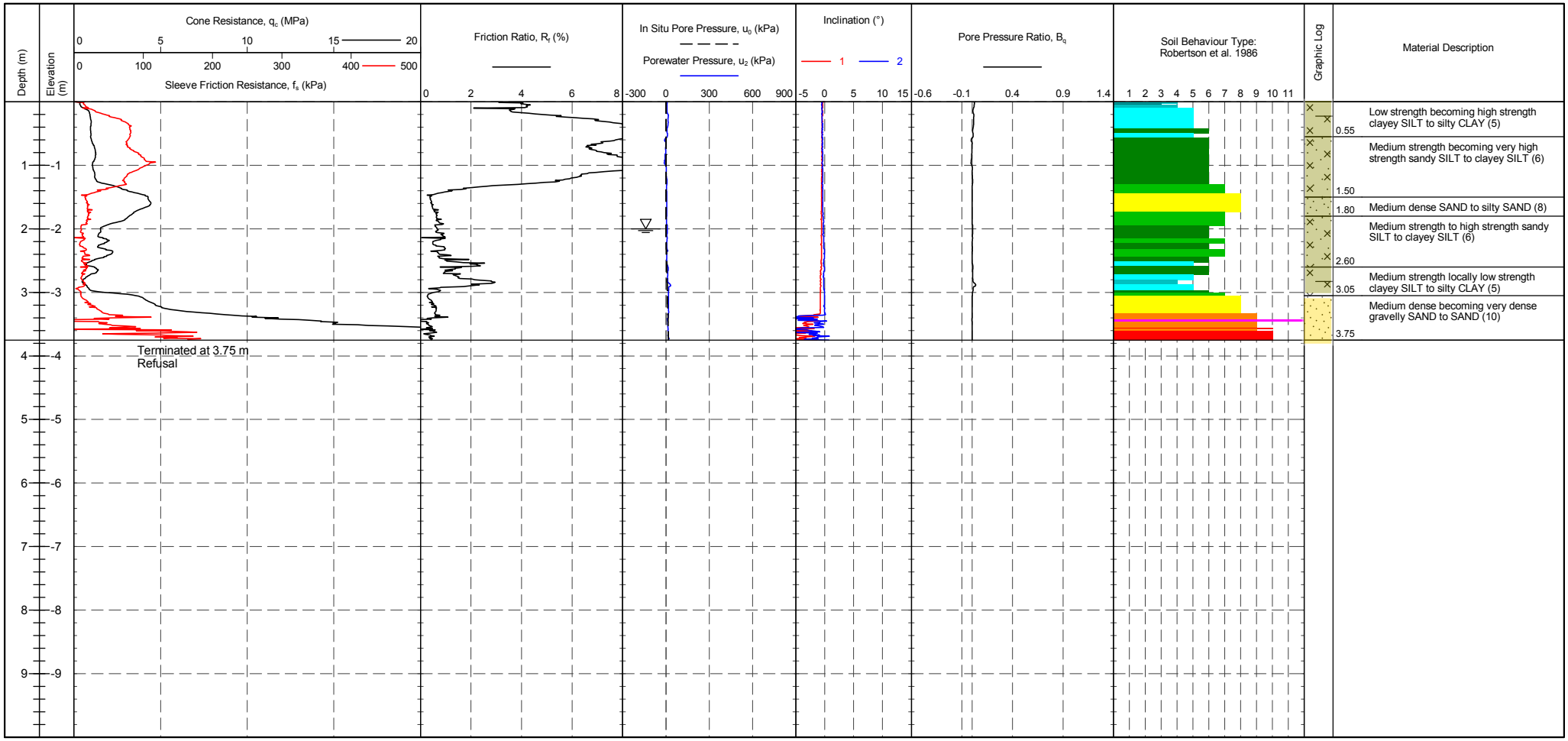
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 03

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES		
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	282 mV	282 mV
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	278 mV	278 mV
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 03	Pore Pressure 2	258 mV	257 mV
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2431 mV	2433 mV

Difference
0 MPa
0 kPa
0 kPa

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

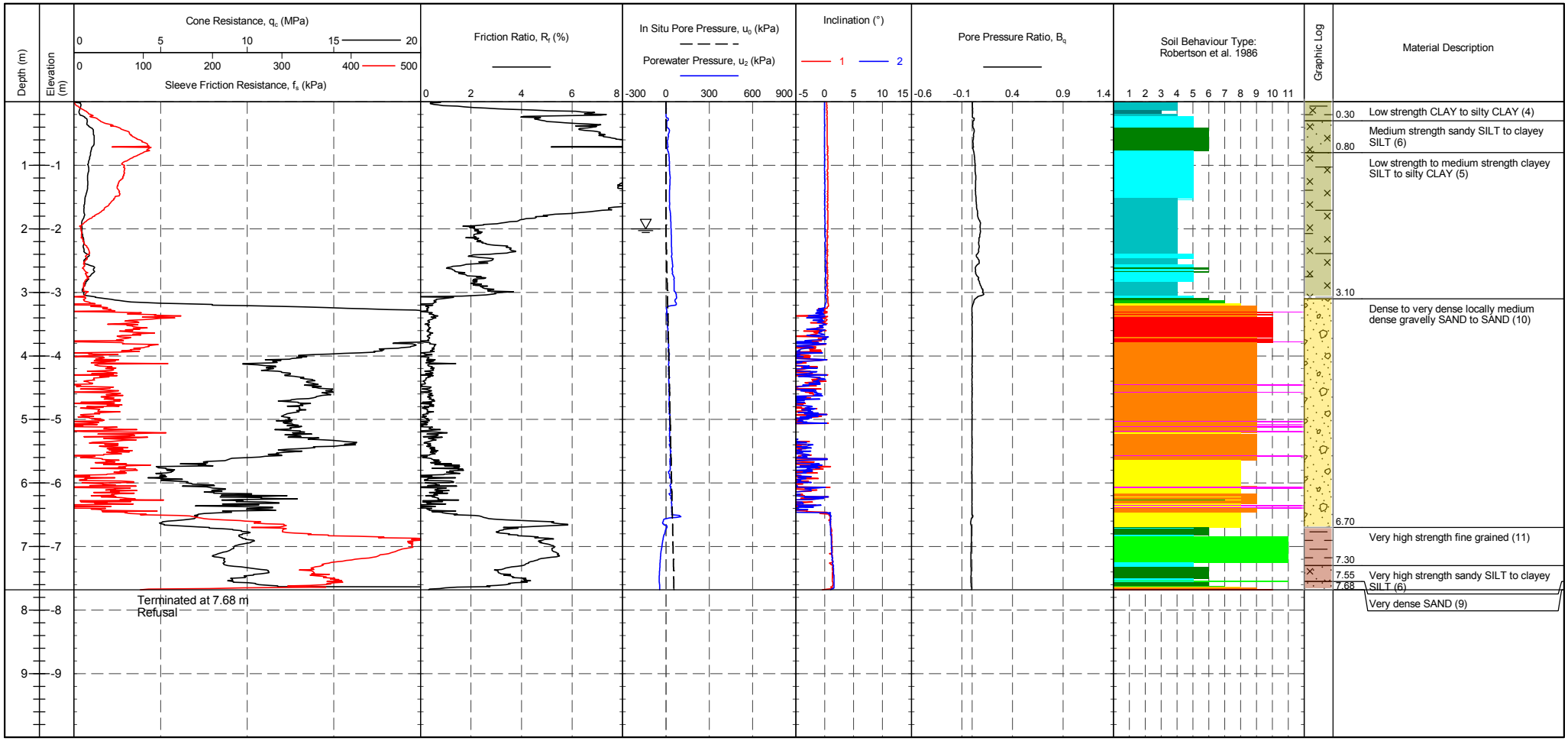
CPT 04

CLIENT : Geotechnics Limited
PROJECT : Newark
LOCATION : Newark
PROJECT No. : 1170175

EASTING :
NORTHING :
ELEVATION : 0.00 m
CHECKED BY : Luisa Dhimitri
TERMINATION REASON : Refusal

REMARK
Test refused on tip resistance.

SHEET : 1 OF 1
STATUS : Final
TEST DATE : 16/03/2017
PLOT DATE : 20/03/2017
METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2		
CONE AREA	: 15cm²	APPLICATION CLASS	: 2		
CONE AREA RATIO	: 0.79	RIG	: CPT 006		
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough		
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 04		
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild		

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	282 mV	280 mV	-0.022 MPa
Sleeve	277 mV	274 mV	-0.002 kPa
Pore Pressure 2	259 mV	252 mV	-0.002 kPa
X-Y Inclinometer	2466 mV	2460 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level
Dissipation Test

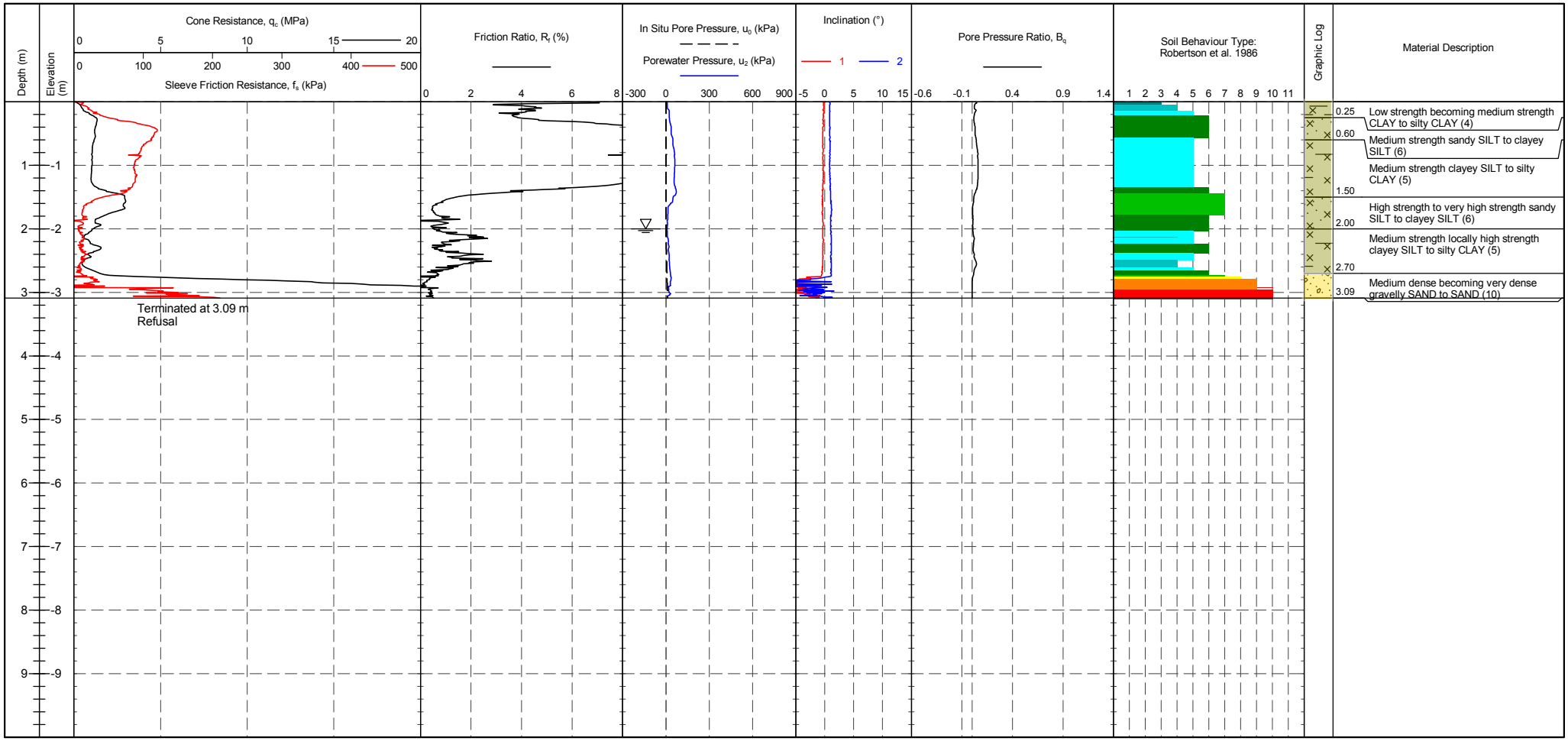
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 05

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	283 mV	0.022 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	276 mV	279 mV	0.002 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 05	Pore Pressure 2	254 mV	258 mV	0.001 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2427 mV	2399 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

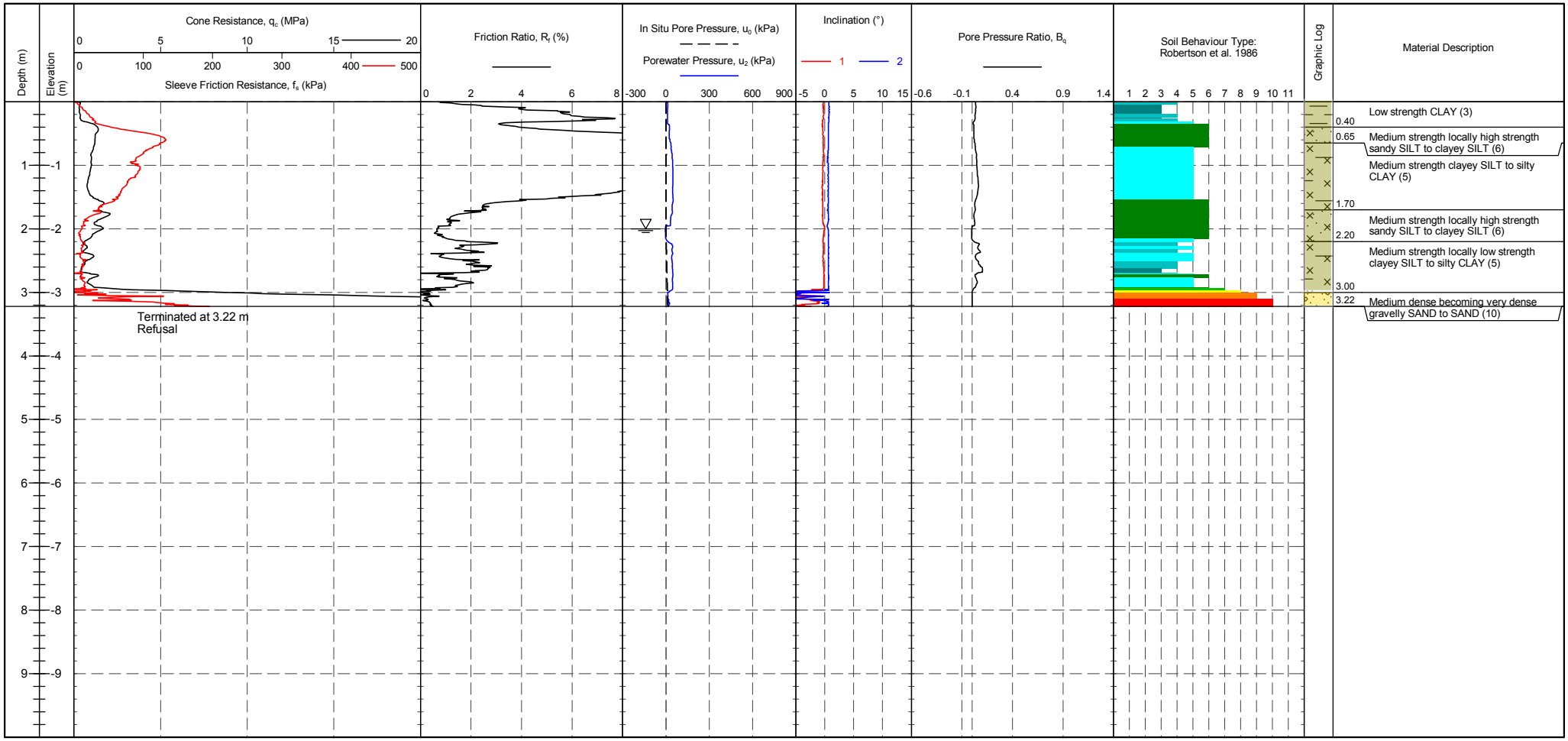
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 05A

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES		
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	283 mV	283 mV
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	278 mV	279 mV
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 05A	Pore Pressure 2	257 mV	253 mV
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2402 mV	2431 mV

Difference
0 MPa
0.001 kPa
-0.001 kPa

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

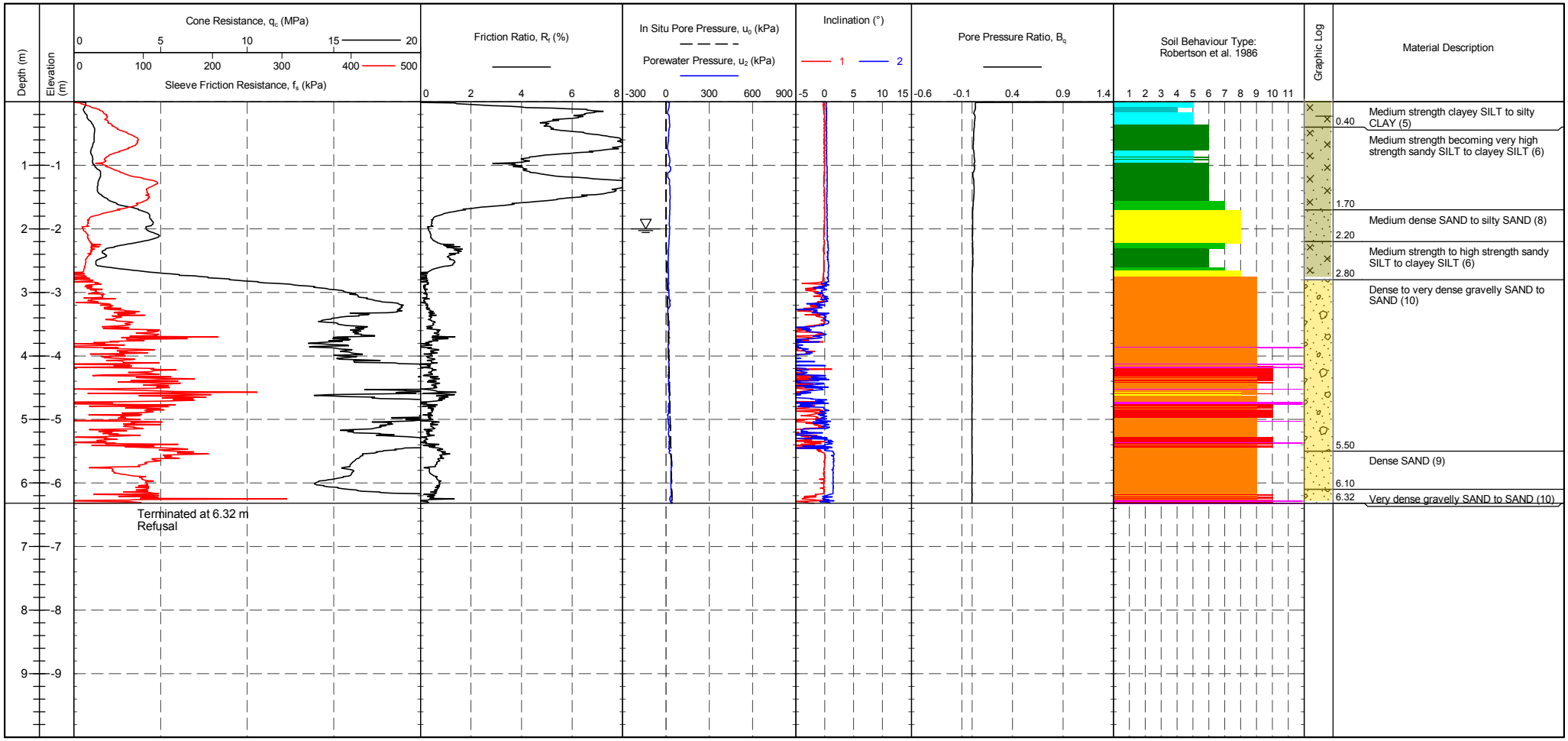
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 06

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2		
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2		
CONE AREA RATIO	: 0.79	RIG	: CPT 006		
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough		
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 06		
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild		

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	281 mV	280 mV	-0.011 MPa
Sleeve	277 mV	276 mV	-0.001 kPa
Pore Pressure 2	255 mV	255 mV	0 kPa
X-Y Inclinometer	2409 mV	2424 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

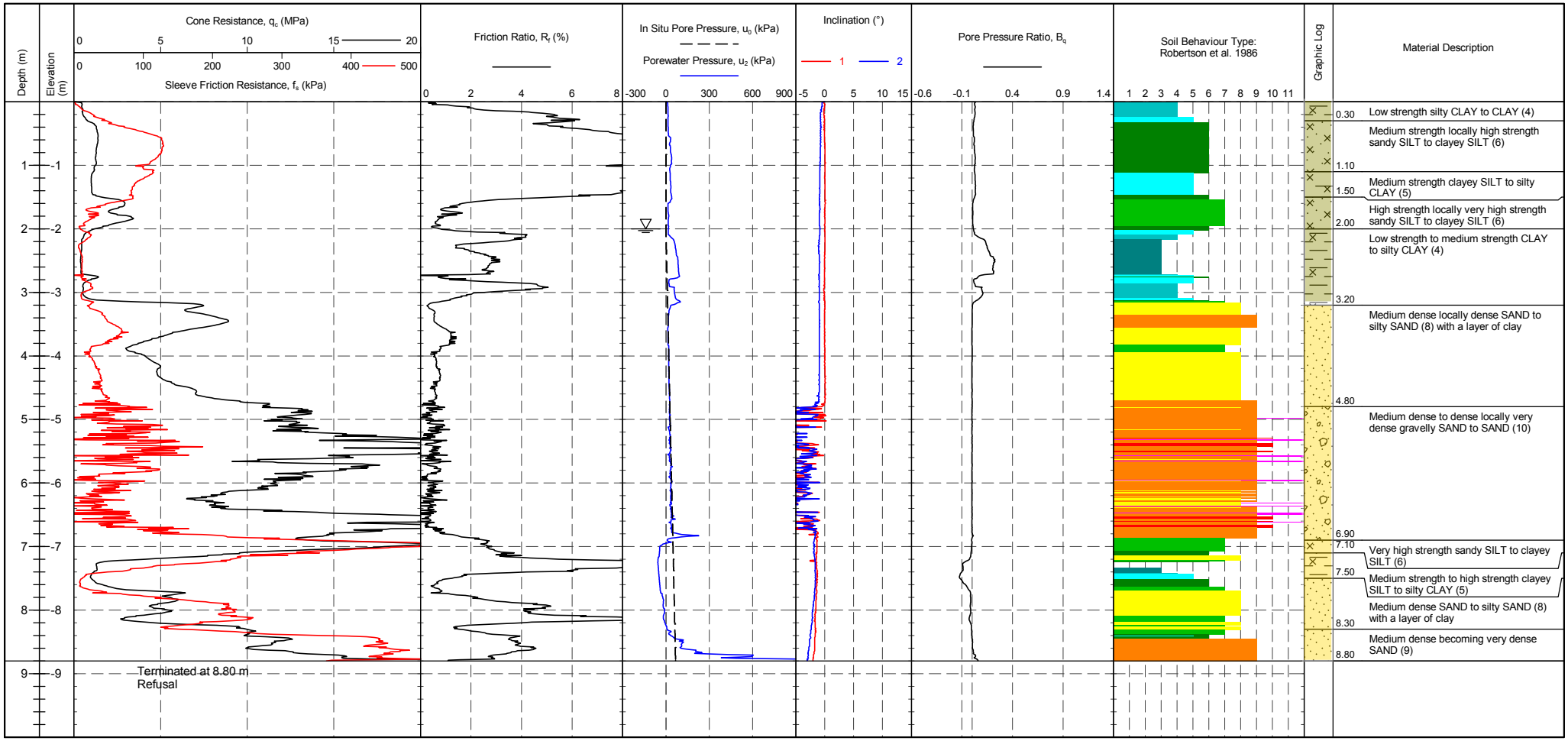
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 07

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	282 mV	280 mV	-0.022 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	277 mV	274 mV	-0.002 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 07	Pore Pressure 2	260 mV	263 mV	0.001 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2417 mV	2419 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

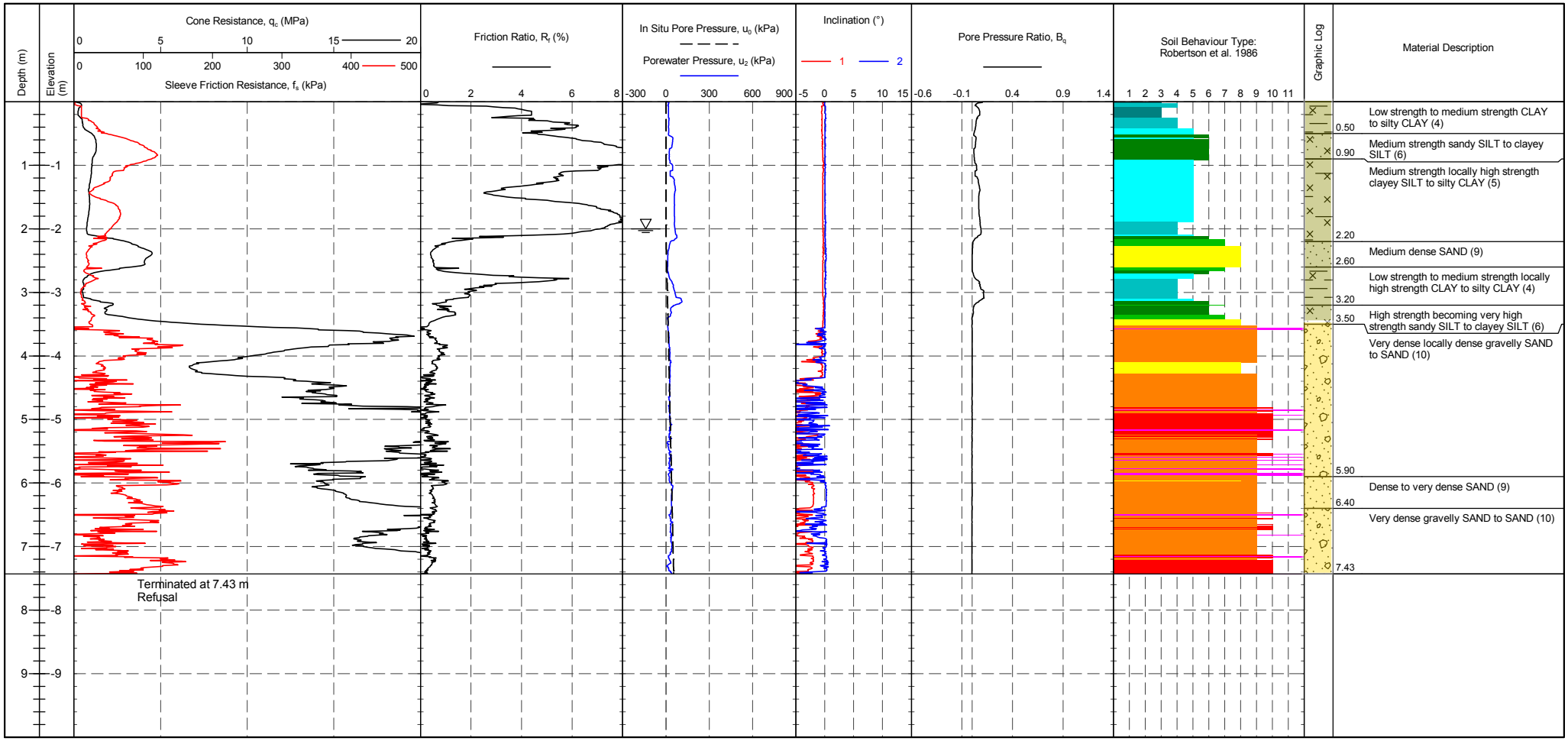
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 08

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2		
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2		
CONE AREA RATIO	: 0.79	RIG	: CPT 006		
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough		
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 08		
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild		

CPTU ZERO VALUES

	Pre	Post	Difference
Transducer			
Tip	281 mV	277 mV	-0.044 MPa
Sleeve	275 mV	273 mV	-0.001 kPa
Pore Pressure 2	255 mV	249 mV	-0.002 kPa
X-Y Inclinometer	2372 mV	2381 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

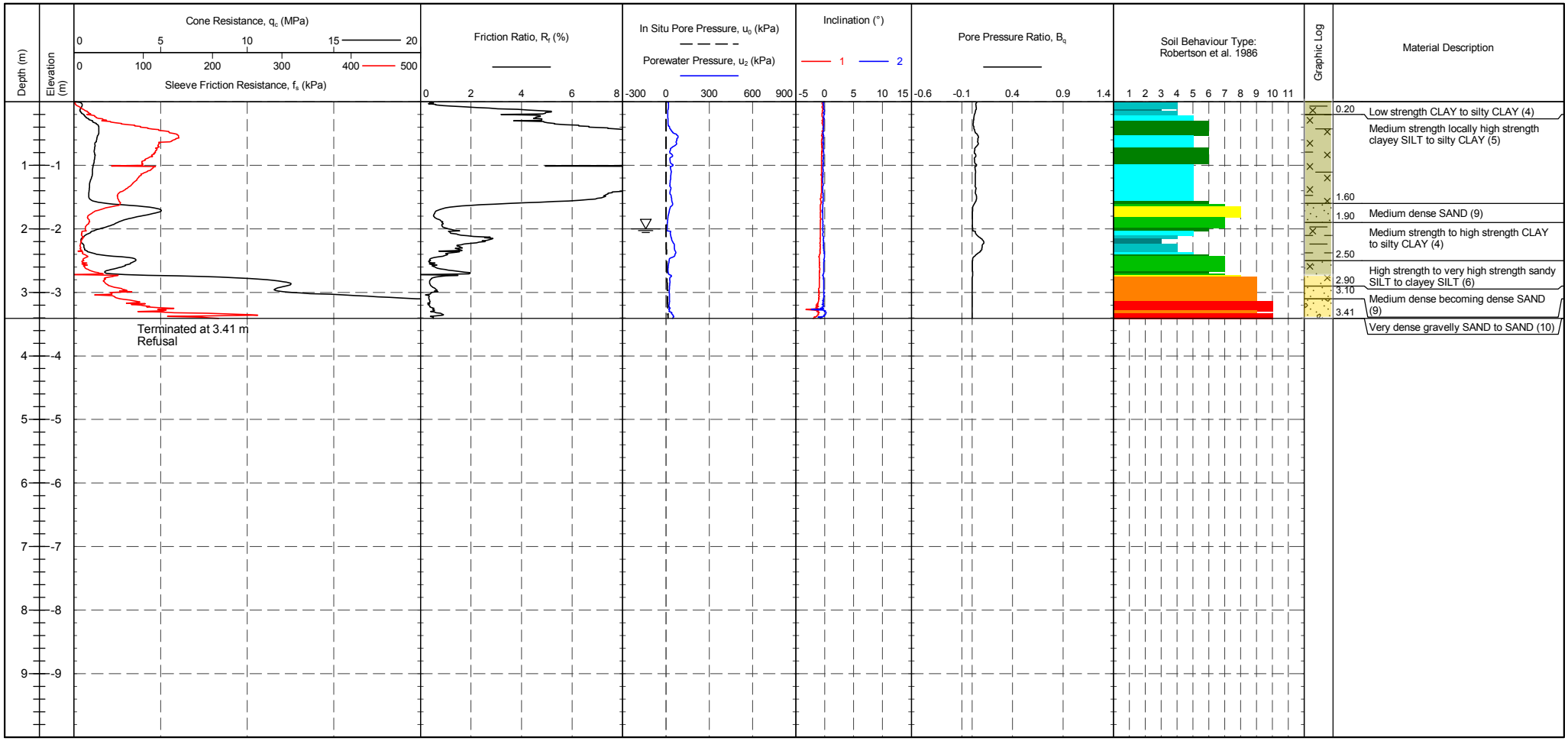
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 09

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	281 mV	284 mV	0.033 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	267 mV	279 mV	0.009 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 09	Pore Pressure 2	259 mV	254 mV	-0.001 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2457 mV	2437 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test

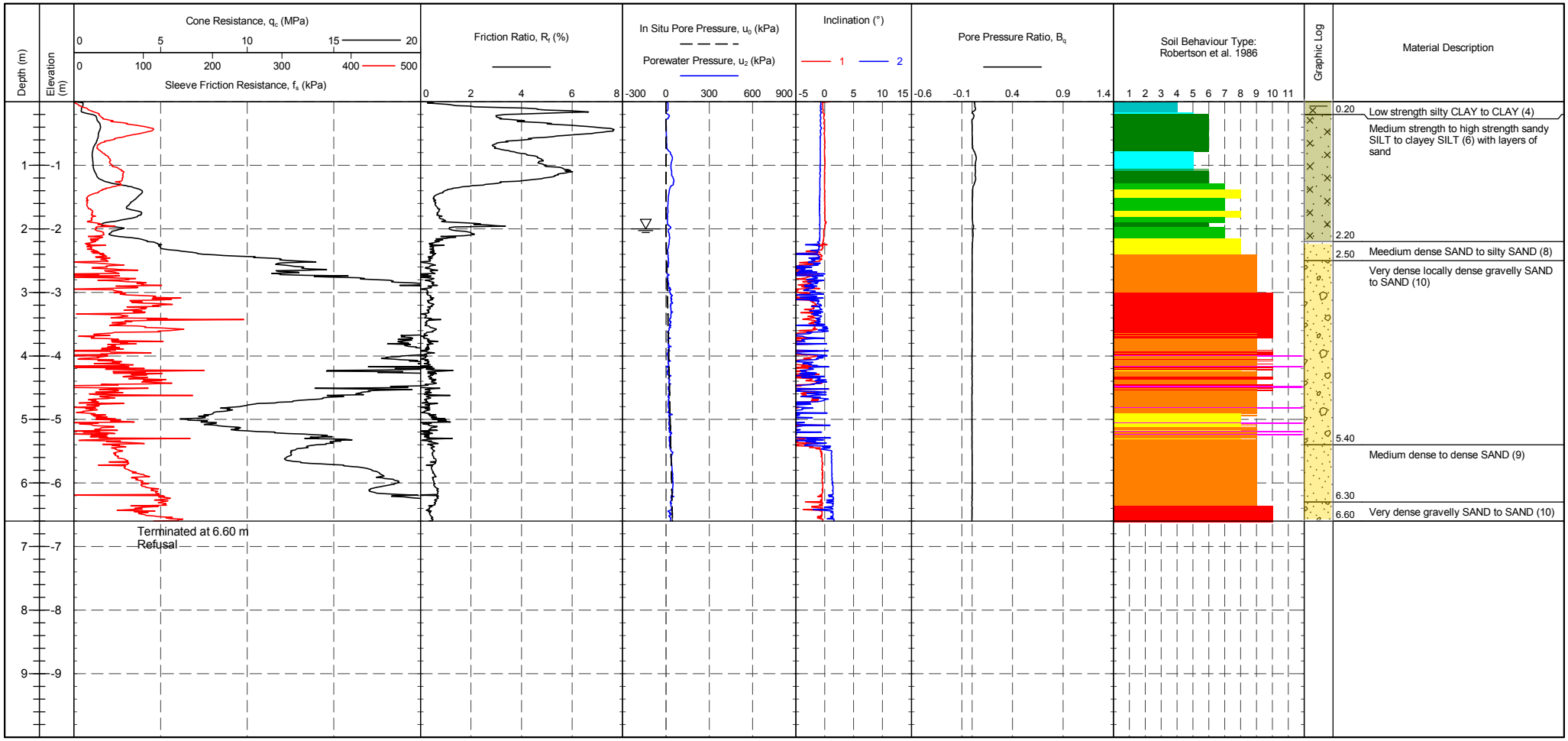
IN SITU SITE INVESTIGATION Working with:

CPT LOG 01

PointID

CPT 10

CLIENT : Geotechnics Limited	EASTING :	REMARK	SHEET : 1 OF 1
PROJECT : Newark	NORTHING :	Test refused on tip resistance.	STATUS : Final
LOCATION : Newark	ELEVATION : 0.00 m		TEST DATE : 16/03/2017
PROJECT No. : 1170175	CHECKED BY : Luisa Dhimitri		PLOT DATE : 20/03/2017
	TERMINATION REASON : Refusal		METHOD : ISO 22476-1:2012



CONE ID	: S15-CFIP.1486	TEST TYPE	: TE2	CPTU ZERO VALUES			
CONE AREA	: 15cm^2	APPLICATION CLASS	: 2	Transducer	Pre	Post	Difference
CONE AREA RATIO	: 0.79	RIG	: CPT 006	Tip	280 mV	277 mV	-0.033 MPa
FILTER POSITION	: u2	OPERATOR	: Ben Bilsbrough	Sleeve	273 mV	265 mV	-0.006 kPa
FILTER TYPE	: HDPE	FILE NAME	: 1170175-CPT 10	Pore Pressure 2	266 mV	253 mV	-0.004 kPa
FRICTION REDUCER	: None	WEATHER	: Sunny & Mild	X-Y Inclinometer	2528 mV	2393 mV	

METHOD: Robertson et al. 1986

1 - Sensitive fine grained material (1)
2 - Organic material (2)
3 - CLAY (3)
4 - Silty CLAY to CLAY (4)
5 - Clayey SILT to silty CLAY (5)
6 - Sandy SILT to clayey SILT (6)
7 - Silty SAND to sandy SILT (7)
8 - SAND to silty SAND (8)
9 - SAND (9)
10 - Gravelly SAND to SAND (10)
11 - Very stiff fine grained (11)
12 - SAND to clayey SAND (12)

Groundwater Level

Dissipation Test