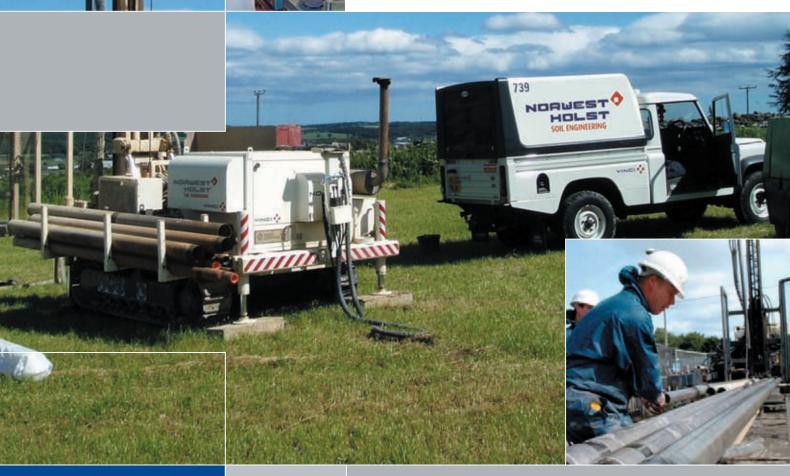
Annex 7.3

Report on Ground Investigation for South Humber Channel Marine Studies

(Vinci)



REPORT ON A GROUND INVESTIGATION FOR SOUTH HUMBER CHANNEL MARINE STUDIES



REPORT	QUALITY	ASSURANCE SHEET

Title:

REPORT ON A GROUND INVESTIGATION

FOR

SOUTH HUMBER CHANNEL MARINE STUDIES

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Report Status:	Description:	Date:	Written By:	Checked By:	Approved By:
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Distribution: Roger Tym & Partners
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GROUND INVESTIGATION: SOUTH HUMBER CHANNEL MARINE STUDIES

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(by Zetica Ltd)

(by EMU Ltd.)



1.0 INTRODUCTION

In June 2010 Soil Engineering were instructed by Roger Tym & Partners (The Engineer) acting for and on behalf of Yorkshire Forward (the Employer) to carry out a ground investigation for the South Humber Channel Marine Studies. The Engineer was advised geo-technically by Buro Happold Consulting Engineers.

It is proposed to construct a new Marine Terminal in the Humber Estuary between Immingham and North Killingholme Haven, by building up land out into the river, constructing jetty wharves and dredging access channels. The investigation comprised an Unexploded Ordnance (UXO) desk study, geophysical surveying and the formation of vibrocored boreholes as well as laboratory testing.

This factual report presents the results of the fieldwork and laboratory testing undertaken. The fieldwork was carried out between 15th June and 15th July 2010.

2.0 PURPOSE, SCOPE AND REPORT FORMAT

2.1 Purpose

The purpose of this investigation was to determine the sub-riverbed ground conditions at the site of the proposed Marine Terminal. This information was to be obtained from a combination of geophysical and intrusive investigation techniques together with laboratory testing.

2.2 Scope of Work

The brief for this factual report comprised the following items:

- 1. To provide a UXO Desk Study.
- 2. To undertake a geophysical survey of the site.
- 3. To form exploratory holes on site
- 4. To schedule and undertake laboratory tests on samples recovered from site.

Sources of information used in the compilation of this report are referenced on page 9.

2.3 Report Format

This report is presented in the following format:

Factual information comprising: -

- Description of fieldwork
- Exploratory hole logs
- Laboratory test results
- Maps and plans
- Photographs
- UXO Desk Study Report
- Geophysical Report



3.0 DESK STUDY INFORMATION

3.1 Scope of Study

A formal comprehensive desk study was not requested by the Engineer for this investigation. The following sections however provide general details of the site location and description, together with the site geology as ascertained from published maps.

3.2 Site Location and Description

The site area is located along the south shore of the Humber Estuary north of Immingham (centred approximately at National Grid Reference TA 180 190). The site works were carried out between the North Killingholme and South Killingholme Havens, northwest of Immingham Dock. The site comprises an irregular area within the estuary some 3000m long and between 150m and 1300m off shore.

The location of the site is indicated on Figure 1 in Section D of this report.

3.3 Geology

From the available information on the 1:50,000 scale Geological Survey map of the area (Sheet 81: 1991, Solid and Drift edition for Patrington) the site is inferred to be underlain by Recent Alluvial deposits, over Glacial Till (boulder clay) over Chalk of Cretaceous age, although no details are actually shown beneath the site as it is located off shore.

3.4 Previous Investigations

Soil Engineering is not, nor has been made, aware of any previous investigations on the site.

3.5 Unexploded Ordnance Desk Study

A specialist Unexploded Ordnance (UXO) Desk Study was required by the Employer for this site prior to the investigation fieldworks and this was provided by our specialist subcontractor Zetica Ltd. of Long Hanborough, Oxfordshire. Zetica's "Sitesafe Desk Study" report of this work is included in the Appendix of this report.

4.0 FIELDWORK

4.1 Scope of Fieldwork

The scope of the fieldwork was specified by the Engineer. The geophysical surveying was required to establish the bathymetry of the site, any magnetic obstructions (including UXOs) within the river bed and a boomer survey to map any reflectors below the river bed. A subsequent second intrusive phase of fieldwork was undertaken with proprietary vibro coring equipment from an appropriate boat at thirty locations. A few of the initially proposed vibro-core locations were relocated as necessary to avoid sunken metallic objects, as revealed by the geophysical surveying, and to avoid other navigational constraints.

Soil logging has been undertaken in accordance with the relevant European Standards, listed in the references for this report. In accordance with the specification and drawings provided by the Engineer, Soil Engineering was required to set out the Vibro-core holes. The exploratory hole locations are shown on the site plan Figure 2 presented in Section D of this report.



4.2 Geophysical Surveying

Geophysical surveying was required to assess the river bed contours (bathymetry), the presence and location of any metallic obstructions (including UXOs) and a boomer survey to detect reflector horizons below the river bed. The geophysical surveying was carried out by our specialist sub-contractor EMU Limited of Southampton. The results and interpretations of this work are reported within the EMU report which is presented in the Appendix of this report. The results of the magnetometer survey were used to confirm safe locations for the subsequent Vibro-cored holes.

4.3 Vibro-Cored Exploratory Holes

A total of thirty exploratory holes, designated VC01 to VC30 inclusive, were formed by vibrocoring techniques to maximum depths of 6.00m and each penetrated or recovered between 1.80m and 6.00m of the river bed materials.

Vibro-core samples were a nominal 84mm in diameter. The vibro-coring barrel was fitted with a retractable rigid plastic inner liner and a basket core retaining spring fitted at the face of the barrel to assist maximum recovery of the samples. The piston within the barrel is held rigidly at the sampling (river bed) level so that no vertical displacement or pressurizing of the sediment occurs while the barrel and liner are penetrated into the ground. The design and performance of the piston ensures that a vacuum is formed over the retained sample when the sample is withdrawn.

The proprietary equipment was operated for us by EMU Ltd. from an appropriate, chartered, boat. Sampling in some parts of the site (estuary) had to be timed to miss the peak tidal currents which would have made sampling locally impracticable. No casing is used in this sampling process and there is therefore only a single sampling opportunity at any one position.

Following recovery of each vibro-core, the liner and core were cut into lengths of up to 1m, sub-sampled where specimens were required for contamination testing by others (Institute of Estuarine and Coastal Studies; University of Hull) and the ends covered with tightly fitting caps prior to transportation to Soil Engineering's laboratory for logging and testing.

The samples recovered from the boreholes were photographed and described by an Engineering Geologist, in accordance with the terminology presented in Section A of this report. Detailed descriptions of all strata encountered are included on the borehole logs presented in Section B of this report. Our engineer also performed a series of Hand Shear Vane tests on representative cohesive material throughout the vibro-core during logging and the results of these tests are included in Section C of this report.

5.0 LABORATORY TESTING

5.1 Scope of Testing

All geotechnical (soils) testing was scheduled by Soil Engineering within the scope and regime required by Buro Happold. The scope of the testing was required to enable comments regarding foundation design and dredging conditions to be made.

5.2 Geotechnical Soils Testing

The programme of laboratory testing was carried out in accordance with BS1377 (1990). The following testing was carried out at the Leeds laboratory of Soil Engineering, which is



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registered as UKAS Testing laboratory No 1265.

The tests listed over the page were carried out and the results are given on the summary sheets and individual test plots presented in Section C of this report.

B.S. CLAUSE No	DESCRIPTION
Part 2: 3	Moisture Content
Part 2: 4 & 5	Atterberg Limits
Part 2: 8	Particle Density
Part 2: 9	Particle Size Distribution
Part 5: 3	One Dimensional Consolidation Properties
Part 7: 8 & 9	Undrained Triaxial Compression Single & Multistage Loading

In addition chemical (sulfate and pH) testing was undertaken by Scientific Analysis Laboratories (SAL) of Manchester which is registered as UKAS testing laboratory 1650. Testing was undertaken in order to assess concrete requirements from BRE Special Digest No 1. Samples were prepared in general accordance with BS 1377, although final analysis of total sulfate was performed using ICP and aqueous extract using Ion Chromatography.

These results are also included in Section C of this report.

6.0 RESULTS OF THE INVESTIGATION

6.1 Scope of Commentary

The results of this investigation appear to broadly concur with the published geology summarised in Section 3.3 of this report. The results are also compatible with the interpretation of the geophysical boomer data, in that alluvium, boulder clay, reworked chalk (white gravelly silt) and one possible occurrence of structureless chalk were found with thicknesses no more than the indicated depths to rockhead from river bed level.

The following sections are only intended to provide a summary of the ground conditions encountered during this investigation whilst the logs presented in Section B of this report give a detailed account of all the strata observed.

6.2 Superficial Deposits

A very variable sequence of alluvial or fluvial materials, sands, sand and gravels and very soft or soft clays/silts were encountered in all the exploratory holes, with the exception of VC23. The finer cohesive materials often included fragments or odours of organic material.

Lenses and laminations of peat were identified within boreholes VC05 to VC09 inclusive, VC12, VC13, VC15, VC17, VC20 and VC21. Kelp / seaweed was also recorded in VC21 between 1.30m and 3.10m depth. These holes occur within the central, third, length of the site

Between river bed (VC23) and up to a maximum depth of 5.60m firm to stiff brown sandy gravelly clay (boulder clay) was encountered in boreholes VC10, VC11 and VC16 to VC30 inclusive. These holes are located along the northwestern half of the site.

Reworked chalk recovered as very pale grey/white gravelly silt was found in exploratory holes VC05, VC10, VC13, VC16 and VC22. In the base of VC13 a white with some pale grey and brown stained silty slightly sandy gravel with low cobble content was found, the gravel and cobbles being sub-angular and entirely of chalk fragments. This, although unlikely, may



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possibly be structureless in-situ Chalk but limited penetration into it and the lack of collaborating adjacent vibro-core hole evidence or geophysical evidence does not help confirm this.

6.3 Cretaceous Strata

Hole VC13 possibly encountered Chalk, between 3.37m and 3.80m depth. If this is Chalk and not silty sandy gravel of chalk fragments with a low cobble content, then being structureless this would be classified as Grade Dc. As mentioned above however due to; the limited penetration (<0.5m) providing restricted material and discontinuities for logging, the absence of any collaborating evidence from adjacent boreholes and the indication from the geophysical survey that rock head is some 7m deeper in this area then this possibility cannot be resolved.

For and on behalf of **Soil Engineering** Part of Vinci Construction UK Limited

Project Geotechnical Engineer

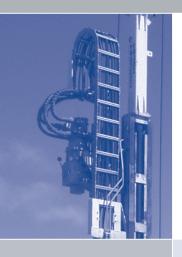
Principal Geotechnical Engineer

Project No: F15842	SOUTH HUMBER CHANNEL MARINE STUDIES
Document No. F01	

REPORT REFERENCES

- BGS Sheet 81: (1991): 1:50,000 scale Solid and Drift editions for Patrington. British Geological Survey.
- BS 5930: (1999): Code of Practice for Site Investigation. British Standards Institution.
- BS 1377: (1990): Parts 1 to 9: Methods of Test for Soils For Civil Engineering Purposes. British Standards Institution.
- BS EN 1997-2: (2007): Eurocode 7 Geotechnical Design Part 2: Ground Investigation and Testing
- BS EN ISO 14688-1: (2002): Geotechnical Investigation and testing Identification and Classification of Soil Part 1: Identification and Description.
- BS EN ISO 14688-2: (2004): Geotechnical Investigation and testing Identification and Classification of Soil Part 2: Principles for a Classification
- BS EN ISO 14689-1: (2003): Geotechnical Investigations and testing Identification and Classification of Rock Part 1: Identification and description.





SUPPORTING FACTUAL DATA SECTION A Notes on Fieldwork, Logging and Laboratory Testing

FIELDWORK PROCEDURES





1.0 CABLE PERCUSSION BORING TECHNIQUES

Unless otherwise stated the light cable percussion technique of 'soft ground' boring has been employed in the formation of boreholes for this contract. In cohesive soils a clay cutter has been used to advance the boreholes whilst in granular deposits a shell has been employed. The combination of clay cutter and shell bring up disturbed material which is generally sufficiently representative to permit identification of the strata. Whilst these particular techniques allow the maximum data to be obtained on strata conditions, a degree of mixing of some layered soils (e.g thin layers of coarse and fine granular material) is inevitable.

2.0 DYNAMIC SAMPLING

As an alternative to cable percussion boring, NHSED employs a number of techniques for the sampling of soils. The most common alternative techniques comprise some form of dynamic sampling system which involves sampling tubes being driven into the ground by means of a sliding weight.

'Window sampling' techniques form the most common type of dynamic sampling and typically comprises 1.0m long steel cylinders with elongated windows. These are driven to the required depth by the use of a percussive hammer. In the 'windowless' mode a plastic liner can be placed in the steel cylinders such that effectively continuous sampling can be undertaken. This method of sampling only produces Class 2 or 3 samples which are generally not suitable for any form of laboratory machine testing.

3.0 ROUTINE SAMPLING

In the UK "undisturbed" samples of predominantly cohesive soils are generally obtained in a 102mm diameter open drive sampler as defined in the British Standard Code of Practice BS 5930 (1999) (ref 01). The British Standard notes however that conventional and lined open drive samplers do not produce Class 1 samples for laboratory testing and for this reason NHSED has incorporated a taper into the cutting shoe of all its lined open drive samplers. This taper significantly reduces sample disturbance and for the majority of cohesive soils allows samples to be recovered which are suitable for laboratory machine testing. However it should be appreciated that no sample can be truly undisturbed when sampled in this manner and the effects of disturbance can best be seen in laminated clays in which the laminations may be turned downward on the margins of the sample due to the driving effects of the sampler. Where it is necessary to minimise the effects of sample disturbance e.g in 'sensitive' clays and silts, alternative sampling techniques may be specified and where used, are described in the report text.

In granular deposits and mixed cohesive-granular deposits where it is not possible to recover undisturbed samples, either large or small disturbed samples are normally obtained. The size of these samples are in accordance with the requirements of BS 5930 (1999) whilst the frequency of sampling is unique to this contract.



It is important to note that the number of blows taken to drive any kind of sampling tube is not necessarily indicative of the strength of the material being sampled. For this reason NHSED recommends that no attempt is made to correlate such blows with the consistency of cohesive strata.

4.0 ROTARY DRILLING

Where rotary open hole drilling techniques have been employed it is important to note that descriptions of the strata encountered are generally solely based on the foreman drillers observations of cuttings and drill flush returns. Whilst such techniques can provide useful information in certain ground conditions it should be recognised that an accurate determination of subsurface rock strata can only be obtained by rotary coring techniques.

An examination of rock cores obtained by rotary drilling generally enables bedding planes, fissuring and consistency to be observed but does not necessarily reveal the presence of vertical fissures or joints.

Details of the strata encountered are given on the borehole log along with the geologist's assessment of Total Core Recovery (TCR), Solid Core Recovery (SCR) and Rock Quality Designation (RQD) each expressed as a percentage of the individual core runs. When appropriate the Fracture Index (FI) or Fracture Spacing (If) is also given on the logs and represents respectively the number of natural fractures per metre run of core for core that has a similar intensity of fracturing, or the minimum, average and maximum spacing of such natural fractures over an arbitrary length of core of similar intensity of fracturing.

The symbols and abbreviations used on the rotary borehole logs are explained on the exploratory hole legend and notation sheet that precedes the exploratory hole records. It is considered however that the meaning of the abbreviations NI and NA (not shown in the key) needs further clarification. NI denotes material recovered non intact and applies to material that has numerous fractures or incipient fractures and which is either naturally broken up or which becomes broken up by drilling activities. The result in both cases is that the core is recovered in a highly fragmented state, generally as a gravel. The term NA is the abbreviation for not applicable and refers to any materials to which determination of a fracture index would be inappropriate, i.e for clay bands.

Where significant core loss (>300mm) has occurred, it is NHSED general policy to insert a separate 'stratum' on the log to coincide with the inferred zone of core loss. Unless there is good evidence as to the rock (or soil) type that has been lost, the legend column is left blank. For zones of inferred mine workings, an appropriate legend is used and this together with all the legends used on the logs is shown on the log notation sheet that precedes the exploratory logs in the report.

A summary of logging methodology for rock strata and core measurements is given in Section A5: Terminology used in the Description and Classification of Rocks.

5.0 IN SITU DYNAMIC PENETRATION TESTS

Standard or Cone Penetration Testing (SPT/CPT) is generally employed where undisturbed samples cannot be obtained e.g in granular soils, fill and rock etc, in order to obtain an indication of the in situ density, compaction or hardness. Inherent difficulties are present in obtaining true SPT or CPT "N" values in water bearing fine grained granular deposits and careful consideration of the test technique and groundwater conditions are necessary before test results are used for design purposes.

The full procedure for carrying out the Standard Penetration Test (SPT) is given in BS EN ISO 22476-3 (2005) (ref 02). Essentially the test consists of driving a 50mm external diameter split barrel sampler into the soil using a 63.5kg hammer dropping 760mm. The penetration resistance is expressed as the number of blows required to obtain 300mm penetration below an initial seating drive of 150mm through any disturbed ground at the bottom of the borehole. The number of blows for the 300mm test drive penetration is recorded on the borehole logs as the "N" value. A full record of the number of blows required to drive the sampler at 75mm intervals throughout the total 450mm drive is also tabulated along with the groundwater level at the time of test. It is important to distinguish how the blow count relates to the penetration of the sampler and this may be achieved in the following manner:

- (i) Where the test drive is terminated at 50 blows the number of blows for the partial test drive (usually 50) and the penetration of the sampler within the test drive are recorded. An approximate "N" value may be obtained by linear extrapolation of the number of blows recorded for the partial test drive.
- (ii) If the total penetration is equal to or less than the 150mm seating drive then the number of blows (usually 25) and the depth of penetration within the initial seating penetration are recorded on the borehole logs.

The "N" value obtained from the Standard Penetration Test may be used to assess the relative density of sands and gravels in accordance with Clause 41.3.2 of BS 5930 (1999) (ref 01), as shown in table 1:

TABLE 1: DETERMINATION OF RELATIVE DENSITY FROM PENETRATION TESTS (from BS 5930)

Term	SPT N-Value: Blows/300mm Penetration
Very Loose	0-4
Loose	4-10
Medium Dense	10-30
Dense	30-50
Very Dense	Over 50

Standard Penetration Testing may also be performed in very stiff/hard clays in which it would be difficult to obtain undisturbed samples. In such cases the SPT "N" values may be used for design purposes based on correlations between "N" value and various soil parameters such as those proposed by Stroud and Butler (1975) (ref 03).



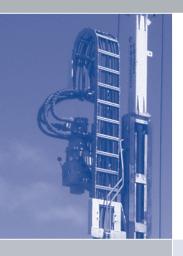
6.0 GROUNDWATER

The groundwater conditions entered on the exploratory hole records are those encountered at the time of the investigation. These however, may not represent the actual conditions or those which may apply in large excavations. The normal rate of boring does not always permit the recording of an equilibrium water level for any one water strike, particularly because the entry of water into a borehole may be reduced or even eliminated due to casing off a water bearing layer or due to a skin being formed on the borehole wall by the drilling tools. It should also be noted that groundwater conditions may vary seasonally and/or tidally and that the water levels as shown at the time of investigation should not necessarily be taken as being constant because they may be subject to such fluctuations.

More accurate information on groundwater conditions can be obtained from exploratory hole installations such as piezometers and standpipes. Normally three or four monitoring visits are required at the site to provide this information.

References

- 01) BS 5930 (1999) Code of Practice for Site Investigation. British Standards Institution.
- 02) BS EN ISO 22476-3 (2005). Geotechnical Investigation and Testing Field Testing Part 3: Standard Penetration Test.
- 03) Stroud, M.A, Butler, F.G (April 1975) 'The Standard Penetration Test and the Engineering Properties of Glacial Materials'. The Engineering Behaviour of Glacial Materials Proc. of Symp.



SUPPORTING FACTUAL DATA SECTION A Notes on Fieldwork, Logging and Laboratory Testing

TERMINOLOGY USED IN SOIL DESCRIPTIONS





SECTION A 2: TERMINOLOGY USED IN SOIL DESCRIPTIONS

1.0 GENERAL PROCEDURES

Soil descriptions contained in this report have been produced in accordance with the procedures and principles given in BS EN ISO 14688-1: 2002 (ref 01), BS EN ISO 14688-2: 2004 (ref 02) and also where there is no conflict with the European standards, in accordance with BS 5930 1999 (ref 03).

For a soil description the main soil characteristics should be given in a standard word order although the word order can be adjusted to enhance and clarify if appropriate. The main soil characteristics can be divided as follows:-

- 1 Mass Characteristics comprising state and structure
- 1a Density and Field Strength
- 1b Discontinuities
- 1c Bedding

- 2 Material Characteristics comprising nature and state
- 2a Colour
- 2b Composite Soil Types: particle grading and composition, shape and size
- 2c Principal Soil Type, name in capitals eg CLAY
- 3 Stratum Name (optional)
- 3a Geological group or Formation

The basic soil categories may be broadly summarised as follows, with categories i to iii covered by these notes and category iv and v by separate notes.

- (i) Very coarse soils: greater than 63mm in diameter, ie cobbles and boulders.
- (ii) Coarse soils: 0.063mm to 63mm in diameter, ie sands and gravels.
- (iii) Fine soils: less than 0.063mm in diameter, ie clays and silts.
- (iv) Organic soils.
- (v) Man made "soils".

2.0 MASS CHARACTERISTICS OF SOILS

2.1 Cohesive Soils

For cohesive material determination of consistency is made in accordance with Table 1 on the following page. The undrained shear strength of clays is determined by laboratory or field testing and is made in accordance with the terms given in Table 2.



TABLE 1: CONSISTENCY GUIDE FOR COHESIVE MATERIAL (from BS EN ISO 14688-1: 2002)

Term	Field Identification
Very Soft	Exudes between fingers when squeezed in the hand
Soft	Can be molded by light finger pressure
Firm	Cannot be moulded, but can be rolled into 3mm thick thread
Stiff	Crumbles when rolled into 3mm thick thread
Very Stiff	Cannot be moulded and crumbles under pressure. Indented by thumbnail

TABLE 2: UNDRAINED SHEAR STRENGTH OF FINE SOILS (from BS EN ISO 14688-2: 2004)

Undrained shear strength of clays	Undrained shear strength (Cu) kPa
Extremely low	<10
Very low	10 to 20
Low	20 to 40
Medium	40 to 75
High	75 to 150
Very High	150 to 300
Extremely High¹	>300

'Materials with shear strengths greater than 300kPa, may behave as weak rocks and should be described in accordance with ISO 14689-1.

2.2 Granular Soils

For granular deposits relative density may only be determined by the Standard Penetration Test (SPT). The following table provides a scale of terms related to SPT 'N' values from BS 5930 (1999) (ref 03).

TABLE 3: ASSESSMENT OF RELATIVE DENSITY FOR GRANULAR SOILS (from BS 5930: 1999)

Term	Field Identification (generally in trial pits)	SPT 'N' Values (blows for 300mm penetration)
Very loose	Can be excavated with a spade	0-4
Loose	and 50mm wooden peg can be easily driven	4-10
Medium dense	-	10-30
Dense	Requires pick for excavation	30-50
Very dense	and 50mm wooden peg is hard to drive	over 50

N.B: The field identification terms for very loose/loose material and dense/very dense material are very subjective and should be treated with caution.

SECTION A 2: TERMINOLOGY USED IN SOIL DESCRIPTIONS

2.3 Discontinuities

The type of discontinuity should be described eg fissures, faults and shear planes together with their spacing as given in Table 4. Discontinuity openness, and surface texture eg rough, smooth, polished and striated are recorded although these may not always be added to the borehole log if the required level of detail is low.

2.4 Bedding

Bedding spacing is assessed using the thickness terms given in Table 4.

TABLE 4: DESCRIPTIONS FOR DISCONTINUITIES AND BEDDING (from BS 5930: 1999)

DISCONTINUITIES Scale of Spacing Term	Mean Spacing mm	BEDDING Scale of Bedding Term	Mean Thickness mm
Very widely	>2000	Very thickly bedded	>2000
Widely	2000-600	Thickly bedded	2000-600
Medium	600-200	Medium bedded	600-200
Closely	200-60	Thinly bedded	200-60
Very closely	60-20	Very thinly bedded	60-20
Extremely closely	<20	Thickly laminated	20-6
		Thinly laminated	<6
N.B: Spacing terms are also used for describing the distance between partings, isolated beds, laminae or roots etc.		N.B: Interbedded/interlaminated: alternating layers of different material type. These terms must be given a thickness if material is present in equal proportions. Otherwise the thickness of and spacing between subordinate layers must be defined.	

3.0 MATERIAL CHARACTERISTICS OF SOIL

An examination of insitu soil deposits, disturbed or undisturbed samples allows the material characteristics to be recorded. These characteristics include colour, particle shape, particle grading and particle composition.

3.1 Colour

The recorded colour is based on the logger's general impression of the overall colour. For material with more than three colours the term multicoloured is used. The term mottled is applied to soils which exhibit two colours, one of which is subordinate to the other.

White, cream, grey, black, yellow, orange, red, brown, green and blue etc may be used but supplemented as necessary with: light, dark, mottled and reddish brownish etc. All coloration associated with chemical changes is noted in grey gleying on fissures.

3.2 Soil Types (Including Composite Soils)

3.2.1 Very Coarse Soils (Boulders and Cobbles)

Where the soil sample is considered large enough to be representative, material is described as shown in Table 5.



TABLE 5: DESCRIPTORS FOR VERY COARSE SOILS (from BS 5930: 1999)

Main Name	Estimated Boulder/Cobble Content of Very Coarse Fraction
BOULDERS	Over 50% is of boulder size (>200mm)
COBBLES	Over 50% is of cobble size (200mm to 63mm)

Mixtures of very coarse and finer materials are described by combining terms for the very coarse constituents with those for the finer constituents as shown in Table 6.

TABLE 6: DESCRIPTORS FOR MIXTURES OF VERY COARSE AND FINER SOILS (from BS 5930: 1999)

Term	Composition (Approx %)
BOULDERS (or COBBLES) with a little finer material (1)	Up to 5% finer material
BOULDERS (or COBBLES) with some finer material (1)	5% to 20% finer material
BOULDERS (or COBBLES) with much finer material (1)	20% to 50% finer material
FINER MATERIAL with low boulder content	<5% boulders
FINER MATERIAL with low cobble content	<10% cobbles
FINER MATERIAL with medium boulder content	5% to 20% boulders
FINER MATERIAL with medium cobble content	10% to 20% cobbles
FINER MATERIAL with high boulder content (or cobbles)	>20% boulders or cobbles
(1) The description of "finer material" is made in accordance with BS 5930 principal soil type name of the finer material may also be given in capital content; COBBLES with some sandy CLAY.	

3.2.2 Coarse Soils (Gravel and Sand)

A coarse soil (omitting any cobbles and boulders) contains 65% or more of SAND or GRAVEL. The terms given in Table 7 are used to describe the coarse fraction.

TABLE 7: DESCRIPTORS FOR MIXTURES OF VERY COARSE AND FINER SOILS (from BS 5930: 1999)

Term	Principal Soil Type	Approximate Proportion of Secondary Constituent
Slightly sandy or gravelly	SAND	<5%
Sandy or gravelly	or	5% to 20%
Very sandy or gravelly	GRAVEL	>20%
+	SAND and GRAVEL	About equal proportions

SECTION A 2: TERMINOLOGY USED IN SOIL DESCRIPTIONS

3.2.3 Fine Soils and Mixtures of Fine and Coarse Soils

Fine soil should be described as either a SILT or a CLAY. The use of silty CLAY or clayey SILT is however permitted, where the presence of the secondary constituent is considered important.

For deposits that contain a mixture of soil types the descriptors given in Table 8 are used. The dominant secondary fraction is placed immediately before the principal soil type. It should also be noted that the terms silty and clayey are mutually exclusive in a coarse soil. The use of the terms sandy and gravelly are however permitted.

TABLE 8: DESCRIPTORS FOR FINE SOILS AND COMPOSITE SOIL TYPES (from BS 5930: 1999)

Term	Principal Soil Type	Approximate Prop Coarse Soil	oortion of Secondary Constituent Coarse and/or Fine Soil			
Slightly clayey or silty and/or sandy or gravelly	SAND and/or		<5%			
Clayey or silty and/or sandy or gravelly	GRAVEL		5% - 20% *			
Very clayey or silty and/ or sandy or gravelly			>20% *			
Very sandy or gravelly	SILT or	>65% +				
Sandy and/or gravelly	CLAY	35% - 65%				
Slightly sandy and/or gravelly		<35%				
* or described as fine soil depending on assessed engineering behaviour + or described as coarse soil depending on assessed engineering behaviour						

3.3 Particle Shape and Grading

For coarser granular deposits (gravel and cobbles) the particle shape is described as shown in Table 9.

TABLE 9: DESCRIPTORS FOR PARTICLE SHAPE (from BS EN ISO 14688-1: 2002)

Angularity	Form	Surface Texture
Very Angular	Cubic	
Angular	Flat	Rough
Subangular	Elongated	Smooth
Subrounded		
Rounded		
Well Rounded		
Notes: Form and surface textural de	escriptors are optional.	

The distribution of particle sizes within sands and gravels should be described stating the predominant size fraction present eg fine to medium SAND.



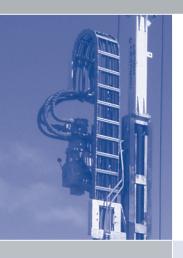
Very Angular Angular Subrounded Rounded Well Rounded

Flat of tabular Elongated

FIGURE 1: PARTICLE ANGULARITY AND FORM TERMS (from BS 5930: 1999 and NHSED)

References

- **01)** BS EN ISO 14688-1: 2002 Geotechnical Investigation and Testing Identification and Classification of Soil Part 1: Identification and Description.
- **02)** BS EN ISO 14688-2: 2004 Geotechnical Investigation and Testing Identification and Classification of Soil Part 1: Principles for a Classification.
- 03) BS 5930: (1999) Code of Practice for Site Investigation. British Standards Institution.



SUPPORTING FACTUAL DATA SECTION A Notes on Fieldwork, Logging and Laboratory Testing

TERMINOLOGY USED IN PEAT AND ORGANIC SOIL DESCRIPTIONS





SECTION A 4: TERMINOLOGY USED IN PEAT AND ORGANIC SOIL DESCRIPTIONS

The basic designation for soils consisting principally of organic matter is summarised it Table 1.

TABLE 1: IDENTIFICATION AND DESCRIPTION OF ORGANIC SOIL

Term Fibrous Peat	Description Fibrous structure, easily recognisable plant structure, retains some strength
Pseudo-fibrous Peat	Recognisable plant structure, no strength of apparent plant material
Amorphous Peat	No visible plant structure, mushy consistency
Gyttja	Decomposed plant and animal remains, may contain inorganic constituents
Humus	Plant remains, living organism and there excretions together with inorganic constituents, from the topsoil

If a soil contains organic material in identifiable fragments these are individually described using the "occasional, some and much" terms as appropriate. Any smells or odours should be noted. Where the organic materials are disseminated throughout the soil the term "organic" should be given prior to the soil type.

eg: Soft grey organic CLAY

Where the soil is composed of natural organic material a peat description may be more appropriate. Peats shall normally be described after BS EN ISO 14688-1 (2002) (ref 01), although as the descriptive scheme in that standard is very limited, the additional terms summarised by Hobbs (ref 02) may be used if required.

Peats can be identified as shown in Table 2. The word order is as for other natural soils, however different terms are used to describe the consistency of the peat and the soil type is preceded by an additional term (Fibrous or Amorphous).

No guidance is given in either BS EN ISO 14688-1 (2002) or 14688-2 (2004) or BS 5930 (1999) as to how to deal (in terms of description) with peat soils that contain other materials such as clay or gravel. If the peat has a coarse soil fraction the proportions given in section A2, Table 6 for soil descriptions (for fine soils with a coarse soil fraction) are used. It is difficult to assess visually what proportion of the fine soil is mineral and what proportion is organic therefore the terms "clayey" or "silty" are used with caution if at all.

e.g Firm black fibrous PEAT (H3)
Plastic brown amorphous PEAT (H8)
Spongy black slightly sandy fibrous PEAT (H4)

References

- **01)** BS EN ISO 14688-1: 2002 Geotechnical Investigation and Testing Identification and Classification of Soil Part 1: Identification and Description.
- 02) Hobbs, N.B 1986 'Mire morphology and the properties and behaviour of some British and foreign peats. Q.J. Engng Geol. 19, No 1, 7-80.
- 03) BS 5930 (1999) Code of Practice for Site Investigation. British Standards Institution.



TABLE 2: GUIDANCE ON THE IDENTIFICATION AND DESCRIPTION OF PEAT (AFTER BS 5930 AND HOBBS)

RESIDUE IN HAND	Not pasty Somewhat pasty		Thick, pasty	Very thick	10	Prainchous and fibre which resist decomposition			
MATERIAL EXTRUDED BETWEEN FINGERS	Clear, colourless water	Yellowish water Brown, muddy water, no peat	Dark brown muddy water no peat	Muddy water and some peat	Above one third of peat squeezed out; water dark brown	About one half of peat squeezed out, consistency like porridge; any water is very dark brown	About two thirds of peat squeezed out, also some pasty water	Nearly all the peat squeezed out as a fairly uniform paste	All the peat passes between the fingers, no free water visible
DESCRIPTION	Entirely unconverted mud-free peat	Almost entirely unconverted mud-free peat Very slightly converted or very slightly muddy peat	Slightly converted or some what muddy peat	Fairly converted or rather muddy peat, plant structure still quite evident	Fairly converted or rather muddy peat, plant structure indistinct but more obvious after squeezing	Fairly well converted or markedly muddy peat; plant extract still discernible	Well converted or very muddy peat, very indistinct plant structure	Almost completely converted or mud-like peat, plant structure almost not recognisable	Completely converted or entirely muddy peat, no plant structure visible
DECOMPOSITION	None Incipalificant	Insignificant Very slight	Slight	Moderate	Moderately strong	Strong	Very strong	Nearly complete	Complete
DEGREE OF HUMIFICATION	도	H2 H3	H4	H5	Н6	Н7	8 ±	Н9	H10
SOIL TYPE	Fibrous							Amorphous PEAT	
CONSISTENCY SOIL TYPE	Firm or Spongy						Plastic		



SUPPORTING FACTUAL DATA SECTION A Notes on Fieldwork, Logging and Laboratory Testing

ASSESSMENT OF AGGRESSIVE GROUND AND GROUNDWATER CONDITIONS





SECTION A 6: ASSESSMENT OF AGGRESSIVE GROUND AND GROUNDWATER CONDITIONS

Certain ground and groundwater conditions may be described as aggressive depending on their chemical composition which is related to previous industrial use. Where foundations are proposed to be constructed on industrial sites or on landfill sites in which the ground or groundwater may be contaminated with chemical waste, detailed consideration needs to be given to both the method of investigation and the severity of ground and groundwater conditions with respect to construction materials. For such sites it will usually be necessary to undertake a full chemical analysis in order to identify the potentially aggressive compounds.

On sites where new concrete foundations are to be constructed in natural ground it is usually only necessary to examine the sulfate content and pH level of the ground. The sulfate content of soils varies widely and can range from being virtually absent to extremely high concentrations in crystals such as gypsum. In between these two extremes sulfate may be disseminated throughout a soil or may be present in discrete bands or lenses. Because of this wide variation in the sulfate content of soils, the most reliable indication of possible aggressive conditions can be obtained by testing representative samples of groundwater. In order to take account of natural variations in the distribution of sulfates in the ground, samples should be taken at a number of locations that are well spaced across the site and at different depths.

The methods for the determination of total sulfate of soil and the sulfate content of groundwater and 2:1 aqueous soil extracts are given in various specifications including BS 1377 (1990) Part 3: Section 5 (ref 01). The results of tests performed in accordance with BS 1377 yield results which are expressed as percentage of dry weight retained or grammes/litre SO_3 . Tests performed in accordance with other specifications however, tend to express results as SO_4 .

The classification of natural sulfate conditions is based on BRE Special Digest 1 (2005) (ref 02). This digest makes most use of sulfate values expressed as milligrammes/litre SO4. In order to convert the results expressed as SO_3 (BS 1377) to SO_4 (BRE Special Digest 1) it is necessary to apply a multiplication factor of 1.2. In the following discussion of sulfate conditions values given in the tables are expressed in terms of SO_4 .

The current approach to the classification of aggressive ground conditions given in BRE Special Digest 1 is based on the Aggressive Chemical Environment for Concrete (ACEC). This takes into account the type of site, sulfate concentration and ground water acidity and mobility. Different site assessment procedures are used for natural ground, for brownfield sites that contain industrial waste and pyritic ground. The reactions of sulfates in the presence of other ions, notably carbonate and magnesium are also taken into account.

As with the previous Special Digest 1, there are five design sulfate classes (designated DS1 to DS5) for the site, although in the current digest natural ground and brownfield sites are now covered by separate tables. More subdivision of ACEC Class is given in the table for brownfield locations and this reflects the complexity of conditions that often apply.

In general when the results of sulfate determinations are assessed emphasis must be given to the samples which fall in the higher classes. Therefore if eight out of ten samples are found to be non aggressive and fall within Class DS1 and the remainder fall within Class DS2 it will be necessary to adopt the precautions appropriate to Class DS2 conditions for the whole site. The current digest differentiates between 'natural ground locations' and brownfield locations'.

Table 1 on page 2 is reproduced from the digest and deals with natural ground locations.



TABLE 1: AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASSIFICATION FOR NATURAL GROUND LOCATIONS (a) (From BRE Special Digest 1)

SULFATE		GROUNDWA	TER			
DESIGN SULFATE CLASS FOR LOCATION	2:1 WATER/SOIL EXTRACT (b)	GROUNDWATER	TOTAL POTENTIAL SULFATE (c)	STATIC WATER	MOBILE WATER	ACEC CLASS FOR LOCATION
1	2 (SO ₄ mg/l)	3 (\$0 ₄ mg/l)	4 (SO ₄ %)	5 (pH)	6 (рн)	7
DS-1	<500	<400	<0.24	>2.5	>5.5 (d) 2.5-5.5	AC-1s AC-1 (d) AC-2z
DS-2	500-1500	400-1400	0.24-0.6	>3.5	>5.5 2.5-5.5	AC-1s AC-2 AC-2s AC-3z
DS-3	1600-3000	1500-3000	0.7-1.2	>3.5 2.5-3.5	>5.5 2.5-5.5	AC-2s AC-3 AC-3s AC-4
DS-4	3100-6000	3100-6000	1.3-2.4	>3.5	>5.5 2.5-5.5	AC-3s AC-4 AC-4s AC-5
DS-5	>6000	>6000	>2.4	>3.5 2.5-3.5	>2.5	AC-4s AC-5

NOTES

- a) Applies to locations on sites that comprise either undisturbed ground that is in its natural state or clean fill derived from such ground.
- b) The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous digests.
- c) Applies only to locations where concrete will be exposed to sulphate ions (504) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance.
- d) For flowing water that is potentially aggressive to concrete owing to high purity or an aggressive carbon dioxide level greater than 15mg/l, increase the ACEC Class to AC-2z.

Explanation of suffix symbols to ACEC Class

Suffix 's' indicates that the water has been classified as static

Concrete placed in a ACEC Class that includes the suffix 'z' primarily have to resist acid conditions and may be made with any of the cements listed in Table D2 in the Digest.

Additional testing is required for those natural sites that contain pryrite. In particular it is essential to take account of the total potential sulfate content which might result from oxidation following ground disturbance. On such sites it is necessary to determine total sulfate content (AS% SO_4), total sulfur (TS%). The total potential sulfate is then determined from TPS% SO_4 =3.0 x TS%S. Finally the amount of oxidisable sulfides (OS as % SO_4) is determined by subtracting the acid soluble sulfates(AS% SO_4) from the total potential sulfate content: $OS%SO_4$ = TPS% SO_4 – $AS%SO_4$. It is important to note that this testing is in addition to and not instead of the standard sulfate determination testing.

Unless the site can be demonstrated to comprise natural ground, Table 2 for brownfield locations must be used in all assessments for the design of concrete. It should be noted that the effects of the magnesium ion become relevant to concrete design for certain Design Sulfate Classes.

TABLE 2: AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASSIFICATION FOR BROWNFIELD LOCATIONS (a) (From BRE Special Digest 1)

SULFATE AND) MAGNESIU	M				GROUND	WATER	
DESIGN SULFATE CLASS FOR LOCATION	2:1 WATER/SOI EXTRACT (b)	L	GROUNDWATER		TOTAL POTENTIAL SULFATE (c)	STATIC WATER	MOBILE WATER	ACEC CLASS FOR LOCATION
1	2 (SO ₄ mg/l)	3 (Mg mg/l)	4 (SO ₄ mg/l)	5 (Mg mg/l)	6 (SO ₄ %)	7 (pH) (d)	8 (pH) (d)	9
DS-1	<500		<400	-	<0.24	>2.5	>6.5 (d) 5.5-6.5 4.5-5.5 2.5-4.5	AC-1s AC-1 AC-2z AC-3z AC-4z
DS-2	500-1500		400-1400	-	0.24-0.6	>5.5 2.5-3.5	>6.5 5.5-6.5 4.5-5.5 2.5-4.5	AC-1s AC-2 AC-2s AC-3z AC-4z AC-5z
DS-3	1600-3000		1500-3000	-	0.7-1.2	>5.5 2.5-5.5	>6.5 5.5-6.5 2.5-5.5	AC-2s AC-3 AC-3s AC-4 AC-5
DS-4	3100-6000	<1200	3100-6000	<1000	1.3-2.4	>5.5 2.5-3.5	>6.5 2.5-6.5	AC-3s AC-4 AC-4s AC-5
DS-4m	3100-6000	>1200 (e)	3100-6000	>1000 (e)	1.3-2.4	>5.5 2.5-5.5	>6.5 2.5-6.5	AC-3s AC-4m AC-4ms AC-5m
DS-5	>6000	<1200	>6000	<1000	>2.4	>5.5 2.5-3.5	>2.5	AC-4s AC-5
DS-5m	>6000	>1200 (e)	>6000	>1000 (e)	>2.4	>5.5 2.5-5.5	>2.5	AC-4ms AC-5m

NOTES

- a) Brownfield locations are those sites or parts of sites that might contain chemical residues produced by industrial processes.
- b) The limits of Design Sulfate Classes based on 2:1 water/soil extracts have been lowered relative to previous digests.
- c) Applies only to locations where concrete will be exposed to sulfate ions (504) which may result from the oxidation of sulfides (eg pyrite) following ground disturbance.
- d) An additional account is taken of hydrochloric and nitric acids by adjustment to sulfate content
- e) The limit on water soluble magnesium does not apply to brackish groundwater (chloride content between 12000mg/l and 17000mg/l). This allows 'm' to be omitted from the relevant ACEC classification. Sea water (chloride about 18000mg/l) and stronger brines are not covered by this table.

Explanation of suffix symbols to ACEC Class

Suffix 's' indicates that the water has been classified as static Concrete placed in ACEC Classes that include the suffix 'z' primarily have to resist acid conditions and may be made with any of the cements listed in Table D2 in the Digest. Suffix 'm' relates to the higher levels of magnesium in Design Sulfate Classes 4 and 5.



The pH value of groundwater provides a crude measure of the potential aggressiveness due to the presence of organic acids. The standard procedure for measuring the acidity of soils and groundwater is the electrometric method using a pH meter and is described in BS 1377 (1990) Part 3: Section 5. The pH value of pure water is 7.0 and the presence of acid substances will yield results with values less than 7. It should be noted however that the pH of most natural waters depends mainly on the dissolved carbon dioxide content and therefore lies between pH values of 6.5 and 8.5. It is generally accepted that soils or groundwater with pH values in the range 6 to 9 may be classified as near neutral. It should be noted that the pH value of soil and groundwater can change with time and it is therefore necessary to carry out testing on fresh samples of soil or water.

The pH value of the soil or groundwater also needs to be taken into consideration when the recorded sulfate content is borderline between two classes or approaches the upper limit of a given class. In these circumstances both the pH value and the mobility of the groundwater needs to be assessed and where doubt exists, the sample should be placed in the more severe class of the sulfate classification. This general approach may be justified on the grounds that the acids present will tend to break down the concrete surface and therefore make it more susceptible to sulfate attack. This will be especially so if the sample contains large amounts of sulfides since these can be converted to sulfuric acid.

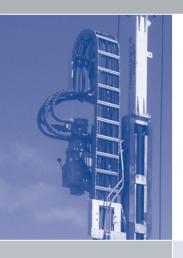
Organic acids are often found in peaty or marshy soils in which the pH value is below 6.0. In such soils it will be necessary to take specific precautions to protect any concrete which would be exposed to organic acids. The recommended precautionary measures outlined in Tomlinson (2001) (ref 03) could be followed. In all cases where mineral acids are present the groundwater is likely to be aggressive with regard to foundation concrete and in these circumstances the recommendations given in BRE Special Digest 1 Part C will need to be followed.

Apart from acid groundwater, the effects of static and mobile ground water tables are taken into account in BRE Special Digest 1 in 'Box C9' and the incremental rules in this table need to be viewed in relation to Tables C1 and C2 in the Digest.

Alkaline groundwater is not generally considered aggressive to concrete unless present in high concentrations. Unless the aggregate used in foundation concrete is of a reactive type, pH values of groundwater up to pH = 14 need not be considered as problematic.

References

- 01) BS 1377 (1990) Methods of Test for Soils for Civil Engineering Purposes. Part 3: Chemical and Electrochemical Tests, British Standards Institution.
- 02) Building Research Establishment (2005) Concrete in Aggressive Ground. BRE Special Digest 1. Building Research Station, Garston
- 03) Tomlinson M.J (2001) Foundation Design and Construction. 7th Edition, Pearson, Prentice Hall.



SUPPORTING FACTUAL DATA SECTION B Exploratory Hole Records and Field Data

EXPLORATORY HOLE LOG LEGENDS AND NOTATION SHEET





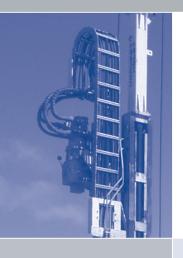
SECTION B: EXPORATORY HOLE LOG LEGENDS

CODE	DESCRIPTION	LEGEND	CODE	DESCRIPTION	LEGEND
101	Topsoil		806	Coal	
102	Made Ground		807	Breccia	
104	Concrete		808	Conglomerate	00000
201	Clay	THE STATE OF THE S	809	Fine Grained Igneous	
301	Silt	$\begin{bmatrix} \times & \times & \times \\ \times & \times & \times \end{bmatrix}$	810	Medium Grained Igneous	++++
401	Sand		811	Coarse Grained Igneous	++++
501	Gravel		812	Fine Grained Metamorphic	
601	Peat	alle alle alle	813	Coarse / Medium Grained Metamorphic	
701	Cobbles		EVT	Evaporite	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
730	Boulders		MWS	Mine Workings	
801	Mudstone		904	Grout	
802	Siltstone	×××××× ×××××× ××××××	905	Arising	
803	Sandstone		BLK	Zone of No Recovery	
804	Limestone		WTR	Water	
805	Chalk	1 1 1	types are re	soils types comprise a mixture of partic epresented graphically on the explorate the legends shown on this sheet.	cle sizes. These soil ory hole logs by



SECTION B: NOTATION USED ON EXPORATORY HOLE LOGS

SAMPLIN	G NOTATION	IN SITU	IN SITU TEST NOTATION		
U	Undisturbed U100 or U38 sample (not differentiated)	S	Standard Penetration Test		
Р	Piston Sample	C	Cone Penetration Test		
BLK	Block Sample	NP	No Penetration for S or C		
M	Mazier Sample	V	Vane Test		
TW	Thin Walled Sample	HV	Hand Vane		
L	Liner Sample	HP	Hand Penetrometer		
	obtained from windowless sampler	CBR	California Bearing Ratio Test		
D	Small Disturbed Sample	K	Permeability Test (test type not differentiated)		
В	Bulk Disturbed Sample	Pr	Pressuremeter Test		
LB	Large Bulk Disturbed Sample				
С	Core Sample	OTHER N	NOTATION		
ES	Environmental Soil Sample	TCR	Total Core Recovery		
EW	Environmental Water Sample	SCR	Solid Core Recovery		
W	Water Sample	RQD	Rock Quality Designation		
UF	No Recovery in U Sample	FI	Fracture Index		
PF	No Recovery in P Sample	If	Fracture Spacing		
TWF	No Recovery in TW Sample	NI	Non Intact		
		NA	Data Not Applicable		
		NR	Data Not Recorded		



SUPPORTING FACTUAL DATA

SECTION B
Exploratory Hole Records and
Field Data

EXPLORATORY HOLE DRILLING RECORDS





	South Humber Channel Mari	ne Studies				Fxnl	orator	~v	lole Log		Hole ID.	
Project No. Engineer	F15842 Roger Tym & Partners					LAPI	orator	y ı	loic Log		VC01	
Client	Yorkshire Forward									;	Sheet 1 of 1	
Ground Level Hole Type	-9.93m CD VC	Coordinates 519 Inclination Vert		418006.2	0 N Nat	ional Gr	rid					
		Thomation voice	Tour									
	Description of Strata		Legend	Depth Below G.L.	Datum Level		Sampling Details	Dia.	Blow Count An Sample Recover	d Ir	n Situ Test Details	Install- ation
Soft grey mottled da and medium.	ark grey slightly sandy CLAY. Sand is fi	ne		0.48	- - - - 10.41	D001	0.06-0.15				:	
Brown and dark gre Gravel is subrounde flint.	ey silty very gravelly fine to coarse SAN ed to rounded fine to coarse of chalk ar	D. nd	× × × × × × × × × × × × × × × × × × ×	0.80	10.41 - 10.73	L003	0.76-0.96					
from 0.67m to 0 soft dark grey s		ed of			-	D004	1.00-1.20				 - -	
rounded fine to med light brown flint. from 1.61m to 1	ne to coarse SAND and subangular to dium occasionally coarse GRAVEL of ch 1.67m 1 No impersistent thick (<60mr ine to coarse sand				-						:	
from 2.15m to 2 brown fine and	2.17m 1 No persistent thin (<20mm) le medium sand	ense of			- - - - -							
from 2.90m san	nd is medium to coarse			3.10	- - 13.03	D005	2.90-3.10				-	
See heade	s in metres, all diameters in millimet er sheet for details of boring, progre s of abbreviations, see key	res. ess and water.						_			S CJ L	. •
Form No. SI EXP HOLE LO	Log Print Date	And Time: 10/11/20	10 09:10 e Date 04/06						A trading name of VIN			

Project Name South Humber Channel Marine Studies				Explorato	nrv F	Hole Lon	Hole ID.	
Project No. F15842 Engineer Roger Tym & Partners				LAPIOIAIC	луі	loic Log	VC02	
Client Yorkshire Forward							Sheet 1 of 1	ı
	9255.00 E, rtical	417855.1	0 N Nat	ional Grid				
Description of Strata	Legend	Depth Below G.L.	Datum Level	Samplir Details	g Dia.	Blow Count An Sample Recove	In Situ Test Details	Install- ation
Soft locally firm dark grey slightly sandy SILT. Sand is fine to coarse.	XXXXX	0.30	_ _ 10.58	B001 0.00-0.50				
Grey and brown silty very gravelly fine to coarse SAND. Gravel is subangular to rounded fine to coarse of chalk and flint.		0.48	10.76 _					
Yellowish brown and light brown fine to coarse SAND and subangular to subrounded occasionally rounded fine to medium rarely coarse GRAVEL of chalk and light grey flint. from 0.69m recovered as light brown slightly gravelly fine to coarse sand. Gravel is subrounded fine to medium of chalk from 1.00m to 1.20m light grey and light brown Light grey and light brown fine to coarse SAND and angular to subrounded fine to medium GRAVEL of chalk and light brown flint. at 1.23m 1 No medium gravel sized pocket of light brown fine to medium sand at 1.48m 3 No angular to subangular coarse gravel sized fragments of black flint		2.22	11.48	D002 1.80-2.00				
from 1.57m to 1.61m 1 No coarse gravel sized pocket of dark brown and black fine to coarse sand with medium organic content at 1.75m 1 No angular medium gravel sized pink shell fragment								
Firm to stiff high strength grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk and flint. from 3.35m to 3.67m gravelly. Gravel is angular to subrounded fine to medium of chalk, flint and white shell fragments at 3.54m 1 No subrounded coarse gravel sized bivalve shell from 3.80m to 3.94m with frequent angular to subangular fine gravel sized fragments of shell from 5.00m to 5.25m very high strength from 5.25m to 5.35m and 5.45m to 5.58m gravelly. Gravel is angular to subrounded fine to medium of chalk, flint and white shell fragments at 5.52m 1 No subangular coarse gravel sized fragment of sandstone		5.60	15.88	L003 5.00-5.25				
Stiff locally firm brown slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium rarely coarse of chalk, flint and quartzite. With occasional fine to medium gravel sized pockets of black silt. at 5.77m 1 No subrounded coarse gravel sized fragment of sandstone Exploratory hole complete at 6.00 m.								
NOTES: All depths in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.					-			
For details of abbreviations, see key Log Print Date And Time: 10/11/2	010 09:10						SCIL SERING	

Project Name South Humber Channel Marine Studies
Project No. F15842
Engineer Roger Tym & Partners

Client Yorkshire Forward

Ground Level Hole Type

Description of Strata

Clegend Below G.L. Details Dia TER SCR ROD

Details Dia TER SCR ROD

Hole ID.

VC03

Sheet 1 of 1

Datum Below G.L. Details Dia TER SCR ROD

Details Dia TER SCR ROD

Details Dia TER SCR ROD

Find Install-Details Details

Details

Description of Strata Legend Below G.L. Details Detail
Soft dark grey mottled grey slightly sandy CLAY. Sand is fine and medium. from 0.33m to 0.50m 1 No possible thin bed of brown slightly slifty fine to coarse sand at 0.52m 1 No subrounded coarse gravel sized fragment of chalk Brown and light grey sandy subangular to subrounded fine to medium occasionally coarse GRAVEL of chalk and light brown flint. With low cobble content. Cobbles are subangular to subrounded of chalk and black flint.
Soft dark grey mottled grey slightly sandy CLAY. Sand is fine and medium. from 0.33m to 0.50m 1 No possible thin bed of brown slightly silty fine to coarse sand at 0.52m 1 No subrounded coarse gravel sized fragment of chalk. Brown and light grey sandy subangular to subrounded fine to medium occasionally coarse GRAVEL of chalk and light brown flint. With low cobble content. Cobbles are subangular to subrounded of chalk and black flint.
diff high strength town slightly gravely CLAY. Crave is advantagular to round of feet to medium of chair, scattering and strength of the stren

NOTES: All depths in metres, all diar See header sheet for details For details of abbreviations,		
Form No. SI EXP HOLE LOG		

-	South Humber Channel Marin	ne Studies				Evnl	orato	rv L	Inle	م ا د	a		Hole ID.	
Project No. Engineer	F15842 Roger Tym & Partners					LAPI	orato	·y·	IOIC	LO	9		VC04	
Client	Yorkshire Forward												Sheet 1 of 1	
Ground Level Hole Type			3961.80 E, tical	418126.2	20 N Nat	tional Gr	rid							
		THE HILLIAND VCI	T	ı										
	Description of Strata		Legend	Depth Below G.L.	Datum Level		Sampling Details	Dia.	Sam	nple Re	ecove		In Situ Test Details	Install- ation
	brown slightly gravelly fine to coarse Sarto subrounded fine of chalk.	AND.		0.14	10.93 _		0.14-0.30 0.30-0.55						1 1	
Soft extremely low sandy SILT. Sand is	strength locally firm dark grey slightly fine and medium.			0.65	-11.44								=======================================	
subangular to subro	n slightly silty fine to coarse SAND and bunded fine to coarse GRAVEL of flint ar	nd			- - -								- -	
	1.20m with low cobble content. Cobbles ubrounded of chalk and sandstone	s are		1.40	- 12.19									
Light grey and brov	vn sandy angular to subangular fine to halk, light brown flint and sandstone. Sa	and											- - - - - - - - - - - - - - - - - - -	
Firm to stiff high sti Gravel is subangula light brown flint an	rength brown slightly gravelly CLAY. Ir to subrounded fine to coarse of chalk, d rare sandstone.			2.70	13.49 - - - -		2.85-3.00 3.00-3.25						- - - - - -	
from 3.30m to 4	4.00m stiff. Gravel is fine to medium				- - - -								- - - - -	
at 3.93m and 3. brown fine to m	.97m 2 No persistent thin (<10mm) lens	ses of		4.10	_ 14.89								- - -	
See head	s in metres, all diameters in millimetre er sheet for details of boring, progres s of abbreviations, see key Log Print Date.)10 09·11	:28				•	EΝ	GI	NI	E۱	SOIL	
Form No. SI EXP HOLE LO			ue Date 04/06						Δ trac	ding nam	of VII	VCI Co	nstruction UK Limited	

•	South Humber Chann	nel Marine Studies				Evnl	lorato	rv F	عاما	Loa		Hole ID.	
Project No. Engineer	F15842 Roger Tym & Partners	\$				Σλ	Ισιατο	ıyı	1010	Log		VC05	
Client	Yorkshire Forward											Sheet 1 of 1	
Ground Level Hole Type	-10.01m CD VC	Coordinates Inclination	518797.90 E, Vertical	418551.4	0 N Nat	ional G	rid						
	Description of Stra	ta	Legend	Depth Below	Datum		Sampling	1		w Count Ar ple Recove		In Situ Test	Install-
				G.L.	Level		Details	Dia.		SCR RQD		Details	ation
at 0.85m 1 No p from 0.85m to 1 lenses of fine to Brown and grey slig frequent persistent medium brown san from 3.00m to 3 Grey slightly silty sl Gravel is subangula Stiff very pale grey a	persistent thick lense of blact 1.25m with frequent persisted of medium brown sand shiftly silty fine to coarse SANI thick lenses of black peat and. Slight organic odour. 3.35m very clayey sightly gravelly fine to coarse or to subrounded fine to mediand white sandy gravelly SILT bunded fine to medium of chapters.	ck silty peat ent thin to thick D with nd fine to SAND. ium of chalk. T. Gravel is		3.45 3.70 4.40	-11.26 13.46 13.71 14.41	D001	0.20-0.80 3.00-3.35	Dia.	TCR	SCR RQD		Detdils	ation
See heade	s in metres, all diameters in er sheet for details of borin s of abbreviations, see key Log I		1/2010 09:11					-	E N	CS I NI			•
Form No. SI EXP HOLE LO		Revision No. 1.03	Issue Date 04/06.						A tradi	ing name of VII	NCI Con	nstruction UK Limited	

	South Humber Channel Marin	ne Studies				Evolorata	rv I		Hole ID	
Project No.	F15842					Explorato	чуг	lole Log	VC06	
Engineer Client	Roger Tym & Partners Yorkshire Forward								Sheet 1 of	1
Ground Level Hole Type	-10.25m CD VC	Coordinates 518 Inclination Vert		418399.3	0 N Nat	ional Grid				
	Description of Strata		Legend	Depth Below	Datum	Samplin)	Blow Count An Sample Recove	rv	Install-
			-0.50°X-0.00	G.L.	Level	Details	Dia.	TCR SCR RQD	Details	ation
Soft locally firm gre SILT. Sand is fine to persistent thick (<5 Light brown slightly persistent lenses (< organic odour. Firm brown slightly subangular to round fragments.	brown very silty fine to medium SAND yish brown and dark grey clayey sandy y coarse. With occasional to frequent 0mm) lenses of brown fine to coarse sa y silty fine to coarse SAND with frequer 50mm) of black pseudofibrous peat. S sandy slightly gravelly CLAY. Gravel is ded fine to medium of chalk, flint and s y silty fine to coarse SAND. plete at 5.30 m.	and.		G.L. 0.26 3.20 4.50 4.90 5.30	-10.51 -13.45 -15.15 -15.55	Details B001 0.00-0.40 D002 1.80-2.00 D003 4.50-4.68 L004 4.68-4.90	Dia.	TCR SCR RQD		
See heade	s in metres, all diameters in millimetr er sheet for details of boring, progre s of abbreviations, see key Log Print Date	es. ss and water. And Time: 10/11/20	10 09:12	:02			- 2			ं
Form No. SI EXP HOLE LO			e Date 04/06					A trading name of VIN	NCI Construction UK Limite	ed .

Project Name Project No. Engineer	South Humber Channel Mar F15842 Roger Tym & Partners	ine Studies				Explora	itory I	Hole Log	Hole ID.	
Client Ground Level	Yorkshire Forward -9.81m CD	Coordinates	518384.50 E,	/19520 A	O N Nat	ional Crid			Sheet 1 of 1	1
Hole Type	VC		Vertical	410000.0	oo in inat	ionai Griu				
	Description of Strata		Legend	Depth Below G.L.	Datum Level	Sam		Blow Count An Sample Recover	In Situ Test Details	Install- ation
Soft black and dark	grey slightly sandy CLAY.				 	D001 0.80-	1.00			-
Soft extremely low with frequent persi- peat. (Slight organic	strength brown and dark brown sand stent lenses (<10mm) of black pseud c odour noted).	y CLAY ofibrous		0.90	10.71	D003 1.25-	1.40			
Exploratory hole com	plete at 2.60 m.			2.60	12.41					
See heade	s in metres, all diameters in millime er sheet for details of boring, progi s of abbreviations, see key	tres. ess and water.	/2010 no·12	·18				ENGINI	SOIL	.

Issue Date 04/06/2009

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Form No. SI EXP HOLE LOG

Issue.Revision No. 1.03

	South Humber Channel Mari	ne Studies				Evol	orato	rv L	4010	Log		Hole ID.	
Project No. Engineer	F15842 Roger Tym & Partners					Lxbi	orato	уг	ioie	Lug		VC08	
Client	Yorkshire Forward											Sheet 1 of 1	
Ground Level	-8.91m CD VC		3764.00 E, tical	419127.8	30 N Nati	ional G	rid						
Hole Type	VC	inclination ver	licai										
	Description of Strata		Legend		Datum Level		Sampling		Sam	w Count A		In Situ Test Details	Install- ation
Soft brown mottled	l dark grey sandy SILT. Sand is fine and		×××××	G.L.	_		Details	Dia.	TCR	SCR RQD		_	
medium.	and group surray orem surray or mountains		XXXXX XXXXX XXXXX	0.45	_ _ 9.36							- -	
Light brown and bro	own silty fine to medium SAND.		XXX	0.45	7.30 _ _							- -	
from 0.80m to 0 from 0.92m to 0	0.92m very clayey 0.95m 1 No thin (<30mm) lense of darl	k grey			_ _ 	D001	0.80-1.00					- -	
pseudofibrous p	peat				_ _ _							-	
					- - -	B002	1.70-2.00					- -	
					- - -							_ 	
												-	
	2.75m 5 No persistent thin (<10mm) le	enses of			-	1000	275.000					-	
black amorphou	us peat				- - -	B004	2.75-3.00 3.00-3.20					_ 	
from 3.10m to 4	4.70m with occasional impersistent this s of black amorphous peat	n			- - -	B005	3.00-3.50					- -	
, , , , , ,			X		_							-	
			XXX		-	D006 L007	3.80 4.00-4.15					- -	
					- - -							=	
				4.70	-							- - -	
Exploratory hole com	nplete at 4.70 m.			4.70	13.61 - -							-	
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See heade	s in metres, all diameters in millimet er sheet for details of boring, progre	res. ess and water.						-					45
For detail	s of abbreviations, see key Log Print Date	And Time: 10/11/20	010 09:12	:36				= :::					
Form No. SI EXP HOLE LO			ue Date 04/06						A tradi	ing name of \	VINCI C	onstruction UK Limited	

Project Name	South Humber C	hannel Mari	ne Studies				Гент	lorote	m . I	اما	. l . =		Hole ID.	
	F15842						Expl	lorato	ry F	1016	Log		VC09	
_	Roger Tym & Par													
	Yorkshire Forwa	ıu	Coordinates	518554.70 E	418822	10 N Na+	ional C	rid					Sheet 1 of 1	
	VC		Inclination	Vertical	410022.0	oo iy iyat	ional G	nu						
	Description o	of Strata		Legend	Depth Below G.L.	Datum Level		Sampling Details	Dia.	San	ow Count nple Reco		In Situ Test Details	Install- ation
Reddish brown and Gravel is subrounde lint.	brown slightly gravell ed to rounded fine to c	y fine to coarse S oarse of black	SAND.		0.15	9.66 _	D001	0.15-0.35				•	-	
Soft brown and dark enses (<20mm) of I medium.	k grey sandy CLAY with black amorphous peat	n frequent persis . Sand is fine to	tent			-							- - - -	
slightly gravelly	0.74m 1 No thin bed (fine to coarse sand. G fine to medium of red	ravel is subangu	lar	(XXXX) (XXXX) (XXXX)	1.12	-10.63							-	
	remely low to very low by SILT. Sand is fine and		dark	(***** (******************************			L002	1.65-1.85					- - - -	
Brown and arey slig	htly silty slightly grave	ally fine to coarse	2		2.25			2.05-2.25 2.25-2.40					 - - -	
SAND. Gravel is sub occasionally coarse	rounded to rounded fi	ne to medium			2.70	- - - 12.21							-	
	ick amorphous peat												-	
						-							- - -	
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See heade	s in metres, all diame er sheet for details of s of abbreviations, se	boring, progre	res. ess and water.						-				SOIL	. •
orm No. SI EXP HOLE LO		•	And Time: 10/1	1/2010 09:12 Issue Date 04/0									onstruction UK Limited	_

Project Name	South Humber C	channel Mari	ne Studies					Laurel		1 - 1			Hole ID.	
Project No.	F15842						Ехр	Iorato	ry F	1016	e Log		VC10	
Engineer	Roger Tym & Par													
Client	Yorkshire Forwa	rd	0	F10274 / 0	- 410/71	40 NI NI=41	l C	Sant at					Sheet 1 of 1	
Ground Level Hole Type	-8.86m CD VC		Coordinates Inclination	518374.60 Vertical	_,418671.	40 N Nat	ionai G	ьгіа						
	Description of	of Strata		Legen	Depth Below G.L.	Datum Level		Sampling Details	Dia.	San	ow Coun nple Rec	overy	In Situ Test Details	Install- ation
Soft brown and dark	k grey sandy CLAY. Sar	nd is fine to coar	se.			-	D001	0.20-0.40					-	
					-	-							-	
						-							-	
from 0.80m to 1	1.00m 1 No thin bed o	f soft black silt				_								
						-							-	
from 1.60m to 1	1.80m 1 No thin bed o	f brown slightly	silty			-	L002	1.50-1.70					-	
fine to coarse sa	and				1.90	-10.76	L003	1.90-2.00					-	
Gravel is subangula mudstone, sandstor	ength brown slightly g ir to subrounded fine t	o coarse of chalk	Ç,	<u> </u>	2.25	-11.11	D004	2.25-2.35					-	
from 1.90m to 2 black fine to co	2.20m 2 No coarse gra	vel sized pocket	s of			-							-	
Stiff very pale grey a	and white sandy grave	Ily SILT. Gravel is	<u> </u>			-							=	
		n of chalk.		X X X X	3.20	-12.06								
Exploratory hole com	piete at 3.20 m.					<u>-</u>							-	
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NOTES: All depths	s in metres, all diame	ters in millimet	es.											- A-
See heade	er sheet for details of s of abbreviations, se	boring, progree e key	ess and water. And Time: 10/1	11/2010 09:1	3:18				=	EN		4 E	SOIL ERINE	. 0
orm No. SI EXP HOLE LO	G	Issue.Revision No. 1		Issue Date 04/						A tra	ding name o	f VINCI (Construction UK Limited	

Project No.	South Humber Channel Mari F15842	ne Studies				Explorato	ory F	Hole Log	Hole ID. VC11	
Engineer Client	Roger Tym & Partners Yorkshire Forward									
Ground Level Hole Type	-4.64m CD VC	Coordinates 5182 Inclination Verti		418664.3	0 N Nat	ional Grid			Sheet 1 of 1	
	Description of Strata		Legend	Depth Below G.L.	Datum Level	Samplir Details	g Dia.	Blow Count An Sample Recover	In Situ Test Details	Install- ation
Brown gravelly fine subrounded fine to	to coarse SAND. Gravel is angular to coarse of flint and sandstone.			0.30	- - 4.94	D001 0.30-0.45				
light bluish grey slig	very high strength reddish brown mot ghtly gravelly CLAY. Gravel is ounded fine to coarse of chalk and mu				- - -	D002 0.45-0.55				
pockets of black	1.12m with occasional coarse gravel si k sandy silt. Sand is fine to medium	/		1.12		L004 1.00-1.12 D005 1.12-1.25 D006 1.25-1.35 L007 1.35-1.58				
CLAY. Gravel is suba	h strength brown mottled grey gravell angular to rounded fine to medium rar t, sandstone and mudstone.	y ely			- - - -	D008 2.00-2.20				
Exploratory hole com	plete at 2.20 m.			2.20	- 6.84 - -	2.50 2.20				
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See heade	s in metres, all diameters in millimet er sheet for details of boring, progre s of abbreviations, see key	res. ess and water. e And Time: 10/11/20	10 09:13	·41			E	ENGIN	SOIL	•

Issue Date 04/06/2009

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Form No. SI EXP HOLE LOG

Issue.Revision No. 1.03

Project Name Project No. Engineer	South Humber Channel Mari F15842 Roger Tym & Partners	ne Studies				Explorator	ry Hole Log	Hole ID. VC12	
Client Ground Lovel	Yorkshire Forward -8.58m CD	Coordinates 519	417.00 E	, 419263.9	O AL Mai	tional Crid		Sheet 1 of 1	
Ground Level Hole Type	VC	Coordinates 5186 Inclination Vert		419203.7	U IV IVa	llonai Griu			
	Description of Strata		Legend	Depth Below G.L.	Datum Level		Blow Count An Sample Recover		Install- ation
Reddish brown and Gravel is subrounde chalk.	d brown slightly gravelly fine to coarse : ed to rounded fine occasionally mediur	SAND. In of		0.40	- - 8.98				
coarse. from 0.45m to (and light brown sandy CLAY. Sand is fir 0.50m 3 No medium to coarse gravel s	sized			- - -				
odour noted) at 0.80m 1 No p	ck pseudofibrous peat. (Slightly organic persistent thick lamination (<15mm) of					L001 1.20-1.45			
gravel sized frag from 1.50m to laminations (<1	1.00m 3 No subrounded to rounded co agments of flint 1.70m silty with frequent persistent th 10mm) of black amorphous peat	iick			- - -	D002 1.80-2.00			
chalk from 2.00m to 2	subrounded medium gravel sized fragr 2.40m 1 No thin bed of soft black sligh d is fine to medium				-				
Brown slightly silty	r fine to coarse SAND.			3.90	- - - - 12.48				
	4.30m slightly gravelly. Gravel is suban fine to medium of chalk plete at 4.30 m.	gular		4.30		D004 4.15			
See head	s in metres, all diameters in millimetrer sheet for details of boring, progress of abbreviations, see key Log Print Date	res. ess and water. e And Time: 10/11/20	10 09:14	1:03			ENGINE	SOIL EERING	•
Form No. SLEXP HOLE LO		103 Issue					A trading name of VIA	JCI Construction LIK Limited	

-	South Humber Channel Mari	ne Studies				Evol	orata	rv. I	ماما	Log		Hole ID.	
Project No.	F15842					Expi	orato	уг	ioie	Lug		VC13	
Engineer Client	Roger Tym & Partners Yorkshire Forward											Sheet 1 of 1	
Ground Level	-8.67m CD	Coordinates 518	487.80 E,	419111.7	0 N Nati	onal Gr	id					JICCL T OF T	
Hole Type	VC	Inclination Vert	ical										
	Description of Strata		Legend	Depth Below	Datum		Sampling			/ Count A		In Situ Test	Install-
	Description of Strata		Legend	G.L.	Level		Details	Dia.		CR RQD	SI Y	Details	ation
Sand is fine to coars												-	
	0.30m and 0.70m to 0.80m 2 No persis s of black amorphous peat	tent thin			-							=	
					-	D001	0.80-1.00					-	
					 -							 	
					- -	L002	1.30-1.55					-	
subrounded fine	1.63m with black slightly sandy angula e to medium gravel of chalk and white		* * * * * * * * * * * * * * * *	1.63	-10.30	D003	1.90-2.00					=	
Firm to stiff very ligh	d is fine to coarse ht grey slightly sandy gravelly SILT.		* x x x x * x x x x x * x x x x		-	3000	2.00					-	
Gravel is subangula	r to subrounded fine to medium of cha 2.40m yellowish brown mottled white	lk.	*									=	
from 2.60m to 2	2.70m greenish grey mottled white		* * * * * * * * * * * *									=	
			X X X X X X X X X X X X X X X X X X X			L004	3.00-3.25					=	
White slightly sand	y silty subangular fine to coarse GRAVE	L of	× × × × ×	3.37	_ 12.04 _							=	
light brown staining	ole content. In places with light grey ar g (Possible structureless chalk - Grade	d	* X * * * * * * * * * * * * * * * * * *	3.80	- - 12.47							- - -	
CDc). Exploratory hole com	plete at 3.80 m.											=	
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Form No. SI EXP HOLE LO		And Time: 10/11/20	10 09:14 e Date 04/06						A tradin	g name of V	INCI Co	onstruction UK Limited	
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	South Humber Channel Mar	ine Studies					a . I	Jole Lee		Hole ID.	
Project No.	F15842					Explorato	Уŀ	Hole Log		VC14	
Engineer Client	Roger Tym & Partners Yorkshire Forward										
Ground Level	0.26m CD	Coordinates 518	3097.40 E,	418655 3	O N Nati	ional Grid				Sheet 1 of 1	
Hole Type	VC		tical			orial oria					
	Description of Strata		Legend		Datum Level	Sampling		Blow Count Ar Sample Recove	nd ery	In Situ Test Details	Install- ation
				G.L.	20101	Details D001 0.00-0.25	Dia.	TCR SCR RQD		Details	ution
ounded fine to coa ine to coarse.	ey slightly sandy very clayey subangula erse GRAVEL of sandstone and chalk. S	ir to and is		0.25	0.01	L002 0.25-0.48				- - - -	
gravelly CLAY. Sand ounded fine to me	ength brown slightly sandy slightly I is fine to coarse. Gravel is subrounde dium of chalk, sandstone, flint and	d to			- - -	D003 0.80-1.00 L004 1.00-1.15				- - -	
nudstone. at 0.65m decon	nposed wood (<10mm)					L004 1.00-1.15				- - -	
				1.80	- - 1.54	D005 1.60-1.80				- - -	
xploratory hole com	plete at 1.80 m.									_ _ _	
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See heade	s in metres, all diameters in millimet er sheet for details of boring, progr s of abbreviations, see key	res. ess and water.					-	ENGIN	-	SOIL	•
and No CLEVID LIGHT	-	e And Time: 10/11/20									_
orm No. SI EXP HOLE LO	G Issue.Revision No.	1.03 lss	ue Date 04/06	/2009				A trading name of VI	INCI Consti	ruction UK Limited	

	South Humber Channel M	arine Studies				Evol	lorato	rv L	ماما	Log		Hole ID.	
Project No. Engineer	F15842 Roger Tym & Partners					LXPI	orato	ут	1016	Log		VC15	
Client	Yorkshire Forward											Sheet 1 of 1	
Ground Level Hole Type	-8.63m CD VC	Coordinates Inclination	518470.80 E, Vertical	419399.9	0 N Nati	ional G	rid						
	Description of Strata		Legend	Depth Below G.L.	Datum Level		Sampling Details	Dia.	Sam	w Count Apple Recov		In Situ Test Details	Install- ation
Reddish brown and to coarse SAND. Gra of white gastropods	brown slightly gravelly slightly silt avel is subrounded to rounded fine	y fine to medium		0.26	-8.89		0.30-0.40						
Soft to firm brown a coarse.	and dark brown sandy CLAY. Sand is .49m 2 No persistent thick (<30mn				-							-	
laminations of b	plack amorphous peat gth dark brown very sandy CLAY wit			1.30	 _ 9.93	L002	1.30-1.55					 - - -	
persistent thick lam	ninations of black amorphous peat.				- - -	D003	1.80-2.00					-	
Dark grey and brow	n sandy very silty angular to suban EL of flint and chalk. Sand is fine to	gular		2.20 2.36	- 10.83 10.99		2.15-2.25 2.36-2.50					- - - -	
coarse.	subangular to subrounded coarse g			2.60	- 11.23 - -							-	
Dark brown clayey of coarse GRAVEL of communication of the communication	very sandy subangular to subround halk and rare flint. Sand is fine to c uplete at 2.60 m.	ed fine to oarse.											
	s in metres, all diameters in millir												
See head	er sheet for details of boring, pro s of abbreviations, see key		11/2010_09·14	:49				=	ΞN	GIN		SOIL BRING	. •
Form No. SI EXP HOLE LO			Issue Date 04/06						A trad	ling name of \	/INCI Co	onstruction UK Limited	

Project Name South Humber Channel Marine Studies
Project No. F15842
Engineer Roger Tym & Partners

Hole ID.

VC16

Ground Level -7.87m CD Coordinates 518210.60 E, 419095.60 N National Grid

Hole Type VC								
Description of Strata	Legend	Depth Below G.L.	Datum Level	Sampling Details	Dia.	Blow Count And Sample Recovery	In Situ Test Details	Install- ation
Reddish brown and brown slightly gravelly very clayey fine coarse SAND. Gravel is subrounded to rounded fine occas (medium of chalk.					Dia.	TON JON NOD		
Firm to stiff brown mottled dark grey gravelly CLAY. Grave subangular to subrounded fine to medium occasionally coof chalk, sandstone and flint.								
	× × × × ×							
Very stiff, very high strength, grey mottled light brown slightly sandy clayey gravelly SILT. Gravel is subangular to subrounded fine to medium of chalk.								
	* * * * * * * * * * * * * * * * * * *							
	X X X X X X X X X X X X X X X X X X X							
Exploratory hole complete at 3.40 m.	* * * * * * * * * * * * * * * * * * *							

NOTES: All depths in metres, all diame See header sheet for details of For details of abbreviations, se			SOIL O
Form No. SI EXP HOLE LOG	Issue.Revision No. 1.03	Issue Date 04/06/2009	A trading name of VINCI Construction UK Limited

Client Vorkshire Forward Vorkshire Forward Coordinates Foliand Event Description of Strata Description of Str		outh Humber Channel 15842	Marine Studies				lax3	orato	rv H	Hole Log	Hole ID	
Stream Level — 0.4 dam CD — Coordinates Inclination Coordinates Description of Strets D							ı		,	3	VC17	
Description of Strata Logond Displin Di											Sheet 1 of	1
Description of Strate (Legend Below Substitution of July Sample Recovery Details) (Legend Below Substitution of Legend Below Substitution of July Sample Recovery Details Substitution of Legend Below Substitu					418943.5	0 N Nat	tional Gr	rid				
ins automated fine to medium of chalt. Sand is fine with nave couches of greening reciperage (2007). If the bown sandy gravely CARY Sand is fine to coase, Cravel such gravely country from the coase, Cravel and Sandstone. From 0.22m to 0.35m 1 No very thin bed of firm brown sandy cole; Sand is fine to medium. In case is subangular to more 0.21m to 1.05 m and you can be come of the coase sand medium. Is cravel is subangular to more 1.02m to 1.00m sandy. Care of Subangular to Subrounded fine and medium of chalk. Subcreativy hole complete at 4.10 m. NOTES All depths in metres all diameters in millimetres. See header sheet or details of forting, progress and water.		Description of Strata		Legend	Below					Sample Recove		Install- ation
subsequent ros subtravaded fine to medium of chalk, filing and sandstone, from 0.32m 1 No very thin bed of firm brown sandy ctuy, Sand is fine to medium. Gravel is substragilar to councied fine to medium of chalk, sandstone, filing and councied fine to medium of chalk. Sands fisme and medium. Gravel is substragilar to councied fine sand medium of chalk. Sands fisme and medium of chalk councied fine and medium of chalk. Gravel is substrauded fine and medium of chalk. Saphanatry hole complete at 4.10 m. A100 - 18.54 A100 - 18.54 A100 - 18.54 ANDES. All dophts in metres, all diameters in millimetres. See header sheet for details of borning, progress and water.	unded fine to n	medium of chalk. Sand is fine	ubangular e with rare		0.20	- 6.64 -						-
Lip, Sand is fine to medium. If the most interest is subsequent to counted fine to medium of chalk. Save it subsequent to counted fine to medium of chalk. Save it subsequent to counted fine to medium of chalk. Save it subsequent to counted fine to medium of chalk. Save it subsequent to counted fine and medium of chalk. Save it subsequent to counted fine and medium of chalk. Save it subsequent to subsorpted fine and medium of chalk. Granel is subsequent to subsorpted fine and medium of chalk. Sapieratory hole complete at 4.10 m. And the provided fine and medium of chalk. And the provided fine and medium of chalk. Sapieratory hole complete at 4.10 m.	gular to subrou	velly CLAY. Sand is fine to coa unded fine to medium of cha	rse. Gravel lk, flint		0.82	- - - 7.26	D003	0.60-0.80				- - - -
CLAYS and is fine and medium. Grove it is subangular to consult of the time factors. (find and musistonic mid and musistonic mi	0.32m to 0.35 Sand is fine to	o medium				- - - -						- - -
clayer fine to coarse sand from 2.39 m to 2.62 milght grey mottled brown and gravelly. Gravel is subangular to subrounded fine and medium of chalk Exploratory hole complete at 4.10 m. Exploratory hole complete at 4.10 m. Exploratory hole complete at 4.10 m.	nd is fine and r fine to mediur ie. 0.90m to 1.00	medium. Gravel is subangula im of chalk, sandstone, flint a Om sandy	ar to nd			- - - - -						-
NOTES: All depths in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.	ey fine to coars 2.39m to 2.62	se sand 2m light grey mottled brown	and gravelly.			- - - - -						-
NOTES: All depths in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.												- - - - - - - -
NOTES: All depths in metres, all diameters in millimetres. See header sheet for details of boring, progress and water.	ny holo complet	to at 4.10 m			4.10	- - - 10.54						
See header sheet for details of boring, progress and water.						-						
See header sheet for details of boring, progress and water.						-						-
See header sheet for details of boring, progress and water.												-
See header sheet for details of boring, progress and water.						-						-
See header sheet for details of boring, progress and water.												
For details of abbreviations, see key	See header sl	sheet for details of boring, ¡ f abbreviations, see key	orogress and water.						Ę	ENGIN	SOII	
Log Print Date And Time: 10/11/2010 09:15:17 Form No. SI EXP HOLE LOG Issue.Revision No. 1.03 Issue Date 04/06/2009 A trading name of VINCI Construction L	EXP HOLE LOG	•								A trading name of VIN	NCI Construction UK Limite	ed

Hole Type VC	Inclination Vert								
Description of Strata		Legend	Depth Below G.L.	Datum Level	Sampling Details	Dia.	Blow Count And Sample Recovery	In Situ Test Details	Install- ation
Very soft dark greenish brown sandy CLAY. Sand is fine to						Dia.	TCR SCR RQD		
medium. Brown gravelly very clayey fine to coarse SAND. Gravel is angular to subangular fine and medium of flint, chalk and				0.24					
mudstone. Firm brown slightly gravelly sandy CLAY. Sand is fine to									
coarse. Gravel is angular to subangular fine and medium of flint and chalk.									
from 1.75m to 2.00m medium strength									
from 3.10m to 3.20m stiff									
Stiff locally firm brown slightly gravelly CLAY. Gravel is subrounded to rounded fine and medium of chalk, flint, sandstone and mudstone.			4.30 4.70	3.70 - - 4.10					
Firm brown slightly gravelly sandy CLAY. Gravel is subang to subrounded fine to coarse of chalk, flint and sandstone sand is fine to coarse.			5.20						
Exploratory hole complete at 5.20 m.		<i>.</i>							

NOTES: All depths in metres, all diame See header sheet for details of For details of abbreviations, se	f boring, progress and water.		SOIL O
	Log Print Date And Time: 10/1	1/2010 09:15:32	
Form No. SI EXP HOLE LOG	Issue.Revision No. 1.03	Issue Date 04/06/2009	A trading name of VINCI Construction UK Limited

Project Name Project No.	South Humber Channel Mari F15842	ne Studies				Explorator	~y	lole Log	Hole ID.	
Engineer	Roger Tym & Partners					•	,	3	VC19	
Client	Yorkshire Forward								Sheet 1 of 1	
Ground Level Hole Type	1.95m CD VC	Coordinates 517 Inclination Vert		418707.1	0 N Nat	tional Grid				
	Description of Strata		Legend	Depth Below G.L.	Datum Level	Sampling Details	Dia.	Blow Count An Sample Recover	In Situ Test Details	Install- ation
slightly sandy silty of fine and medium so organic odour noted from 1.00m to fine and medium. Soft very low streng gravelly CLAY. Sand subrounded fine to Firm brown mottled Sand is fine to coars of mudstone, sands from 1.78m to to coarse sand.	ckly laminated brown and dark grey CLAY with some pockets (10-60mm) o and. Sand is fine and medium. (Slight d). 1.26m slightly gravelly. Gravel is angul m of flint ght grey and brown slightly sandy sligh d is fine to coarse. Gravel is subangular medium of chalk and flint. d grey slightly sandy slightly gravelly Cl se. Gravel is subangular fine to coarse stone, chalk and flint. 1.86m 1 No pocket (80mm) of grey cla gth brown slightly sandy slightly grave to coarse. Gravel is angular to subrounc alk, chert , flint and mudstone.	ar tly to .AY. yey fine			Level	Details D001 0.00-0.35 B002 0.35-1.00 D003 1.00-1.26 L004 1.26-1.52 L005 1.52-1.64 D006 1.65-1.80 D007 1.80-2.00 L008 2.90-3.00	Dia.		Details	ation
See heade	s in metres, all diameters in millimet er sheet for details of boring, progre s of abbreviations, see key Log Print Date	res. ess and water. And Time: 10/11/20	10 09:15	:47			E	NGINE	SOIL	•
Form No. SI EXP HOLE LO			e Date 04/06					A trading name of VIN	NCI Construction UK Limited	

Project Name	South Humber Channel Mar	ine Studies				Г I			lala laa	Hole I	D.
Project No.	F15842					Ехрі	orato	ry F	Hole Log	VC20	1
Engineer	Roger Tym & Partners									V C Z (J
Client	Yorkshire Forward									Sheet 1 c	of 1
Ground Level	2.15m CD	Coordinates	517746.10 E,	418845.2	0 N Nat	ional Gr	id				
Hole Type	VC	Inclination	Vertical								
				Depth	Б.	Т	0 "		Blow Count An	nd 1 00 T	.
	Description of Strata		Legend	Below	Datum Level		Sampling		Sample Recover		Install- ation
				G.L.	LCVCI		Details	Dia.	TCR SCR RQD	Details	ation
	mottled brown silty CLAY with some I vn clayey fine and medium sand. (Orga		××		- -						=
noted).	olayoy ililo alla ililoalalli oalla (engi		<u> </u>			D001	0.30-0.70]
			×_*_×		-						=
			××		_	D002	1.00-1.15				_
			<u> </u>		- -						-
f 1 45 t	1.70		XX		_ _ _	L003	1.45-1.70				3
Irom 1.45m to	1.70m extremely low strength		xx		<u>-</u>	1004	1.77-2.00				=
from 1.77m to 2	2.00m with some shell fragments		×		_	2004	1.77 2.00				_
Soft to firm groupil	ty CLAY with many pockets of black			2.20	-0.05]
pseudofibrous peat	t. (Organic odour noted).		x_ ×_ ×	2.50	_ 0.35						=
Firm brown sandy o	organic CLAY with many pockets (60-8 material. Sand is fine.	30mm) of		2.80	- - 0.65						=
	mottled grey slightly sandy slightly		/ <u> </u>		_						4
gravelly CLAY. Sand	d is fine to coarse. Gravel is subanguland medium of chalk, flint and mudstor	r to			_						=
at 2.87m 1 No	pocket (20mm) of black fibrous peat				_	D005	3.60-3.80				=
	pocket (50mm) of grey fine and medi		1 2	3.80	- 1.65	2003	3.00 3.00				=
Exploratory hole com	nplete at 3.80 m.										
					-						=
					_						-
					-						7
					_						
					-						7
					_]
					-						<u> </u>
					_						-
					-						3
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					- - -						3
					- -						7
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					_						3
					- -						=
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					- -						=
					_						=
					_						-
NOTES: All depths	s in metres, all diameters in millime	tres.									
See head	er sheet for details of boring, progr is of abbreviations, see key	ess and water.								SOL	L •
i or uctall	·	e And Time: 10/	11/2010 09:16	:01				Ę	ENGINE	ZERIN	C3

Issue Date 04/06/2009

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Issue.Revision No. 1.03

Form No. SI EXP HOLE LOG

Project Name Project No. Engineer Client	South Humber Channel Mari F15842 Roger Tym & Partners Yorkshire Forward	ine Studies					Explorato	ry F	lol€	e Lo	g	Hole ID. VC21 Sheet 1 of 1	
Ground Level Hole Type	1.30m CD VC	Coordinates Inclination	5178 Vertic		418927.4	10 N Nat	ional Grid					0.1000, 1.01.	
	Description of Strata			Legend	Depth Below G.L.	Datum Level	Sampling Details	Dia.	San	ow Cou nple Re	ecove	In Situ Test Details	Install- ation
Very soft thickly lar odour noted.	minated dark grey and brown CLAY. Or	ganic]-[-[-]- [-[-]-[-			D001 0.00-0.50						

Description of Strata	Legend		Datum Level	Sampling		Blow Count And Sample Recovery	In Situ Test Details	Install- ation
		G.L.	20101		Dia.	TCR SCR RQD	Dotalis	
Very soft thickly laminated dark grey and brown CLAY. Organic	EEE							
odour noted.								
	E-E-E							
	I-I-I						_	
from 1.15m to 1.25m with some lenses of brown clayey fine								
sand (20-45mm)		1.50	0.20					
Soft to firm low strength brown CLAY with many medium to coarse gravel sized pockets (5-20mm) of black and brown kelp,				L002 1.75-2.00				
seaweed and plant remains. (Strong organic odour noted).	<u> </u>			D003 2.00-2.40				
	<u> </u>			D003 2.00-2.40				
	E===							
6 0/0 1 0/0 11/1 1 1 1 1 1 1 1 1 1 1 1 1								
from 2.60m to 2.68m thick laminations of reddish brown and light brown decayed plant matter				L004 2.88-3.00				
from 2.88m to 3.00m sandy to very sandy		3.10	 1.80	D005 3.10-3.30				
Firm to stiff high strength brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to				L006 3.32-3.62				
graveiry CLAY. Sand is fine to coarse. Graver is subangular to subrounded fine and medium of chalk, flint, mudstone and				2000 0.02 0.02				
chert.								
from 3.85m to 4.00m very clayey fine and medium sand								
from 4.42m to 4.55m sandy with some pockets (50mm) of clayey fine and medium sand								
	享奉卓	4.80						
Exploratory hole complete at 4.80 m.								
							_	

NOTES: All depths in metres, all d See header sheet for deta For details of abbreviation	nils of boring, progress and wa	ter.	SOIL (•
	Log Print Date And Time	10/11/2010 09:16:18		
Form No. SI EXP HOLE LOG	Issue.Revision No. 1.03	Issue Date 04/06/2009	A trading name of VINCI Construction UK Limited	

Description of Strata				
Very soft to soft dark grey and brown sandy SILT. Sand is fine. (Organic odour noted).				
Brown fine and medium SAND.				
Very soft dark grey slightly sandy clayey SILT. Sand is fine. (Organic odour noted).				
Firm to stiff high strength brown slightly sandy slightly				
gravelly CLAY. Sand is fine to coarse, Gravel is subangular to subrounded fine and medium of flint, chalk and mudstone.				
Subrounded fine and mediant of mint, chark and mediatoric.				
Firm to stiff brown mottled grey and white slightly sandy gravelly CLAY. Sand is fine to coarse. Gravel is subangular to				
subrounded fine to coarse of chalk. (Transitional boundary)				
Stiff light greyish brown sandy gravelly CLAY. Gravel is				
subangular to subrounded fine to medium of chalk.				
Exploratory hole complete at 3.60 m.				



Project Name South Humber Channel Marine Studies
Project No. F15842
Engineer Roger Tym & Partners

Client Verkshire Forward

Hole ID.

VC23

Ground Level -3.87m CD Coordinates 517787.30 E, 419215.60 N National Grid

note type vo inclination vert				
Description of Strata				
Firm to stiff medium strength brown slightly sandy slightly		D001 0.00-0.45		-
Firm to stiff medium strength brown slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to rounded fine to coarse of chalk, chert, flint and mudstone.				
rounded fine to coarse of chalk, chert, flint and mudstone. from 0.25m to 0.40m sandy				
Hom 6.25m to 6.46m Sandy				
from 1.70m to 2.00m low strength				
				-
from 2.88m to 3.00m 1 No subrounded cobble of sandstone				
(120mm)				
Forders had a consider at A FF as				
Exploratory hole complete at 3.55 m.				
				-
				-

NOTES: All depths in metres, all diame See header sheet for details of For details of abbreviations, se			- SOIL O
Form No. SI EXP HOLE LOG	Issue.Revision No. 1.03	Issue Date 04/06/2009	A trading name of VINCI Construction UK Limited

Project Name Project No.	South Humber Channel Marin F15842	ne Studies				Exploratory Hole Log						Hole ID.		
Engineer	Roger Tym & Partners											VC24		
Client Ground Level	Yorkshire Forward 1.14m CD	Coordinates	517657.20 E,	410042.4	O NI Nighti	ional Ci	rid				_	Sheet 1 of 1		
Hole Type	VC VC	Inclination	Vertical	419003.4	O IN INALI	orial Gi	iiu							
	Description of Strata		Legend	Depth Below	Datum Level		Sampling			ow Count A		In Situ Test Details	Install- ation	
				G.L.			0.00-0.50	Dia.	TCR	SCR RQD		Detuiis	ution	
odour)	slightly sandy silty CLAY. (Strong organ				-	B002	1.00-1.50							
from 1.50m to gravel of flint ar	1.58m with occasional subrounded me	dium		1.58	- 0.44	L004	1.70-2.00					- -		
Firm to stiff mediur	n strength brown slightly sandy slightly I is fine to coarse. Gravel is subangular	y ***			- - 	L005	2.00-2.16					-		
rounded fine and m mudstone.	nedium of chalk, flint, chert, sandstone			2.40	- - 1.26	B006	2.40-3.00					-		
from 2.20m to 2 Firm to stiff brown	•				- - -							- -		
from 3.10m to 3 coarse sand	3.27m 1 No thin bed of brown clayey fi	ne to			- - - -	D007	3.00-3.30					-		
Exploratory hole com					-2.46									
See head	s in metres, all diameters in millimetr er sheet for details of boring, progre s of abbreviations, see key							-					. •	
Form No. CLEVE HOLE:		And Time: 10/1							A.	ding reserved	(INOL C	potruotica III/ Link		
Form No. SI EXP HOLE LO	G Issue.Revision No. 1	.03	Issue Date 04/06/	2009					A trac	aing name of \	VINCI Co	nstruction UK Limited		

Project No.	South Humber Channel Mari F15842	ne Studies				Explorator	y Hole Log	Hole ID. VC25	
Engineer Client	Roger Tym & Partners Yorkshire Forward							Sheet 1 of 1	
Ground Level Hole Type	1.53m CD VC	Coordinates 5179 Inclination Verti		419199.5	0 N Nat	ional Grid			
	Description of Strata		Legend	Depth Below G.L.	Datum Level	, ,	Blow Count An Sample Recover Dia. TCR SCR RQD	v	nstall- tion
Very soft dark grey	CLAY. (Organic odour noted).		I-I-I I-I-I- I-I-I-I	0.55	- - - - - 0.98	D001 0.00-0.40 D002 0.55-0.80		-	
gravelly CLAY with on clayey fine and med subangular to subro	rength brown slightly sandy slightly occasional pockets (10-40mm) of brow dium sand. Sand is fine to coarse. Graw ounded fine to medium of chalk and	vn el is		0.00	- 0.70 - - -	L003 0.89-1.00 L004 1.00-1.30			
(possibly drilling	0.88m 1 No very thin bed of grey silt g induced) ine to coarse SAND and subangular to			1.32	0.21	D005 1.32-1.70			
subrounded fine to Firm to stiff brown s rare pockets (10-30 fine to coarse. Grave coarse of chalk, flin	coarse GRAVEL of chalk and flint. slightly sandy slightly gravelly CLAY wi Dmm) of brown fine and medium sand. el is subangular to rounded fine to it, chert and sandstone. 2.10m with occasional thick laminatior	Sand is		1.95	- - - - - - - - - - - - -				
Exploratory hole com	plete at 3.17 m.			3.17	-1.64				
See heade	s in metres, all diameters in millimetr er sheet for details of boring, progre s of abbreviations, see key	res. ess and water.					-	SOIL'	•
- Tor dotain		e And Time: 10/11/20	10 09:17:	:16			ENGIN	EERING	-

Project Name Project No.	South Humber Channel Ma F15842	arine Studies				Exp	lorato	ry F	Hole	Log		Hole ID.	
Engineer	Roger Tym & Partners												
Client Ground Level Hole Type	Yorkshire Forward -3.54m CD VC		517640.20 E, Vertical	419351.6	0 N Nat	ional G	rid					Sheet 1 of 1	
	Description of Strata		Legend	Depth Below G.L.	Datum Level		Sampling Details	Dia.	Samp	Count Ar le Recove		In Situ Test Details	Install- ation
Fravel is subangula lint. Firm brown silty slig ine to coarse of mu Grey slightly sandy Sand is fine to coars chalk, mudstone an stiff medium streng dightly gravelly CL	inated grey slightly gravelly silty CLAr fine to coarse of chalk, mudstone ghtly gravelly CLAY. Gravel is subangulatione, chalk and flint. slightly gravelly clayey organic SILT. se. Gravel is subangular fine to coard flint. gth brown thinly laminated slightly stay. Sand is fine to coarse. Gravel is coarse of sandstone, chalk, flint and	gular			-4.59 -4.80 -4.94	D001	Details 0.00-0.40 1.05-1.20 1.40-1.52 1.52-1.72	Dia.				Details	ation
												-	
See heade	s in metres, all diameters in millim er sheet for details of boring, proj s of abbreviations, see key	etres. gress and water.						-	- 5.1	215.0		SOIL	•
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orm No. SI EXP HOLE LO	G Issue.Revision N	0. 1.03	Issue Date 04/06	/2009					A trading	g name of VII	NCI Co	nstruction UK Limited	

Project Name Project No.	South Humber Channel Mari F15842	ne Studies				Expl	orator	ˆy ⊢	lole Log	Hole II	
Engineer	Roger Tym & Partners									VC2	
Client	Yorkshire Forward									Sheet 1 c	f 1
Ground Level Hole Type	-5.57m CD VC	Coordinates 5179 Inclination Vert		419638.2	0 N Nat	ional Gr	·id				
	Description of Strata		Legend	Depth Below G.L.	Datum Level		Sampling Details	Dia.	Blow Count An Sample Recover	In Situ Tes Details	t Install- ation
Brown clayey very g subangular fine to c	gravelly fine to coarse SAND. Gravel is coarse of chalk.			0.45	- - - - - -		0.00-0.45				
gravelly CLAY, Sand	n to high strength slightly sandy slightl I is fine to coarse. Gravel is subangular nt, mudstone and chalk.	у	ALACA ALACA ALACA ALACA ALACA ALACA ALACA ALACA ALACA Alaca alaca a	4.90	-6.02	L003	0.45-0.53 0.53-0.83				
											=
NOTES: All denths	s in metres, all diameters in millimet	res.									
See heade	er sheet for details of boring, progre s of abbreviations, see key	ess and water. And Time: 10/11/20	10 09:17	:44				=	ENGINE	SOI	L 今
Form No. SI EXP HOLE LO			Date 04/06						A trading name of VIN	NCI Construction UK Lim	ted

Project Name South Humber Channel Marine Studies
Project No. F15842
Engineer Roger Tym & Partners

Exploratory Hole Log

VC28

Ground Level -5.74m CD Coordinates 517643.10 E, 419485.60 N National Grid

Hole Type VC IIII			
Description of Strata			
Soft brown slightly sandy slightly gravelly CLAY. Sand is fine			
to coarse. Gravel is subangular fine to coarse of chalk, mudstone and flint.			
from 0.50m to 0.70m low to medium strength			
Stiff to very stiff brown slightly sandy slightly gravelly			
CLAY. Sand is fine to coarse. Gravel is subangular fine to coarse of chalk, mudstone and flint.			
from 3.00m to 3.40m mottled grey			
from 4.08m high strength			
Exploratory hole complete at 4.30 m.			

	SOIL ◆

Project Name	South Humber Channel Mar			Hole ID.
Project No.	F15842		Exploratory Hole Log	VC29
Engineer	Roger Tym & Partners			VC29
Client	Yorkshire Forward			Sheet 1 of 1
Carrial Laval	0.54 0.0	O	-til Coid	

Hole Type VC	Inclination Vert								
Description of Strata		Legend	Depth Below G.L.	Datum Level	Sampling Details	Dia.	Blow Count And Sample Recovery	In Situ Test Details	Install- ation
Very soft grey slightly sandy CLAY.			O.L.		D001 0.00-0.50 D002 0.50-0.90	Dia.	TOK JOK ROD	- - - - -	
Firm to stiff high strength brown slightly sandy slight gravelly CLAY. Sand is fine to coarse. Gravel is subang fine to medium locally coarse of chalk, flint and muds	ly ular ttone.		0.90	1.46 1.46 	L003 1.00-1.10 B005 1.00-2.00 L004 1.42-1.70 D006 2.00-2.25 D007 2.25-2.50				
Exploratory hole complete at 2.90 m.			2.90	-3.46					

NOTES: All depths in metres, all diame See header sheet for details of For details of abbreviations, se	SOIL O		
Form No. SI EXP HOLE LOG	Issue.Revision No. 1.03	Issue Date 04/06/2009	A trading name of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies
Project No. F15842
Engineer Roger Tym & Partners

Client Variables Featured

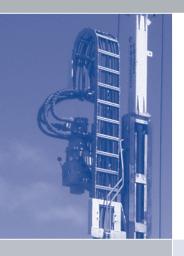
Hole ID.

VC30

Ground Level -6.30m CD Coordinates 517406.00 E, 419761.90 N National Grid

Hole Type						
		Legend				
Soft to firm grey and						
Gravel is subangula						
from 0.00m to 0						
from 0.65m to 1						
		<u> </u>				
Stiff brown slightly:						
fine to coarse. Grave flint and mudstone.						
from 1.83m to 2						
Exploratory hole com						

NOTES: All depths in metres, all diame See header sheet for details o For details of abbreviations, se	SOIL O		
Form No. SI EXP HOLE LOG	Issue.Revision No. 1.03	Issue Date 04/06/2009	A trading name of VINCI Construction UK Limited



SUPPORTING FACTUAL DATA

SECTION C Laboratory Testing

HAND SHEAR VANE TEST RESULTS





Project Name South Humber Channel Marine Studies Project No. F15842					udies			etrometer Pisturbed es	Hole ID VC01
Enginee		ger Tym &							Table No.
Client	Yo	Yorkshire Forward							1
Depth m	Sample R	Sample ef Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.06 0.06 0.06			0.06 0.15 0.18	01 02 03	2 2 3 3	0 0 1		19/07/2010 19/07/2010 19/07/2010	
material			rbed sample					situ	SOIL O ENGINEERING
Form No.	SE-IS	T-F-016	Revision No.	1.01	Issue Date	29/01/20	010		Part of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies Project No. F15842					udies		lts for D	etrometo Disturbed		
Engineer		er Tym & I	Partners				Sampl	es		Table No.
Client		kshire For								
										2
Depth m	Sample Re	Sample f Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date		Remarks
0.00 0.00 4.00 4.00 4.00			0.15 0.24 0.42 4.69 4.84 5.00	01 02 03 01 02 03	4 3 98 100 85	3 1 1 32 31 36		20/07/203 20/07/203 20/07/203 20/07/203 20/07/203	1.0 1.0 1.0	
Note: Test material	ts carried o	ut on distu	rbed sample	s will not r	reflect the s	hear streng	th of the in	situ		soil •
Form No.	SI DVF	P Revisi	on No. 1.01	Issu	e Date 29/	/01/2010				ne of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies Project No. F15842					udies			etromete Disturbed			
Engineer	Rog	ger Tym & I	Partners				Janipi		Table No.		
Client	Yor	kshire For	ward						3		
Depth m	Sample Re	Sample f Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks		
0.00 0.00 0.00			0.28 0.39 0.50	01 02 03	3 2 2 2			20/07/2010 20/07/2010 20/07/2010			
Note: Test	ts carried c	ut on distu	rbed sample	s will not r	eflect the s	hear streng	th of the in	situ			
material Form No.	SI DV		on No. 1.01			/01/2010			ENGINEERING A trading name of VINCI Construction UK Limited		

Project Name South Humber Channel Marine Studies Project No. F15842					udies		lts for D	etrometo Disturbeo			
Engineer	Ro	ger Tym & I	Partners				Sampl	es		Table No.	
Client	You	kshire For	ward							4	
		Sample		Test		Residual	Penetro-				
Depth m	Sample Re	ef Type	Test Depth m	Number	Peak Vane kPa	Vane kPa	meter kPa	Date		Remarks	
0.00 0.00 0.00 0.00 0.00			0.18 0.21 0.26 0.36 0.60 0.64	01 02 03 01 02 03	5 5 4 5 4 4	4 4 3 2 2 3		20/07/20: 20/07/20: 20/07/20: 20/07/20: 20/07/20:	1.0 1.0 1.0		
material	ts carried (rbed sample	s will not r	eflect the s	hear streng	oth of the in	situ	ENGI	SOIL ? NEERING	
Form No.	SI DV	P Revisi	on No. 1.01	Issu	e Date 29/	/01/2010			A trading name	of VINCI Construction UK Limited	

Project Name South Humber Channel Marine Studies Project No. F15842					udies		lts for D	etrometo Disturbed			
Engineer	Rog	jer Tym & I	Partners				Sampl	162		Table No.	
Client	Yor	kshire For	ward							5	
Depth m	Sample Re	Sample f Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date		Remarks	
0.00 0.00 4.00 4.00 4.00			1.00 1.00 4.00 4.05 4.10	01 02 03 01 02 03	4 4 4 66 40 30	1 0 6 10 10		20/07/20: 20/07/20: 20/07/20: 20/07/20: 20/07/20:	10 10 10		
Note: Tes material	ts carried o	ut on distu	rbed sample	s will not i	reflect the s	hear strenç	l gth of the in	ı situ	ENGI	SOIL O	
Form No.	SI DV	P Revisi	on No. 1.01	Issu	e Date 29	/01/2010			A trading name of	of VINCI Construction UK Limited	

Project Name South Humber Channel Marine Studies Project No. F15842					udies			etromete Disturbed les	
Enginee		ger Tym & I							Table No.
Client	Yo	rkshire For	ward						6
Depth m	Sample R	Sample ef Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.00 0.00 0.00			1.00 1.00 1.00	01 02 03	4 4 3			20/07/2010 20/07/2010 20/07/2010	0
material		out on distu					th of the in	ı situ	SOIL • ENGINEERING
Form No.	SI D\	/P Revisi	on No. 1.01	Issu	e Date 29	/01/2010			A trading name of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies Project No. F15842 Engineer Roger Tym & Partners					udies			etromete Pisturbed Jes	VC07
Engineer Client		er Tym & F shire For							Table No.
00									7
Depth m	Sample Ref	Sample Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.00 0.00 2.00 2.00 2.00			0.90 0.90 1.00 2.45 2.48 2.50	01 02 03 01 02 03	2 2 4 4 3	0 1 0 1 2 0		21/07/2010 21/07/2010 21/07/2010 21/07/2010 21/07/2010	
material	ts carried o		rbed sample	s will not r	eflect the s	hear streng	th of the in	situ	SOIL • ENGINEERING
Form No.	SI DVP	Revisi	on No. 1.01	Issue	e Date 29/	/01/2010			A trading name of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies Project No. F15842					udies			etromete Disturbed les	VC08	
Engineer		ger Tym & I							Table No.	
Client	Yo	rkshire For	ward						8	
Depth m	Sample R	Sample ef Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks	
0.00 0.00 0.00			0.26 0.26 0.26	01 02 03	5 8 8	3 5 7		21/07/2010 21/07/2010 21/07/2010	0	
material			rbed sample				th of the in	ı situ	SOIL O ENGINEERING	
Form No.	SI D\	/P Revisi	ion No. 1.01	Issu	e Date 29.	/01/2010			A trading name of VINCI Construction UK Limited	

Project Name South Humber Channel Marine Studies Project No. F15842					udies		lts for D	etromet Disturbed		Hole ID VC09
Engineer		ger Tym & I	Partners				Sampl	es		Table No.
										Table No.
Client	Yo	rkshire For	ward		T.					9
Depth m	Sample R	Sample ef Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date		Remarks
0.00 0.00 0.00 0.00 0.00			0.30 0.32 0.80 0.80 0.82	01 02 03 01 02 03	4 4 4 3 2 2 2	3 1 0 1 1		21/07/20: 21/07/20: 21/07/20: 21/07/20: 21/07/20:	10 10 10 10	
Note: Tes material	ts carried	out on distu	rbed sample	s will not i	eflect the s	hear streng	of the in	ı situ	ENG	SOIL † SINEERING
Form No. SI DVP Revision No. 1.01 Issue Date 29/01/2010										me of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies						Vane a	and Pen	etromet	er	Hole ID
Project N	lo. F158	342				Resu	Its for D Sampl)isturbed les	i	VC10
Engineer	Roge	er Tym & F	Partners				ошр.		=	Table No.
Client	York	shire For	ward							10
		Sample		Test		Residual	Penetro-			
Depth m	Sample Ref	Туре	Test Depth m	Number	Peak Vane kPa	Vane kPa	meter kPa	Date		Remarks
0.00			0.30	01	2	1		21/07/20		
0.00			0.30	02	2	1		21/07/20		
0.00			0.30	03	1	0		21/07/20		
1.20			1.35	01	3	1		21/07/20		
1.20			1.35	02	1	1		21/07/20		
1.20			1.35	03	2	1		21/07/20		
2.20			2.42	01	70	10		21/07/20		
2.20			2.45	02	68	9		21/07/20		
2.20			2.48	03	52	11		21/07/20	10	
Note: Test material	ts carried ou	ıt on distuı	bed sample	s will not r	eflect the s	hear streng	th of the in	ı situ	E	SOIL † ENGINEERING
Form No.	SI DVP	Revisi	on No. 1.01	Issue	e Date 29	/01/2010			A tr	ading name of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies Project No. F15842 Engineer Roger Tym & Partners					udies			etromete Disturbed les	VC11
Engineei Client		er Tym & F							Table No.
									11
Depth m	Sample Ref	Sample Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
				01 02 03				21/07/2010 21/07/2010 21/07/2010	
Note: Tes material	sts carried ou	t on distu	rbed sample	s will not r	eflect the si	hear streng	jth of the in	ı situ	SOIL O
Form No.	SI DVP	Revisi	ion No. 1.01	Issu	e Date 29/			A trading name of VINCI Construction UK Limited	

Project Name South Humber Channel Marine Studies Project No. F15842					udies			etromet Disturbed		Hole ID VC12
			n .				Sampl	les		
Engineer		ger Tym & I								Table No.
Client	Yor	kshire For	ward							12
Depth m	Sample Re	Sample ef Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date		Remarks
0.00 0.00 1.00 1.00 1.00			0.55 0.55 2.00 2.00 2.00	01 02 03 01 02 03	18 18 8 9 8	11 10 11 4 4 3		21/07/20 21/07/20 21/07/20 21/07/20 21/07/20	10 10 10 10	
Note: Tes material	ts carried o	out on distu	rbed sample	s will not r	reflect the s	hear streng	of the in	ı situ	E	SOIL † NGINEERING
Form No. SI DVP Revision No. 1.01 Issue Date 29/01/2010										ding name of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies						Vane a	and Pen	etromete	er Hole ID
Project N	lo. F158	842				Resu	lts for D Sampl)isturbed les	d VC13
Engineer	Rog	er Tym & I	Partners				ошр.		Table No.
Client	York	shire For	ward						13
Depth m	Sample Ref	Sample Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.00 0.00 2.00 2.00 2.00			0.40 0.40 2.60 2.60 2.60	01 02 03 01 02 03	4 4 3 60 59 59	2 2 3 10 8 11		21/07/201 21/07/201 21/07/201 21/07/201 21/07/201	10 10 10 10
	ts carried o	ut on distu	rbed sample	s will not r	eflect the s	hear streng	oth of the in	n situ	soi∟
material Form No.	SI DVP	Dovice	on No. 1.01	leeu	e Date 29.	/01/2010			ENGINEERING
i UIIII IVO.	SI DVP	kevisi	OILINO. T.OT	issue	- Date 29.	/ U1/ ZU1U			A trading name of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies Project No. F15842					udies			etromete Disturbed	
Engineer	r Ro	ger Tym &	Partners				oup.		Table No.
Client	Yo	rkshire For	ward						14
Depth m	Sample R	Sample lef Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.00 0.00			0.25 0.25 0.25	01 02 03	3 2 2			21/07/2010 21/07/2010 21/07/2010	0
Note: Tes material	ts carried	out on distu	rbed sample	s will not r	eflect the s	hear streng	th of the in	n situ	SOIL • ENGINEERING
Form No.	SI D	/P Revisi	ion No. 1.01	Issu	e Date 29	/01/2010			A trading name of VINCI Construction UK Limited

Table No. Tabl	Project Name South Humber Channel Marine Studies Project No. F15842					udies			etromete Disturbed les	
Sample Ref Type Test Depth Nourber Pesk Vane Vane Residual Penetro Date Remarks	Enginee	r Ro	oger Tym &	Partners				·		Table No.
Depth Sample Ref Type Test Depth Northee Depth Sample Ref Sample Re	Client	Yo								15
0.00		Sample		Test Depth			Vane	meter	Date	Remarks
material ENGINEERING	0.00			0.50	02	10	8		21/07/2010	0
material ENGINEERING										
Form No. SI DVP Revision No. 1.01 Issue Date 29/01/2010 A trading name of VINCI Construction UK Limited								of the in	n situ	ENGINEERING

Project Name South Humber Channel Marine Studies Project No. F15842					udies			etromete Disturbed les	
Enginee		er Tym & F							Table No.
Client	York:	shire For	ward						16
Depth m	Sample Ref	Sample Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.00 0.00 2.10 2.10 2.10			0.20 0.20 2.10 2.10 2.10	01 02 03 01 02 03	9 7 56 54 54	4 2 4 11 10 10			
	sts carried ou	ıt on distu	rbed sample	es will not	reflect the s	hear strenç	gth of the in	n situ	SOIL •
material									ENGINEERING
Form No.	SI DVP	Revisi	ion No. 1.01	Issu	ie Date 29/	/01/2010			A trading name of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies						Vane a	and Pen	etromete	er Hole ID
Project N	No. F158	342				Resu	Its for D Sampl	Disturbed les	VC17
Engineer	Rog	er Tym & F	Partners						Table No.
Client	York	kshire Forv	ward						17
Depth m	Sample Ref	Sample Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.15 0.15 0.30 0.30 0.30			0.15 0.15 0.30 0.30 0.30	01 02 03 01 02 03	30 32 30 38 36 44	8 12 7 10 12 20			
Note: Test material	ts carried o	ıt on distu	rbed sample	s will not r	eflect the s	hear streng	th of the ir	n situ	SOIL • ENGINEERING
Form No.	SI DVP	Revisi	on No. 1.01	Issue	Date 29	/01/2010			A trading name of VINCI Construction UK Limited

Project N		uth Humbe	er Channel I	Marine St	udies			etromete isturbed es	
Enginee		ger Tym & l							Table No.
Client	YO	rkshire Fon	ward						18
Depth m	Sample R	Sample ef Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.30 0.30 0.30			0.30 0.30	01 02 03	0 0 2 2				
Note: Tes material	ts carried	out on distu	rbed sample	s will not r	reflect the s	hear streng	th of the in	situ	SOIL O ENGINEERING
Form No.	SI D\	/P Revisi	on No. 1.01	Issu	e Date 29.	/01/2010			A trading name of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies					udies	Vane a	and Pen	etromete	Hole ID		
Project N	lo.	F158	42				Resu	lts for D Sampl	Disturbed les	VC19	
Engineer		Roge	r Tym & P	'artners						Table No.	
Client		Yorks	shire Forv	vard						19	
Depth m	Samp	le Ref	Sample Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks	
0.00				0.00						Material unsuitable too so	t
Note: Tes	ts carri	ed out	t on distur	bed sample	s will not r	eflect the s	hear strenc	th of the in	n situ		
material				•						ENGINEERING	•
Form No.	S	I DVP	Revisio	on No. 1.01	Issue	e Date 29.	/01/2010			A trading name of VINCI Construction UK L	imited

Project N Project N Engineer	lo. F15	th Humbe 842 er Tym & I	r Channel f Partners	Marine St	udies			etromete Pisturbed es	r	Hole ID VC20 Table No.
Client	Yor	kshire For	ward							20
Depth m	Sample Re	Sample f Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date		Remarks
0.50 2.90 2.90 2.90			0.50 2.90 2.90 2.90	01 02 03	55 30 62	21 10 18			M	aterial unsuitable too soft
	ts carried o	ut on distu	rbed sample	s will not r	eflect the s	hear streng	th of the in	situ		SOIL •
material Form No.	SI DVF) Revisi	on No. 1.01	Issu	e Date 29	/01/2010				NEERING of VINCI Construction UK Limited

Project N Project N Engineer	lo. F15	th Humbe 842 er Tym & F	r Channel I Partners	Marine St	udies			etromete Pisturbed Ses	YC2	21
Client	Yor	kshire For	ward						21	L
Depth m	Sample Re	Sample f Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Rema	
0.00			0.60 1.65 1.65 1.65	01 02 03	20 20 18	6 8 4			Material unsuit	table too soft
	ts carried o	ut on distu	rbed sample	s will not r	eflect the s	hear streng	th of the in	situ		50IL ♦
material Form No.	SI DVF	P Revisi	on No. 1.01	ssu	e Date 29	/01/2010			A trading name of VINCI Cons	ING

Project N Project N Engineer	lo. F15	th Humbe 842 er Tym & F	r Channel I	Marine St	udies			etromete Pisturbed es	r	Hole ID VC22 Table No.
Client	Yor	kshire For	ward							22
Depth m	Sample Re	Sample f Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date		Remarks
0.50 1.50 1.50 1.50			0.50 1.50 1.50 1.50	01 02 03	90 85 80	30 35 20			Mater	ial unsuitable too granular
	ts carried o	ut on distu	bed sample	s will not r	eflect the s	hear streng	th of the in	situ		soil †
material Form No.	SI DVI	Ο Ροιποί	on No. 1.01	leeu	e Date 29	/01/2010				NEERING of VINCI Construction UK Limited

Project N		342		Marine St	udies			etromete Disturbed les	VC23
Engineer Client	-	er Tym & F shire Forv							Table No.
									23
Depth m	Sample Ref	Sample Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.65 0.65 1.65 1.65 1.65			0.65 0.65 1.60 1.60 1.60	01 02 03 01 02 03	30 36 33 38 40 37	10 12 20 18 18 20			
Note: Tes material	sts carried ou	t on distur	rbed sample	s will not r			jth of the in	n situ	SOIL •
Form No.	SI DVP	Revisi	ion No. 1.01	Issu	e Date 29/	/01/2010			A trading name of VINCI Construction UK Limited

Project N	Name Sout	th Humbe	r Channel	Marine St	udies	Vane :	and Pen	etromete	r Hole ID
Project N						Resu	ılts for D Sampl	Disturbed les	VC24
Engineer	r Roge	er Tym & F	Partners						Table No.
Client	York	kshire Forv	ward						24
Depth m	Sample Ref	Sample f Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.50			0.50						Material unsuitable too soft
	ı								
	1								
	1								
	1								
	1								
	l								
	ı								
	ı								
l									
Note: Tes	sts carried ou	ut on distu	rbed sample	es will not	reflect the s	shear streng	ath of the ir	n situ	
material			-						SOIL • ENGINEERING
Form No.	SI DVP	Revisi	ion No. 1.01	Issu	e Date 29/	9/01/2010			A trading name of VINCI Construction UK Limited

Project N	lame Sout	h Humbe	r Channel I	Marine St	udies			etromete	
Project N	lo. F158	342				Resu	Its for D Sampl	Disturbed Ies	VC25
Engineer	Roge	er Tym & F	Partners				ошр.		Table No.
Client	York	shire For	ward						25
		Sample		Test		Residual	Penetro-		
Depth m	Sample Ref	Туре	Test Depth m	Number	Peak Vane kPa	Vane kPa	meter kPa	Date	Remarks
0.40			0.40						Material unsuitable too soft
0.70			0.70	01	55	17			
0.70 0.70			0.70	02	102	30			
0.70			0.70	03	96	26			
Note: Test	_ ts carried οι	ıt on distui	rbed sample	s will not r	eflect the s	hear strenç	ı ıth of the ir	n situ	
material			-						SOIL ? ENGINEERING
Form No.	SI DVP	Revisi	on No. 1.01	Issue	e Date 29	/01/2010			A trading name of VINCI Construction UK Limited

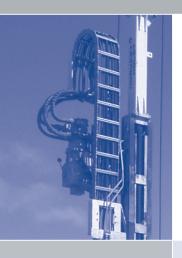
Project Name South Humber Channel Marine Studies Project No. F15842							lts for D	etromete Disturbed		
Engineer		ger Tym & I	Partnars				Sampl	les	Table	
		-							Table	s IVO.
Client	Yo	kshire For	ward						2	6
Depth m	Sample R	Sample ef Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Rem	arks
0.40 1.20 1.20 1.20			0.40 1.20 1.20 1.20	01 02 03	22 20 20	10 14 10		27/07/201 27/07/201 27/07/201 27/07/201	0	rtable too soft
Note: Tes material	is carried (out on distu	rbed sample	s will not i	enect the s	near strenç	Jun of the in	i situ	ENGINEE	SOIL O RING
Form No.	SI DV	P Revisi	on No. 1.01	Issu	e Date 29	/01/2010			A trading name of VINCI Cor	nstruction UK Limited

Project Name South Humber Channel Marine Studies Project No. F15842 Engineer Roger Tym & Partners								etromete Pisturbed es	
Client	Yor	kshire For	ward						27
Depth m	Sample Re	Sample f Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.25 4.40 4.40 4.40			0.25 4.40 4.40 4.40	01 02 03	78 90 80	22 40 34			Material unsuitable too granular
	ts carried o	ut on distu	rbed sample	s will not r	eflect the s	hear streng	th of the in	situ	soil †
material Form No.	SI DVF	P Revisi	on No. 1.01	İssu	e Date 29	/01/2010			A trading name of VINCI Construction UK Limited

Project N Project N Engineer	No. F15	th Humbe 842 er Tym & I	r Channel I	Marine St	udies			etromete Disturbed les	
Client		kshire For							
							,		28
Depth m	Sample Re	Sample f Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date	Remarks
0.25			0.25	01	30	22			
0.25			0.25	02	16	10			
0.25			0.25	03	30	18			
1.15			1.15	01	54	30			
1.15			1.15	02	50	42			
1.15			1.15	03	50	24			
Note: Tes	ts carried o	ut on distu	rbed sample	s will not r	eflect the s	hear streng	th of the in	situ	_
material			•						SOIL
									ENGINEERING
Form No.	SI DVF	P Revisi	on No. 1.01	Issu	e Date 29/	/01/2010			A trading name of VINCI Construction UK Limited

Project Name South Humber Channel Marine Studies Project No. F15842								etromete Pisturbed Jes	r	Hole ID VC29
Engineeı	r Ro	oger Tym &	Partners				•			Table No.
Client	Yo	orkshire For	ward							29
Depth m	Sample I	Sample Ref Type	Test Depth m	Test Number	Peak Vane kPa	Residual Vane kPa	Penetro- meter kPa	Date		Remarks
0.00			0.00							Material unsuitable too soft Material unsuitable too soft
Note: Tes material	ts carried	out on distu	rbed sample	s will not r	eflect the s	hear streng	th of the in	situ	ENG	SOIL 💠 INEERING
Form No.	SI D	VP Revisi	ion No. 1.01	Issu	e Date 29.	/01/2010			A trading nam	e of VINCI Construction UK Limited

Project N	lame Sout	h Humbe	r Channel I	Marine St	udies			etromete	
Project N	lo. F158	342				Resu	Its for D Sampl	Disturbed les	VC30
Engineer	Roge	er Tym & F	Partners				ошр.		Table No.
Client	York	shire For	ward						30
_		Sample		Test	_	Residual	Penetro-		
Depth m	Sample Ref	Туре	Test Depth m	Number	Peak Vane kPa	Vane kPa	meter kPa	Date	Remarks
0.30			0.30						Material unsuitable too soft
1.35			1.35	01	2	0			
1.35			1.35	02	0	0			
1.35			1.35	03	0	0			
Note: Test	ι ts carried οι	ıt on distu	rbed sample	s will not r	eflect the s	hear strenc	th of the in	n situ	
material						•			SOIL 🗘 ENGINEERING
Form No.	SI DVP	Revisi	on No. 1.01	Issue	e Date 29.	/01/2010		+	A trading name of VINCI Construction UK Limited



SUPPORTING FACTUAL DATA SECTION C Laboratory Testing

KEY TO LABORATORY TEST RESULTS





SECTION C: KEY TO LABORATORY SUMMARY SHEETS

COMMON TO ALL SUMMARIES

Sample Type	P Piston TW Thin w	urbed sample sample alled sample	AMAL B BLK	Amalgamated sample Bulk disturbed sample Block sample
	L Liner so D Small o	ampie listurbed sample	C	Core sample
Test status		<i>talics</i> indicates a test that is nor this laboratory.	ot with	in the scope of the UKAS

SUMMARY OF LABORATORY SOIL TESTS: INDEX / CLASSIFICATION TESTS

Particle density	р	Small pyknometer method g Gas jar method
Plastic index	N/P	Non plastic, although liquid limit will have been determined if requested
Particle size (PSD)	1 p	Following value in silt column denotes combined clay and silt fraction Following value in clay column denotes sedimentation by pipette, else sedimentation is by hydrometer.

SUMMARY OF LABORATORY SOIL TESTS: STRENGTH AND PERMEABILITY TESTS

Triaxial	UU UUM UU3 CU CUM CU3 CD CDM CD3 Note the	Single stage unconsolidated quick Multi stage unconsolidated quick Set of 3 unconsolidated quick unconsolidated undrained Multi stage consolidated undrained Set of 3 consolidated undrained Single stage consolidated drained Multi stage consolidated drained Set of 3 consolidated drained Set of 3 consolidated drained Set of 3 consolidated drained at single stage tests are reported assuming parts of the stage stage tests are reported assuming parts of the stage tests are reported assuming test of the stage tests are reported assuming test of the stage test of th	undrained drained ned ed	j
Consol	0ed m _v	One-dimensional oedometer Coefficient of compressibility quot	,	Hydraulic cell consolidation to p0 + 100kPa, where determined
Permeability	С	Constant head permeability	T	Triaxial permeability
Shearbox	SSB P RS	Small shear box Peak value Ring shear	LSB r	Large shear box Residual value



SECTION C: KEY TO LABORATORY SUMMARY SHEETS

SUMMARY OF LABORATORY SOIL RE-USE TEST

MCV s	MCV value at natural or specified moisture content
int	Intercept of calibration line in MCV calibration

SUMMARY OF LABORATORY ROCK STRENGTH TESTS

Point Load	Туре	D	Diametral	Α	Axial					
	(Combination of)	1	Irregular lump	В	Block					
		L	Test performed parallel to planes of	weakn	ess					
		Р	Test performed perpendicular to pla	nes of v	weakness					
		Χ	Invalid failure of point load (not broken between points of load applica-							

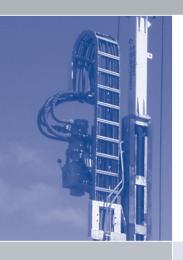
SUMMARY OF LABORATORY ROCK MATERIALS TESTS

POINT LOAD INDEX RESULT

Point Load	Туре	D	Diametral	А	Axial
	(Combination of)	1	Irregular lump	В	Block
		L	Test performed parallel to pla	nes of weak	ness
		Р	Test performed perpendicular	to planes of	weakness
		Χ	Invalid failure of point load (r	ot broken be	etween points of load application)
Dimensions		W	Diameter of core or average sin a block or irregular lump	smallest widt	th perpendicular to axis of loading
		D	Distance between platens wh	en just in co	ntact with specimen
		D'	Distance between platens at	point of failu	re
		De	Equivalent core diameter	ls	P/De ²
		Is(50)	F x Is	F	(De/50) ^{0.45}
		For Ax	point load strength index correction in the correction is a strength index correction in the correctio		metral test of core diameter 50mm

Important note:

Summary sheets are provided for convenience and in no way replace individual test result sheets which shall, without exception, be regarded as the definitive result.



SUPPORTING FACTUAL DATA SECTION C Laboratory Testing

LABORATORY SOIL TEST SUMMARY SHEETS





Project Name	South Hu	mber	Chan	nel Marine	e Stuc	lies		C	las	sific	ati	on 1	Γest	S						
Project No.	F15842									Sui	mm	ary								
Engineer	Roger Tyr	n and	Partr	ners																
Client	Yorkshire	Forw	ard																	
				_		ent			>				_	је		Par	ticle	size		
Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	% Moisture Content	Bulk Density	dew Density	Particle Density	% Liquid Limit	% Plastic Limit	% Plastic Index	% Passing 425µm	% Linear Shrinkage	% Clay	% Silt	% Sand	% Gravel	% Cobbles	
VC01	0.06	001	D	0.06	01	61				60	23	37	100	,,	,,	,,,	, ,	,,	,,	
VC01	0.76	003	L	0.76	01										6	12	54	28	0	
VC01	1.00	004	D	1.00	01											7 ¹	46	47	0	
VC01	2.90	005	D	2.90	01											9 ¹	44	47	0	
VC02	0.00	001	В	0.00	01											14¹	56	30	0	
VC02	1.80	002	D	1.80	01	13														
VC02	5.85	004	D	5.85	01	15				28	14	14	94							
VC03	0.40	001	D	0.40	01	76				48	21	27	96							
VC03	1.83	003	D	1.83	01	21				35	17	18	98							
VC04	0.14	001	D	0.14	01	68				69	37	32	100							
VC04	2.85	003	D	2.85	01	16				28	14	14	84							
VC05	0.20	001	D	0.20	01	47				40	19	21	100							
VC05	3.00	002	D	3.00	01	51				40	23	17	97							
VC06	0.00	001	В	0.00	01										13	22	64	0	0	
VC06	1.80	002	D	1.80	01	46				34	20	14	100							
VC06	4.50	003	D	4.50	01	22				29	20	9	78							
VC06	4.68	004	L	4.68	01										39	35	26	0	0	
VC07	0.80	001	D	0.80	01	30				33	19	14	100							
VC07	1.25	003	D	1.25			35	20	15	100										
VC07	2.10	004	D	2.10	01	50				44	24	20	95							
Approved by:	<u> </u>	<u> </u>	Leed	s Laborato	<u> </u>	+ + + + + + + + + + + + + + + + + + + +								<u> </u>	<u> </u>		╙	<u> </u>		
Stuart Kirk										Drint -	to	24/00/	2010	E	NO	al Mi	EE	RIN	ie,	
			Print date 24/08/2010 Issue Date 27/07/2010							Part of VINCI Construction UK Limited										

Project Name	South Hu	mber	Chan	nel Marine	e Stuc	lies		C	las	sific	ati	on 1	S							
Project No.	F15842									Sui	mm	ary								
Engineer	Roger Tyr	n and	Parti	ners																
Client	Yorkshire	Forw	ard																	
				_		ent			>				_	је		Par	ticle	size		
Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	% Moisture Content	Bulk Density	M/g Dry Density	[™] Particle Density	% Liquid Limit	% Plastic Limit	% Plastic Index	% Passing 425µm	% Linear Shrinkage	% Clay	% Silt	% Sand	% Gravel	% Cobbles	
VC08	0.80	001	D	0.80	01	33				29	17	12	100							
VC08	1.70	002	В	1.70	01											9 ¹	91	0	0	
VC08	3.00	004	В	3.00	01				2.70 p											
VC08	3.00	005	В	3.00	01											10¹	90	0	0	
VC08	4.00	007	L	4.00	02											5 ¹	95	0	0	
VC08	4.00	007	L	4.00	03				2.67 p											
VC09	0.15	001	D	0.15	01	53				54	23	31	100							
VC09	2.25	004	D	2.25	01	26				28	NP	NP	100							
VC10	0.20	001	D	0.20	01	40				31	17	14	100							
VC10	2.25	004	D	2.25	01	17				19	13	6	87							
VC11	0.30	001	D	0.30	01	19				37	17	20	84							
VC11	0.45	002	D	0.45	01				2.68 p											
VC11	1.00	004	L	1.00	02				2.65 p											
VC11	1.00	004	L	1.00	03										27	34	33	7	0	
VC11	1.12	005	D	1.12	01	18				31	14	17	86							
VC11	2.00	008	D	2.00	01	15				31	14	17	90							
VC12	1.80	002	D	1.80	01	31														
VC12	3.70	005	L	3.70	01											8 ¹	92	0	0	
VC12	4.15	004	D	4.15	01	23				30	NP	NP	100							
VC13	0.80	001	D	0.80	01	41				32	23	9	100							
Approved by:	<u> </u>		Lace	s Laborato	nrv	<u> </u>	<u></u>					<u></u>			<u></u>	<u></u>	<u></u>	<u></u>		
Stuart Kirk			LEEU	S LADUIALU								E	:NG	3INI	ee	SO RIN	L {	,		
Juan Kirk			Issue	Date	Print da 27	te /07/20	24/08/2 010	2010		Part of	VINCIC	onstruc	tion UK	Limited						

Project Name	South Hu	mber	Chan	nel Marine	e Stuc	lies		C	las	sific	ati	on 1	S							
Project No.	F15842									Su	mm	ary								
Engineer	Roger Tyr	n and	Partr	ners																
Client	Yorkshire	Forw	ard																	
				_		ent			>				_	је		Par	ticle	size		
Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	% Moisture Content	Bulk Density	Modernsity	" Particle Density	% Liquid Limit	% Plastic Limit	% Plastic Index	% Passing 425µm	% Linear Shrinkage	% Clay	% Silt	% Sand	% Gravel	% Cobbles	
VC13	1.90	003	D	1.90	01	20				25	19	6	72	,,,	,,	,,,	,,,	,,	,,,	
VC14	0.00	001	D	0.00	01	20				40	19	21	44							
VC14	0.80	003	D	0.80	01	15				28	14	14	87							
VC14	1.00	004	L	1.00	02				2.65 p											
VC14	1.00	004	L	1.00	03										29	36	31	4	0	
VC14	1.60	005	D	1.60	01	13				30	14	16	87							
VC15	0.30	001	D	0.30	01	22														
VC15	1.80	003	D	1.80	01	53				45	27	18	100							
VC15	2.15	004	D	2.15	01	25				32	31	1	100							
VC15	2.36	005	В	2.36	01											12¹	27	58	3	
VC16	0.00	001	D	0.00	02	23				24	NP	NP	100							
VC16	1.20	005	D	1.20	02	15				27	16	11	86							
VC16	1.80	006	D	1.80	02	15				20	14	6	84							
VC17	0.00	001	D	0.00	02	18				28	15	13	91							
VC17	0.20	002	В	0.20	01											8 ¹	85	7	0	
VC17	0.60	003	D	0.60	02	17				27	11	16	84							
VC17	1.80	005	D	1.80	02	17				28	13	15	90							
VC17	2.80	006	L	2.80	02				2.66 p											
VC17	2.80	006	L	2.80	03										27	33	35	5	0	
VC18	0.10	001	D	0.10	02	87				40	20	20	85							
Approved by:		<u> </u>	l eed	s Laborato	<u> </u>	+ + + + + + + + + + + + + + + + + + + +										<u> </u>				
Stuart Kirk				. Laborato									SOIL † ENGINEERING							
Jean Civille			Print date 24/08/2010 Issue Date 27/07/2010							Part of VINCI Construction UK Limited										

Project Name	South Hu	mber	Chan	nel Marin	e Stuc	lies		C	las			on 1	S							
Project No.	F15842									Sui	mm	ary								
Engineer	Roger Tyr	n and	Partr	ners																
Client	Yorkshire	Forw	ard																	
				_		ent			>				_	је	Particle size					
Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	% Moisture Content	Bulk Density	Mony Density	[™] Particle Density	% Liquid Limit	% Plastic Limit	% Plastic Index	% Passing 425µm	% Linear Shrinkage	% Clay	% Silt	% Sand	% Gravel	% Cobbles	
VC18	0.70	002	D	0.70	02	18				22	15	7	66							
VC18	1.10	003	L	1.10	02				2.68 p											
VC18	1.10	003	L	1.10	03										31	24	39	6	0	
VC18	5.00	005	D	5.00	02	15				21	12	9	63							
VC19	0.00	001	D	0.00	02	55				45			100							
VC19	0.35	002	В	0.35	01				2.63 p											
VC19	1.00	003	D	1.00	02	36				35	16	19	71							
VC19	1.52	005	L	1.52	02				2.67 p											
VC19	1.52	005	L	1.52	03										23	32	31	14	0	
VC19	1.65	006	D	1.65	02	19				31	15	16	81							
VC20	0.30	001	D	0.30	01	67				52	26	26	100							
VC20	1.00	002	D	1.00	01	73				58	24	34	100							
VC20	1.77	004	L	1.77	02				2.63 p											
VC20	1.77	004	L	1.77	03										28	56	11	6	0	
VC20	3.60	005	D	3.60	01	15				29	16	13	93							
VC21	0.00	001	D	0.00	01	67				46	24	22	100							
VC21	2.00	003	D	2.00	01	86				109	39	70	100							
VC21	2.88	004	L	2.88	02				2.75 p											
VC21	2.88	004	L	2.88	03										21	18	52	10	0	
VC21	3.10	005	D	3.10	01	26				38	15	23	95							
Approved by:	ļ]	Leed	s Laborato	<u> </u>	+ + + + + + + + + + + + + + + + + + + +								<u> </u>	<u> </u>	so	/			
Stuart Kirk								Dui · ·		2//52	2010	=	:NC	al Mi		80 80				
				Issue	Date	Print da 27	te /07/20	24/08/2 010	2010		Part of	VINCIC	onstruc	tion UK	Limited					

Project Name	t Name South Humber Channel Marine Studies							C	las			on 1	S								
Project No.	F15842						Su	mm	ary												
Engineer	Roger Tyr	n and	Parti	ners																	
Client	Yorkshire	Forw	ard																		
				_		ent			>				_	ge	Particle size						
Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	% Moisture Content	Bulk Density	Dry Density	Particle Density	% Liquid Limit	% Plastic Limit	% Plastic Index	% Passing 425µm	% Linear Shrinkage	% Clay	% Silt	% Sand	% Gravel	% Cobbles		
VC22	0.37	001	D	0.37	01	20															
VC22	0.70	004	D	0.70	01	16				27	14	13	87								
VC22	2.00	003	D	2.00	01	16				29	14	15	91								
VC23	0.00	001	D	0.00	01	21				30	14	16	42								
VC23	0.48	002	L	0.48	02				2.69 p												
VC23	0.48	002	L	0.48	03										25	30	31	14	0		
VC23	0.60	003	В	0.60	01				2.68 p												
VC23	1.25	005	D	1.25	01	17				31	15	16	85								
VC23	2.20	007	D	2.20	01	16				31	14	17	80								
VC24	0.00	002	В	0.00	01										31	56	13	0	0		
VC24	0.00	001	D	0.00	01	70				54	25	29	100								
VC24	1.00	003	D	1.00	01	73				51	23	28	93								
VC24	2.00	005	L	2.00	02				2.69 p												
VC24	2.00	005	L	2.00	03										28	38	25	9	0		
VC24	2.40	006	В	2.40	01				2.69 p												
VC24	3.00	007	D	3.00	01	21				49	24	25	100								
VC25	0.00	001	D	0.00	01	66				28	16	12	100								
VC25	0.55	002	D	0.55	01	17				33	16	17	92								
VC25	0.89	003	L	0.89	02				2.66 p												
VC25	0.89	003	L	0.89	03										28	44	23	4	0		
Approved by:	ļ]	Leed	s Laborato	ry	<u> </u>]					<u> </u>	<u> </u>		<u> </u>	<u> </u>	<u> </u>	<u> </u>			
Stuart Kirk					,										SOIL † ENGINEERING						
Studit Wilk			Revisi	on No.	Issue	Date	Print da	te /07/20	24/08/2)10	2010		Part of VINCI Construction UK Limited									

Project Name	South Hui		Classification Tests																						
Project No.	F15842									Sui	mm	ary													
Engineer	Roger Tyn	n and	Partr	ners																					
Client	Yorkshire	Forw	ard																						
										Particle size															
Hole ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	% Moisture Content	Bulk Density	©M Dry Density	" Particle Density	% Liquid Limit	% Plastic Limit	% Plastic Index	% Passing 425µm	% Linear Shrinkage	% Clay	% Silt	% Sand	% Gravel	% Cobbles						
VC25	1.32	005	S D	1.32	01	15		1419,		26	13	13	48	,,	,,,	,,,	,,	70	/						
			5		01					20		10													
VC26	0.00	001	D	0.00	01	83				61	25	36	100												
VC26	1.05	002	D	1.05	01	16				31	15	16	74												
VC26	1.40	003	L	1.40	02				2.66 p																
VC26	1.40	003	L	1.40	03										24	28	32	16	0						
VC26	3.60	005	D	3.60	01	14				28	13	15	85												
VC27	0.00	001	D	0.00	01	15																			
VC27	0.00	001	D	0.00	02										10	6	56	28	0						
VC27	4.77	004	D	4.77	01	15				30	14	16	90												
VC28	0.00	001	D	0.00	01	19				29	14	15	76												
VC28	0.70	004	D	0.70	01	16				28	14	14	86												
VC28	1.90	006	D	1.90	01	14				28	12	16	87							_					
VC29	0.00	001	D	0.00	01	100				67	26	41	100												
VC29	0.50	002	D	0.50	01				2.69 p																
VC29	1.00	005	В	1.00	01										64	12	21	3	0						
VC29	1.00	003	L	1.00	02				2.71 p																
VC29	1.00	003	L	1.00	03										25	31	24	20	0						
VC29	2.00	006	D	2.00	01	17				33	15	18	93												
VC30	0.00	001	D	0.00	01	100				60	26	34	100							 					
VC30	0.65	002	L	0.65	01										35	53	12	0	0						
Approved by:		<u> </u>	Leed	s Laborato									+ + + + + + + + + + + + + + + + + + + +												
Stuart Kirk																			SOIL ♦ ENGINEERING						
	Revision No. 2.02								Print date 24/08/2010 Issue Date 27/07/2010							Part of VINCI Construction UK Limited									

Project Name	South Hu	mber	Chan	nel Marine	Classification Tests															
Project No.	F15842						Sui	mm	ary											
Engineer	Roger Tyn	n and	Partr	ners																
Client	Yorkshire	Forw	ard																	
				Е		itent			ity				ш	age		Par	ticle	size		
Ное ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	% Moisture Content	Bulk Density	Dry Density	" Particle Density	% Liquid Limit	% Plastic Limit	% Plastic Index	% Passing 425µm	% Linear Shrinkage	% Clay	% Silt	% Sand	% Gravel	% Cobbles	
VC30	1.00	003	D	1.00	01	75		vig/iii		58	27	31	100	70	70	70	70	70	70	
VC30	1.66	004	D	1.66	01	17				29	14	15	88							
VC30	2.67	006	D	2.67	01				2.67 p											
VC30	2.85	007	L	2.85	02				2.64 p											
VC30	2.85	007		2.85	03		End								26	34	33	8	0	
Approved by: Stuart Kirk				s Laborato	ry 2.02			Issue	Date	Print da	te /07/20	24/08/2	010	E			! Construction		G	•

Project Name Project No.	South Hun F15842	nber Ch	nannel	Marine Stud	dies	Pe		reng abilit			ary						
Engineer	Roger Tym	and Pa	artners	5													
Client	Yorkshire F																
									Triaxial		Co	nsol	Perme	eability		Shearbo	x
Ное ID	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	% Moisture Content	Model Bulk Density	Туре	c kPa	Ø	Type	m _v	Туре	K m/s	Туре	c kPa	Ø
VC02	5.00	003	L	5.00	1	15	2.18	uu	158	0			·				
VC03	1.60	002	L	1.60	1	20	2.12	uu	105	0							
VC04	0.30	002	L	0.30	1	65	1.64	иим	5	1.0							
VC04	3.00	004	L	3.01	1	14	2.23	uu	107	0							
VC05	4.10	003	L	4.10	1	20	2.09	uu	91	0							
VC07	1.00	002	L	1.00	1	55	1.64	иим	5	0.0							
VC08	4.00	007	L	4.00	1	29	1.85				Oed						
VC09	1.65	002	L	1.65	1	39	1.68	иим	6	0.5							
VC09	2.05	003	L	2.05	1	28	1.86	иим	10	0.5							
VC10	1.90	003	L	1.90	1	20	1.37	иим	30	1.6							
VC11	0.75	003	L	0.75	1	18	2.20	uu	156	0							
VC11	1.00	004	L	1.00	1	16	2.16				Oed						
VC11	1.35	007	L	1.35	1	15	2.20	иим	98	6.3							
VC12	1.20	001	L	1.20	1	24	1.99	иим	11	0.0							
VC13	1.30	002	L	1.30	1	33	1.88	иим	10	0.0							
VC13	3.00	004	L	3.01	1	22	1.91	иим	56	0.0							
VC14	0.25	002	L	0.25	1	22	2.15	иим	31	6.5							
VC14	1.00	004	L	1.00	1	17	2.15				Oed						
VC15	1.30	002	L	1.30	1	31	1.97	uu	10	0							
VC16	0.25	002	L	0.25	1	16	2.16	иим	58	6.3							
Approved by:			l eeds	Laboratory													
Stuart Kirk									Print date		4/08/2010			INE	으다		
		Revisio	n No.	3.01		lss	ue Date		08/07	/2010			Part of V	INCI Const	truction U	K Limited	

Project Name	South Hun	nber Ch	nannel	Marine Stu	dies			reng									
Project No.	F15842					Pe	rme	abilit	ty Su	ımm	ary						
Engineer	Roger Tym	and Pa	artners	5													
Client	Yorkshire I	Forward	d														
						Ħ			Triaxial		Со	nsol	Perm	eability		Shearbo	х
Ное ІD	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	% Moisture Content	My/Bulk Density	Туре	c kPa	Ø	Type	m _v	Туре	K m/s	Туре	c kPa	Ø
VC16	0.70	004	L	0.71	1	15	2.22	uu	70	0			·				
VC16	2.10	007	L	2.10	1	17	2.16	иим	168	0.0							
VC17	1.55	004	L	1.55	1	15	2.20	uu	50	0							
VC17	2.80	006	L	2.80	1	18	2.17				Oed						
VC17	3.00	800	L	3.00	1	16	2.18	иим	46	4.1							
VC18	1.10	003	L	1.10	1	19	2.15				Oed						
VC18	1.75	004	L	1.75	1	15	2.13	иим	45	4.9							
VC19	1.26	004	L	1.26	1	25	1.95	иим	14	0.0							
VC19	1.52	005	L	1.52	1	18	2.14				Oed						
VC19	2.90	800	L	2.90	1	13	0.33	иим	19	0.0							
VC20	1.45	003	L	1.45	1	165	1.60	иим	5	0.0							
VC20	1.77	004	L	1.77	1	56	1.74				Oed						
VC21	1.75	002	L	1.75	1	82	1.51	uu	20	0							
VC21	2.88	004	L	2.88	1	25	2.02				Oed						
VC21	3.32	006	L	3.32	1	18	2.12	иим	77	0.7							
VC22	1.00	002	L	1.00	1	15	2.22	uu	84	0							
VC23	0.48	002	L	0.48	1	18	2.14				Oed						
VC23	1.70	006	L	1.70	1	17	2.98	иим	29	0.0							
VC23	3.00	800	L	3.00	1	15	2.24	иим	53	0.0							
VC24	1.70	004	L	1.70	1	18	2.12	иим	54	0.0							
																	<u> </u>
Approved by: Stuart Kirk				Laboratory					Print date		4/08/2010			INE	ERI		
		Revisio	n No.	3.01		lss	ue Date		08/07	//2010			Part of V	INCI Cons	truction L	K Limited	

Project Name	South Hum	ber Ch	annel	Marine Stud	dies		St	reng	th a	nd							
Project No.	F15842					Pe		abilit			ary						
Engineer	Roger Tym	and Pa	artners	5													
Client	Yorkshire F	orward	d														
									Triaxial		Cor	nsol	Perme	eability	9	Shearbo	<
Пое го	Sample depth m	Sample no.	Sample type	Specimen depth m	Specimen no.	% Moisture Content	by Bulk Density	Туре	c kPa	Ø	Туре	m _v	Туре	K m/s	Туре	c kPa	Ø
VC24	2.00	005	L	2.00	1	20	2.13		Ki u		⊢ Oed	710110	<u> </u>	1117 0	T	Ki u	
VC25	0.89	003	L	0.89	1	18	2.11				Oed						
VC25	1.00	004	L	1.00	1	18	2.13	иим	97	0.0							
VC26	1.40	003	L	1.40	1	18	2.16				Oed						
VC26	1.52	004	L	1.52	1	16	2.18	uu	50	0							
VC27	0.53	003	L	0.53	1	15	2.23	иим	51	6.3							
VC28	0.50	003	L	0.50	1	16	2.17	иим	32	3.2							
VC28	4.08	007	L	4.08	1	14	2.21	иим	89	4.0							
VC29	1.00	003	L	1.00	1	16	2.16				Oed						
VC29	1.42	004	L	1.42	1	17	2.14	uu	76	0							
VC30	1.83	005	L	1.83	1	16	2.19	иим	65	1.4							
VC30	2.85	1.83 005 L 1.83			1	16	2.17	End			Oed						
Approved by: Stuart Kirk			Leeds	Laboratory								E	NG	INE	90 881		>
otaare rain		Revisio	n No.	3.01		lss	ue Date		Print date 08/07	² /2010	4/08/2010		Part of V	INCI Const	ruction U	K Limited	

CHEMICAL ANALYSIS



David (12.11.	ا ماد										<u> </u>	-1	E450	40	
Project:	Killing	noime	•	ı								Contra	ict no.	F1584	+2	
						1				Test I	Result					
Hole ID	Sample depth m	Specimen depth m	Sample no.	Sample type	Hd	SO ₄ (g/l) a	SO ₄ (%) t	S (%) t	Cl (g/l) a	SO ₄ (g/l) w	Cl (g/l) w	NO ₃ (g/l) w	NH₄ (g/l) a	Mg (g/l) a	Organic (%)	<2mm (%)
VC08	3.80 – 4.00		06	D	8.5	0.28	0.12	0.05								100
VC11	1.25 – 1.35		06	D	8.9	0.25	0.10	0.11								100
VC16	0.50 – 0.70		03	D	8.6	0.13	0.07	0.14								100
VC18	2.90 – 3.00		07	D	9.0	0.28	0.15	0.37								100
VC19	1.80 – 2.00		07	D	8.8	0.22	0.08	0.05								100
VC23	1.00 – 1.25		04	D	8.8	0.16	0.13	0.34								100
VC27	0.45 – 0.53		02	D	8.8	0.25	0.11	0.17								100
VC28	0.25 – 0.50		02	D	8.6	0.22	0.11	0.19								100
VC29	2.25 – 2.50		07	D	8.6	0.18	0.13	0.28								100
						BBREV	IATION	S AND N	NOMEN							
pH				of pH val				SO ₄	W		lwater su					
SO ₄ SO ₄				Sulphate				NO ₃	W		lwater ni			unt.		
SO ₄		Total S		ole Sulph	iale COM	CIIL		NH₄ Mg	a a		soluble A soluble N					
Cl	ι a			chloride (Content			_	a anic		ination c			a IL		
CI	W			nloride c				0.9	, S. 110	20.01111		. organi	o maner			
						Anal	ysis L	abora	atorie	s Lin	nited					

3 Crittall Drive, Springwood Industrial Estate, Braintree, Essex, CM7 2RT Tel: 01376 328646 Fax: 01376 552923



SUPPORTING FACTUAL DATA SECTION C Laboratory Testing

LABORATORY SOIL TEST DATA SHEETS





Project	Name	South Humbe	r Channel N	larine Stuc	lies	Liquid	And Plasti	ic	Hole ID VC01	
Project	No.	F15842				Lin	nit Test		Sample Depth	1
Engine	er	Roger Tym an	d Partners						0.06m Sample Numbe	er
Client		Yorkshire Ford	vard				BS1377: Part 2: 1 se 4.3 and 5	1990:	001 Sample Type	
Descrip	tion	Brown CLAY				Clau	se 4.5 and 5	5	D Specimen Dept	th
								Sp	0.06m pecimen Numb	per
									1	
	²⁷ T									
	25								•	
ш	23									
ion - r	21									
netrat	19 —				>					
Cone Penetration - mm	17									
Ŭ	15 —		-							
	13									
	50		54		58	(62	66	7	0
					Moist	ure Content - %	6			
Liquid li Plastic li Plasticit	mit: imit: :y index: re conter	e content: nt of soil passing	յ 425µm		61% 60% 23% 37% 61% 1.03		entage retained sample: Natural	on 425µm sieve	e: 0	%
	100		:L		C		СН	CV	CE	
	80 -									
(%):										
Plasticity Index(%)	60 +									1
ticity	40 +									
Plas										
	20									\dashv
	0 +	N	ЛL		N	11 1	мн	MV	ME	
	0	10	20	30	40	50	60 70	80	90	100
					L	iquid Limit (%)				
Approve	ed by:		Leeds Lab	oratory					SOIL	_ •
Sushil S	Sharda					Print d			EERING	
			Revision No	. 2.06		Issue Date 2	7/07/2010	Part of VINO	CI Construction UK Lin	nited

Project	t Name	South Humber	Channel Ma	arine Studi	es	Liqu	uid And F	lastic		Hole ID VC02	
Project	t No.	F15842					Limit Te	st	Si	ample Dept	th
Engine	eer	Roger Tym and	l Partners						Sa	5.85m mple Numl	oer
Client		Yorkshire Forw	vard			Test Me	:hod: BS1377: Clause 4.3 an		S	004 Sample Typ D	e
Descrip	otion	Brown slightly	gravelly CLA	λY.					Sp	ecimen De _l 5.85m	oth
									Spe	cimen Nun	nber
										1	
	²⁷ T										٦
	25										
ш	23									•	
n - nc	21										
etrati											
Cone Penetration - mm	19 —							,			
Cone	17										
	15										
	13										_
	20		22		24		26		28		30
					Moist	ure Conte	nt - %				
		e content:			15%		e retained on				6%
Liquid I Plastic					28% 14%	Preparatio Remarks:	n of sample: \	Vet sieve			
Plastici	ty index:				14%						
	re conter ty index:	nt of soil passing	425µm		16% 0.14						
	,										
	100 _T	CI			C		СН		CV	CE	_
			L		C		СП		CV	L CE	
	80										
(%)>											
lnde	60 +										
Plasticity Index(%)	40 +									1	
	20 +										
	20										
	0 +	IV	IL		IV	11	МН		MV	ME	
	0	10	20	30	40 L	50 iquid Limit	60	70	80	90	100
Approv			Leeds Labo	ratory					-NEIN	SOI	_
Sushil	Sharda		Dovicion N-	3.00		Jeous D-+-		08/2010	Part of VINCLO		
			Revision No.	2.06		Issue Date	27/07/2010		Part of VINCI C	onstruction UK I	murea

Project	t Name	South Humber	Channel Mar	ine Studie	S	Liqu	iid And Pla	astic		Hole ID VC03	
Project	t No.	F15842					Limit Test	t	S	ample Depth	
Engine	er	Roger Tym and	l Partners						Sa	0.40m mple Number	•
Client		Yorkshire Forw	vard			Test Met	.hod: BS1377: Pa	rt 2: 1990	. 9	001 Sample Type	
	ntion .			01.437			Clause 4.3 and 5			D	
Descrip	Juon	Grey slightly g	ravelly sandy	CLAY.						ecimen Depth 0.40m cimen Numbe	
Cone Penetration - mm	27 — 25 — 23 —						<u> </u>			1	
tration	21										
Penei	19			/							
Cone	17										
	15		•								
	13										
	40		44		48	ure Conter	52		56	60	
Liquid li Plastic l Plasticit	imit: limit: ty index: re conter	e content: nt of soil passing	425µm		76% 48% 21% 27% 79% 2.15	_	e retained on 42 n of sample: We		/e:	4%	Ó
	100	CI	L		CI		СН		CV	CE]
	80 -										
(%)											
Plasticity Index(%)	60										
ticity	40 +									1	-
Plas								1			
	20					7		+			-
	0	IV	IL	1	M	II .	МН	\bot	MV	ME	
	0	10	20	30	40	50	60	70	80	90 1	00
					L	iquid Limit	(%)				
Approv	ed by:		Leeds Labora	atory						sall	•
Sushil S						<u> </u>	Print date 24/08/	/2010		EERING	
			Revision No.	2.06		Issue Date	27/07/2010		Part of VINCI (Construction UK Limit	ted

Project	Name	South Humber	Channel Mar	ine Studie	S	Liqu	uid And Pla	astic		Hole ID VC03	
Project	t No.	F15842					Limit Test	t	S	ample Depth	
Engine	er	Roger Tym and	l Partners						Sa	1.83m mple Number	r
Client		Yorkshire Forw	<i>r</i> ard			Test Met	:hod: BS1377: Pa	rt 2: 1990	0:	003 Sample Type	
Descrip	ntion	Brown sandy s		, CL AV			Clause 4.3 and 5	5		D ecimen Depth	1
Descrip	761011	Brown Sandy S	ngntiy graven	CLAT.						1.83m cimen Numb	
Cone Penetration - mm	27 — 25 — 23 — 21 — 19 — 17 —							•	Бре	1	ei
	13 30		32		34		36		38	40	1
	30		32			ure Conter			30	10	
Liquid li Plastic l Plasticit	imit: limit: ty index: re conter	e content: nt of soil passing	425µm		21% 35% 17% 18% 21% 0.22		e retained on 42 n of sample: We		eve:	2%	6
	400										
	100	CI	L		С		СН		CV	CE	
	80							+			-
(%):											
Plasticity Index(%)	60 -					-		+			
ticity	40 -									1	
Plas								1			
	20			+		+		+			-
	_	l N	IL	++	N	11	МН		MV	ME	
	0 0	1	20	30	40	50	60	70	80		⊣ .00
	J	10	20	50		iquid Limit		. •	00	30 1	
Approv	ed by:		Leeds Labora	itory						6611	•
Sushil S				-		<u> </u>	Print date 24/08/	2010	ENGIN	EERING	-
			Revision No.	2.06		Issue Date	27/07/2010		Part of VINCI	Construction UK Limi	ted

Project	t Name	South Humber	Channel Ma	rine Studi	es	Liqu	uid And Pl	lastic		Hole ID VC04	
Project	t No.	F15842					Limit Tes	it	9	Sample Depth	
Engine	or	Roger Tym and	l Partners						Sa	0.14m ample Number	,
	.01									001	
Client		Yorkshire Forw	<i>ı</i> ard			Test Met	hod: BS1377: Pa Clause 4.3 and			Sample Type D	
Descrip	otion	Grey and brow	n mottled sa	ndy CLAY					Sp	ecimen Depth 0.14m	l
									Spe	ecimen Numbe	er
										1	
	27										
	25 —										
٤								,			
Cone Penetration - mm	23 —										
atior	21					~					
enetr	19										
ne P	17										
ပိ				•							
	15										
	13 📙										
	60		64		68	Camban	72		76	80	
					IVIOIST	ure Conter	IT - %				
		e content:					percentage ret		25µm sieve:	0%)
Liquid I Plastic						Preparatio Remarks:	n of sample: Na	atural			
Plastici	ty index:				32%						
	re conter :y index:	it of soil passing	425μm		68% 0.97						
'	,										
	100 —						CH		CVI	C.F.	,
		С	L		CI		СН		CV	CE	
	80										-
(%)											
ndex(60 +										
Plasticity Index(%)											
lasti	40 +										
	20 +										
	20										
	0	N	1L	\preceq	M	I	МН		MV	ME	
	0	10	20	30	40	50	60	70	80	90 10	00
					Li	iquid Limit	(%)				
Λ κα τα το τ	سنا امن		Loodo Labar	rator:							
Approv Stuart I	-		Leeds Labor	асогу					ENGIN	SOIL EERING	•
- caure			Revision No.	2.06		Issue Date	Print date 24/08 27/07/2010	8/2010	Part of VINCI	Construction UK Limit	ed

Project	t Name	South Humb	er Channel	Marine Stud	lies	Liquid	And Plast	tic	Hole ID VC04	
Project	t No.	F15842				Liı	mit Test		Sample Depth	
Engine	er	Roger Tym a	nd Partners	;					2.85m Sample Numbe	er
Client		Yorkshire Fo	rward				: BS1377: Part 2:	1990:	003 Sample Type	
Descrip	otion	Brown sandy	slightly gra	avelly CLAY.		Clai	use 4.3 and 5		D Specimen Dept	h
									2.85m Specimen Numb	er
									1	
	²⁷ T									
	25								•	
Æ	23									
ion - r	21									
netrat	19									
Cone Penetration - mm	17						/			
රි	15					_/				
						7				
	13 20		22		24		26	28	30	0
						ure Content - '	%			
Liquid li Plastic l Plasticit	imit: limit: ty index: re contei	e content: nt of soil passii	ng 425µm		16% 28% 14% 14% 19% 0.36		ained on 425µr sample: Wet si		10	6%
	100 T		CL		C		СН	CV	CE	7
	80 +									
(9										
6)xəpu	60									
Plasticity Index(%)										
Plasti	40 +									
	20 -									-
	_		ML		N	11	МН	MV	ME	
	0 	1	20	30	40	50	60 70	1	•	⊣ 100
	· ·		20			iquid Limit (%)			. -	
Approv			Leeds La	aboratory				ENGI	SOIL NEERING	•
Sushil S	sharda		Revision N	Jo. 2.06		Print of Pri	date 24/08/2010 17/07/2010		NCI Construction UK Lim	

Project	Name	South Humbe	r Channel M	larine Stud	ies	Liqui	d And Pla	astic		Hole ID VC05	
Project	No.	F15842				L	imit Test	t	Sar	mple Dept	th
Engine	er	Roger Tym and	d Partners					-	Sam	0.20m ıple Numl	oer
Client		Yorkshire Forv	vard				od: BS1377: Pa		Sa	001 mple Typ	e
Descrip	tion	Grey and brow	n mottled s	andy CLAY	,	C	lause 4.3 and 5)	Spec	D cimen Dep	oth
									Speci	0.20m men Num	nber
										1	
	27 —								I		7
	25										
٤											
m - no	23 +										
Cone Penetration - mm	21										
one Pe	17										
O	15 —										
	13										
	30		34		38		42	4	.6		50
					Moist	ure Content	- %				
Liquid li Plastic l Plasticit Moistur Liquidity	imit: :y index: re conter	nt of soil passing	յ 425µm		40% 19% 21% 47% 1.33		ercentage reta of sample: Na				
	100	C	L		C		СН		CV	CE	
	80 -										
(%)xa	60 -										
Plasticity Index(%)											
asticit	40										_
띪											
	20 +										
	0 +	N	ЛL		IV	11	МН	ľ	лν	ME	
	0	10	20	30	40	50 iquid Limit (9	60 6)	70	80	90	100
					L	iquiu LIIIIIL (Y	υ <i>)</i>				
Approve			Leeds Lab	oratory				=	NGINE	SOI SRIN	L ¢
Stuart k	\IrK		Revision No.	2.06		Issue Date	27/07/2010		Part of VINCI Cor		

Project	t Name	South Humber	Channel Mar	ine Studie	es	Liqu	iid And Plas	stic		Hole ID VC05
Project	t No.	F15842					Limit Test		San	nple Depth
Engine	er	Roger Tym and	l Partners					-	Sam	3.00m ple Number
Client		Yorkshire Forw				Test Met	hod: BS1377: Part	2· 1990·	Sai	002 mple Type
						TCSt Wict	Clause 4.3 and 5	2. 1550.		D
Descrip	otion	Greyish brown	sandy slightly	y gravelly	CLAY.				·	imen Depth 3.00m
Cone Penetration - mm	27 — 25 — 23 — 21 — 19 — 17 — 15 —					•			Special	men Number 1
	30		34		38 Moist	ure Conter	42 nt - %	2	46	50
Liquid li Plastic l Plasticit	imit: limit: ty index: re conter	e content: nt of soil passing	425µm		51% 40% 23% 17% 53% 1.76		percentage retair n of sample: Natu		µm sieve:	3%
	100 _T	C	L		CI		СН	(CV	CE
	80 +									
lex(%)	60 -									
Plasticity Index(%)	.									
lastici	40			+						
<u>a</u>	20 +									
	20									
	0 +	N	i i		M	•	МН	1	MV	ME
	0	10	20	30	40 Li	50 iquid Limit		70	80	90 100
Approv	ed by:		Leeds Labora	atory						soil 🗘
Sushil S	Sharda		Davidico N	2.00		January D. 1	Print date 24/08/20	10		ERING
			Revision No.	2.06		Issue Date	27/07/2010		rart of VINCI Con	struction UK Limited

Project Nam	e South Humbe	r Channel Ma	Liquid And Plastic			ic	Hole ID VC06				
Project No.	F15842					Limit	Test			ple Depth	
Engineer	Roger Tym and	d Partners								1.80m ole Numbe	r
Client	Yorkshire Forv	vard			Test Me	thod: BS13	377: Part 2:	1990:	Sar	002 nple Type	
Description	Brown clayey					Clause 4.				D men Depth	n
Description	втомп стауеу	SAND								1.80m nen Numb	
									Specir	nen Numb	er
27 -											
25 -						•					
23 -				•							
- 12 ation											
enetra 19 -			y /								
Cone Penetration - mm - 17 - 17 - 17 - 17 - 17 - 17 - 17											
ٽ 15 -		•									
13 -	0	32	34	4		36		38)
					ure Conte					-	
Natural moist				5%	Catina at a d			d a.a. /25	:	0%	/
Liquid limit:	are content:			5% 4%			ge retaine ole: Natura	d on 425µn I	n sieve:	0%	0
Plastic limit: Plasticity inde	v ·)% 4%	Remarks:						
Moisture cont	ent of soil passing	ι 425μm	46	5%							
Liquidity index	ζ:		1.	86							
100											
100		L		C		СН		CV		CE	
80											-
(%											
)xə 60											-
icity l											
Plasticity Index(%)											1
20					\nearrow						-
		41			_	, ai -		8.41	,	D 4.5	
0	+ +	/L	30	N		MH	70	M\		ME 1	00 -
	0 10	20	30	40 I	50 iquid Limit	60	70) 8	U S	90 1	.00
				L	iquiu LIIIII	- (/ 0)					
Approved by:		Leeds Labo	ratory							SOIL	. •
Stuart Kirk					ı	Print date	24/08/2010			ERING	
		Revision No.	2.06		Issue Date	27/07/	2010	Pai	t of VINCI Cons	truction UK Limi	ited

Project Name South Humber Cha				annel M	larine :	Stud	ies	L	iquid <i>i</i>	And Pla	stic			le ID	
Project	No.	F15842							Lin	nit Test			Sampl	C06 e Deptl	1
Enginee	er	Roger Tym a	nd Pa	rtners									4.! Sample	50m Numb	er
Client		Yorkshire Fo						Test	Method:	3S1377: Part	· 2· 1000		C	03 le Type	
								1631		se 4.3 and 5	2. 1990			D	
Descript	tion	Brown clayey	y sligh	ıtly grav	elly SA	AND.								50m	
												S	pecime	n Num 1	ber
	²⁷ T]
	25								/						
E E	23														1
l - uo	21							+/							
etrati															
Cone Penetration - mm	19														
Cone	17						-/-								
	15														
	13														
	20		2	24			28		3	2		36		4	0
							Mois	ture Co	ntent - %)					
Natural r	moistur	e content:					22%	Percen	itane reta	ined on 42 ^t	Sum siev	Ie.		2	2%
Liquid lir	mit:	e content:					22% 29%	Prepar	ation of s	ined on 425 ample: Wet		/e:		2	2%
Liquid lir Plastic li	mit: mit:								ation of s			/e:		2	2%
Liquid lir Plastic li Plasticity Moisture	mit: mit: y index: e conter		ng 425	iμm			29% 20% 9% 27%	Prepar	ation of s			/e:		2	2%
Liquid lir Plastic li Plasticity	mit: mit: y index: e conter		ng 425	iμm			29% 20% 9%	Prepar	ation of s			/e:		2	2%
Liquid lir Plastic li Plasticity Moisture	mit: mit: y index: e conter ı index:		ng 425	iμm			29% 20% 9% 27%	Prepar	ation of s			re:		2	2%
Liquid lir Plastic li Plasticity Moisture	mit: mit: y index: e conter	nt of soil passii	ng 425	ijμm			29% 20% 9% 27%	Prepar Remar	ation of s ks:			cV		CE	2%
Liquid lir Plastic li Plasticity Moisture	mit: mit: y index: e conter v index:	nt of soil passii		ijμm			29% 20% 9% 27% 0.78	Prepar Remar	ation of s ks:	ample: Wet					2%
Liquid lir Plastic li Plasticity Moisture Liquidity	mit: mit: y index: e conter ı index:	nt of soil passii		iμm			29% 20% 9% 27% 0.78	Prepar Remar	ation of s ks:	ample: Wet					2%
Liquid lir Plastic li Plasticity Moisture Liquidity	mit: mit: y index: e conter v index:	nt of soil passii		iμm			29% 20% 9% 27% 0.78	Prepar Remar	ation of s ks:	ample: Wet					2%
Liquid lir Plastic li Plasticity Moisture Liquidity	mit: mit: y index: e conter index:	nt of soil passii		iμm			29% 20% 9% 27% 0.78	Prepar Remar	ation of s ks:	ample: Wet					2%
Liquid lir Plastic li Plasticity Moisture Liquidity	mit: mit: y index: e conter index:	nt of soil passii		iμm			29% 20% 9% 27% 0.78	Prepar Remar	ation of s ks:	ample: Wet					2%
Liquid lir Plastic li Plasticity Moisture	mit: mit: y index: e conter index: 100 — 80 — 40 —	nt of soil passii		iμm			29% 20% 9% 27% 0.78	Prepar Remar	ation of s ks:	ample: Wet					22%
Liquid lir Plastic li Plasticity Moisture Liquidity	mit: mit: y index: e conter index:	nt of soil passii		iμm			29% 20% 9% 27% 0.78	Prepar Remar	ation of s ks:	ample: Wet					22%
Liquid lir Plastic li Plasticity Moisture Liquidity	mit: mit: y index: e conter index: 100 — 80 — 40 — 20 —	nt of soil passin		iμm			29% 20% 9% 27% 0.78	Prepar Remar	ation of s	ample: Wet					22%
Liquid lir Plastic li Plasticity Moisture Liquidity	mit: mit: y index: e conter index: 100 — 80 — 40 —	nt of soil passin	CL	5μm 20	30		29% 20% 9% 27% 0.78	Prepar	ation of s	TH		CV	90	CE	100
Liquid lir Plastic li Plasticity Moisture Liquidity	mit: mit: y index: e conter y index: 100 — 80 — 60 — 40 —	nt of soil passin	CL		30		29% 20% 9% 27% 0.78	Prepar Remar	ation of s ks:	TH	sieve	CV	90	CE	
Liquid lir Plastic lir Plasticity Moisture Liquidity (%)	mit: mit: y index: e conter y index: 100	nt of soil passin	CL	20			29% 20% 9% 27% 0.78	Prepar Remar	ation of s ks:	TH	sieve	CV	90	CE	100
Liquid lir Plastic li Plasticity Moisture Liquidity	mit: mit: y index: e conter index: 100	nt of soil passin	CL				29% 20% 9% 27% 0.78	Prepar Remar	ation of s ks:	AH 60	70	CV		CE ME	100

Project Nam	e South Humber	nber Channel Marine Studies				Liquid And Plastic			Hole ID VC07	
Project No.	F15842					Limit	Test		Sample Dept	h
Engineer	Roger Tym and	d Partners							0.80m Sample Numb	er
Client	Yorkshire Forv	vard			Test Met	hod: BS13	77: Part 2: 1	.990:	001 Sample Type	9
Description						Clause 4.3			D Specimen Der	
Description	Brown sandy (LLAY.							0.80m pecimen Num	
								5	pecimen ivum 1	iber
27 -										_
					/					
25 -				/						
E 23 -			<i>'</i>							
ration -										-
enetr - 19		<i>y</i>								-
Cone Penetration - mm - 17 - 17 - 17 - 17 - 17 - 17 - 17		•								 -
15 -										
13 -										
3	0	32	3,	4		36		38		⊣ 40
			I	Moist	ure Conter	nt - %				
Natural moist	ire content:		3(0%	Estimated	nercentac	ne retained	on 425µm siev	le.	0%
Liquid limit:	aro contont.		3	3%	Preparatio			он 120рии оточ		5 70
Plastic limit: Plasticity inde	x:			9% 4%	Remarks:					
Moisture cont Liquidity index	ent of soil passing ,.	425µm		0% .79						
Elquidity index				.73						
100	C	1		C		СН		CV	CE	\neg
					'	СП		CV	CE	
80										_
(%) 60										
Jude /										
Plasticity Index(%)										_
20			A	_						
0	N	1L		M	11	МН		MV	ME	
	0 10	20	30	40	50	60	70	80	90	100
				L	iquid Limit	(%)				
Approved by:		Leeds Labo	ratory					T		. •
Sushil Sharda						Print date	24/08/2010	ENGI	SCI NEERIN	
		Revision No.	2.06		Issue Date	27/07/2	2010	Part of VIN	ICI Construction UK L	imited

Project Nam	e South Humber	Channel Mai	rine Studies		Liqu	ıid And	Plastic	:	Hole ID VC07
Project No.	F15842					Limit T	est		Sample Depth
Engineer	Roger Tym and	l Partners						:	1.25m Sample Number
Client	Yorkshire Forw				Test Met	hod: BS1377	7· Part 2· 19	90.	003 Sample Type
						Clause 4.3			D
Description	Brown clayey S	SAND							Specimen Depth 1.25m
27 - 25 - 23 - 21 - 20 21 - 20 27 - 23 - 21 - 21 - 23 - 21 - 21 - 23 - 24 - 25 - 21 - 21 - 21 - 21 - 21 - 21 - 21 - 21	ure content: x: ent of soil passing	32 425µm	38 35 20 15 38					38 n 425µm siev	pecimen Number 1
100	С	L		С		СН		CV	CE
80									
(%):									
Plasticity Index(%)									
ticity 40									
Plas							1		
20					$\overline{}$				
0	N	IL	+	N	11	МН		MV	ME
	0 10	20	30 4	1 0	50	60	70	80	90 100
				L	iquid Limit	(%)			
Approved by:		Leeds Labor	atorv						SOIL O
Stuart Kirk		23.001				Print date	24/08/2010	ENGI	SOILY
		Revision No.	2.06		Issue Date	27/07/20		Part of VIN	CI Construction UK Limited

Project	ject Name South Humber Channel Marine Studies					Liqu	uid And Pla	stic	Hole ID VC07		
Project	No.	F15842					Limit Test		Sai	mple Depth	
Engine	er	Roger Tym and	l Partners						Sam	2.10m Iple Number	
Client		Yorkshire Forw	<i>r</i> ard			Test Met	hod: BS1377: Par	t 2: 1990:	Sa	004 mple Type	
Descrip	tion	Greyish brown	sandy slightly	v oravelly C	`I AY		Clause 4.3 and 5		Spe	D cimen Depth	ı
		areylen arevin	ourity original	y gravony c						2.10m men Numbe	
									эрсс	1	,,
	27 —										
	25 —							4			
۶											
- m	23 —					*					
ratior	21										
Penet	19										
Cone Penetration - mm	17										
	15										
	13										
	40		42		44		46		48	50	
					Moist	ure Conter	nt - %				
Natural	moistur	e content:			50%	Percentage	e retained on 42	5µm sieve	:	5%)
Liquid li Plastic li					44% 24%		n of sample: We				
Plasticit	y index:				20%	Remarks.					
Moistur Liquidity		nt of soil passing	425µm		52% 1.40						
, ,	,					l					
	100 _T	CI			C		СН		CV	CE	1
	80 +										-
(%)x	60 +										
y Inde	50										1
Plasticity Index(%)	40 +					-					-
Pla											
	20 +										
	0	IV	IL	$\perp \perp$	N	11	МН		MV	ME	
	0	10	20	30	40	50	60	70	80	90 10	00
					L	iquid Limit	(%)				
Approve	ed by:		Leeds Labora	atory							•
Sushil S							Print date 24/08/2	2010	ENGINE	SOIL ERING	
			Revision No.	2.06		Issue Date	27/07/2010		Part of VINCI Co	nstruction UK Limit	ed

Project	t Name	South Humber	Channel Marir	ne Studies	Liq	uid And Plasti	C Hole ID VC08
Project	t No.	F15842				Limit Test	Sample Depth
Engine	er	Roger Tym and	l Partners				0.80m Sample Number
Client		Yorkshire Forw	vard		Test Me	thod: BS1377: Part 2: 1	990: 001 Sample Type
Descrip	otion	Grey and brow	n mottled clave	ev SAND		Clause 4.3 and 5	D Specimen Depth
		arey and srevi	motada day	oy 0/ 11 12			0.80m Specimen Number
							1
	27 —						
	25 —						
E					7	•	
- m	23						
ratior	21						
Penet	19						
Cone Penetration - mm	17				•		
	15			•/			
	13			·			
	20		24	28		32	36 40
				Mo	oisture Conte	nt - %	
Natural	moistur	e content:		33%	Estimated	percentage retained	on 425µm sieve: 0%
Liquid li Plastic l				29% 17%		on of sample: Natural	
Plasticit	ty index:		405	12%			
Liquidit		nt of soil passing	425µm	33% 1.33			
	100 T	C	L		CI	СН	CV CE
	80 +						
(%)xə	60 -						
Plasticity Index(%)	.						
asticit	40						
룹							
	20 +						
	0 +	IV	IL		MI	МН	MV ME
	0	10	20	30 40	50	60 70	80 90 100
					Liquid Limi	t (%)	
Ληηνου	ad by:		Leeds Laborat	tory			
Approv Stuart k			reens rapolat	LOTY		Print date 24/08/2010	SOIL O ENGINEERING
	-		Revision No.	2.06	Issue Date	27/07/2010	Part of VINCI Construction UK Limited

Project Name	ine Studies		Liqu	iid And P	lastic		Hole ID VC09		
Project No.	F15842					Limit Tes	st		Sample Depth
Engineer	Roger Tym and	l Partners						5	0.15m Sample Number
Client	Yorkshire Forw	vard			Test Met	.hod: BS1377: P	Part 2: 1990		001 Sample Type
						Clause 4.3 and			D
Description	Brown sandy (CLAY							Specimen Depth 0.15m
27 - 25 - 25 - 25 - 21 - 21 - 21 - 21 - 21	ire content:	52 425um	5 5 2 3	4 Moist 3% 4% 3% 1% 3%		56 nt - % percentage re n of sample: N		58	pecimen Number 1 60
Liquidity index				.97					
100	C			C	1	СН		CV	CE
		_							
80 -									
(%) so 60 ·									
Plasticity Index(%)									
sticit									
Pla					4		1		
20									
_	l N	1L	+	N	/ II	мн		MV	ME
0 -	0 10	20	30	40	50	60	70	80	90 100
					iquid Limit.		-		
Approved by:		Leeds Labora	atory				I		•
Stuart Kirk		Lecus Labore	2001 y			Print date 24/0	08/2010	ENGIN	SOIL ? NEERING
		Revision No.	2.06		Issue Date	27/07/2010	70/2010	Part of VINC	CI Construction UK Limited

Project Name South Humbe			Channel Ma	arine Studi	es	Liq	uid A	nd Plas	tic		Hole ID VC09	
Projec	t No.	F15842					Limi	t Test		San	nple Depth	
Engine	eer	Roger Tym and	Partners							Sam	2.25m ple Numbe	r
Client		Yorkshire Forw	ard			Test M		1377: Part 2:	1990:	Sai	mple Type	
Descri	ption	Brown slightly	clayey SANE)			Clause	4.3 and 5		Spec	D imen Dept	h
										Speci	2.25m men Numb 1	er
	27											
	25									/		
E E	23								•	/-		
tion -	21								/			
netra	19											
Cone Penetration - mm	17								/•			
J J	15 —								<u>/</u>			
	13 ↓ 20		22		24		26		28	}	30)
						ure Cont						
Liquid I Plastic Plastici Moistu	limit: limit: ity index:	e content: nt of soil passing	425µm		26% 28% NP NP 26%		on of san	tage retaine nple: Natura		m sieve.	09	70
	100 -											_
	80 -	CI	-		С		СН		C\	/	CE	
(%												
Plasticity Index(%)	60											
ticity	40 -										1	
Plas												
	20					-						-
	0 +	IV	L		N	11	М	-1	М	V	ME	
	0	10	20	30	40	50	6	0 70	3 0	30	90 1	100
					L	iquid Lim	it (%)					
Approv	ved by:		Leeds Labo	ratory							SOIL	. •
Stuart	Kirk						Print date	24/08/2010			ERING	
			Revision No.	2.06		Issue Date	27/0	7/2010	Pa	art of VINCI Con	struction UK Lim	ited

Project Name South Humber Channel Marine Stud					Liqu	id And P	lastic		Hole ID VC10	
Project No.	F15842					Limit Tes	st		Sample Depth	
Engineer	Roger Tym and	d Partners						9	0.20m Sample Number	
Client	Yorkshire Forv	vard			Test Met	hod: BS1377: P	Part 2: 199	0:	001 Sample Type	
Description	Grey and brow					Clause 4.3 and	15		D pecimen Depth	
Description	Grey and brow	III Salluy CLAY							0.20m	
Natural moist Liquid limit: Plastic limit: Plasticity inde	ex: tent of soil passing	24 1 425µm	28 N 40 31 17 14 40 1.6	% % % % %		32 at - % percentage re		36	ecimen Number 1 40	
, , , , ,					l					
100	C	L		С	l l	СН		CV	CE	
80										
Plasticity Index(%)										
city lr										
Plastic 05										
20										
		/IL		N	,,	МН		MV	ME	
0	0 10	20	30 4	0	50	60	70	80	90 100	
	_ 10				iquid Limit		, 0		33 100	
Approved by		loods labs	nton/				T			
Approved by: Stuart Kirk		Leeds Labora	иогу			Print date 24/0	08/2010	ENGIN	SOIL Q RERING	•
		Revision No.	2.06		Issue Date	27/07/2010		Part of VINC	CI Construction UK Limited	

Project Name	South Humber	Channel Ma	rine Studie	:S	Liquid	And Plast	tic	Hole ID VC10
Project No.	F15842				Liı	mit Test		Sample Depth
Engineer	Roger Tym and	l Partners						2.25m Sample Number
Client	Yorkshire Forw	<i>ı</i> ard			Test Method	: BS1377: Part 2:	1990:	004 Sample Type
Description	Brown mottled	Largenish are	y candy cli	iahtly ar:		use 4.3 and 5		D Specimen Depth
	Diowii mottice	- greenish gre	y sandy sn		avelly CLAT.			2.25m Specimen Number 1
²⁷ T								
25								•
E 23								
.e. 21								
netrat 10	23 - Loue Lation 19 - Loue 17 - Loue							
ne Pei	e 19							
	5 17 15							
13 10		12		14		16	18	20
		12			ure Content -		10	20
Natural moistu Liquid limit: Plastic limit: Plasticity index Moisture conte Liquidity index:	nt of soil passing	425μm		19%		tained on 425µr sample: Wet si		13%
100 -								
80 -	C	L		CI		СН	CV	CE
Plasticity Index(%)								
Plastic - 05								
20 -			++					
0 -	N	1L	+1	M	1	МН	MV	ME
(10	20	30	40	50	60 70	0 80	90 100
				Li	quid Limit (%)			
Approved by:		Leeds Labor	atory					SOIL O NEERING
Sushil Sharda		Revision No.	2.06		Issue Date 2	date 24/08/2010 27/07/2010		NCI Construction UK Limited

Project Na	me South Humb	er Channel Mari	ine Studies	Liquid And P		Hole ID VC11
Project No	. F15842			Limit Tes	st	Sample Depth 0.30m
Engineer	Roger Tym a	and Partners				Sample Number
Client	Yorkshire Fo	orward		Test Method: BS1377: F Clause 4.3 and		001 Sample Type D
Description	Brown slight	tly gravelly CLAY	•			Specimen Depth 0.30m
						Specimen Number 1
27	7					
25	j					
E 23						
Cone Penetration - mm	l					
Pene 19)					
OO 17	7		•			
15	i					
13	3					
	30	32	34	36	38	40
			Mois	ture Content - %		
Liquid limit: Plastic limit Plasticity in	:	ng 425µm	19% 37% 17% 20% 22%	Percentage retained on 4 Preparation of sample: W Remarks:		16%
Liquidity inc	dex:		0.25			
10	0	CL		сі сн	CV	CE
8	0					
(apul	60					
Plasticity Index(%)	0					
	0					
		ML		лі МН	MV	ME
	0 10	20	30 40	50 60	70 80	*
				Liquid Limit (%)		
Approved b	y:	Leeds Labora	tory			soil
Sushil Shar	da				08/2010	GINEERING
		Revision No.	2.06	Issue Date 27/07/2010	Part	of VINCI Construction UK Limited

Project Nar	me South Humbe	er Channel Mar	ine Studies		Liquid And Pla	stic	Hole ID
Project No.	F15842				Limit Test		VC11 Sample Depth
Engineer	Roger Tym ar	nd Partners					1.12m Sample Number
					est Method: BS1377: Par	÷ 3: 1000:	005 Sample Type
Client	Yorkshire For			11	Clause 4.3 and 5		D
Description	Brown slightl	y gravelly CLAY					Specimen Depth 1.12m
							Specimen Number 1
27							
25							
돌 23							
. <u>.</u> . <u>.</u> . 21					•		
etrati							
Cone Penetration - mm 19 17					/*		
on 17							
15	-			√			
13							
	20	24	28		32	36	6 40
			M	loisture	Content - %		
Natural mois	sture content:		189	% Per	centage retained on 42	5um sieve:	14%
Liquid limit:			319	% Pre	paration of sample: We		
Plastic limit: Plasticity inc			149 179		narks:		
Moisture co	ntent of soil passin	g 425µm	219				
Liquidity ind	ex:		0.4	1			
100	n						
100		CL		CI	СН	C/	CE
80	0						
(%							
60 (g	0						
city Ir							
Plasticity Index(%)	0						
20							
	0	ML		MI	МН	М	V ME
	0 10	20	30 40)	50 60	70 8	90 100
				Liqui	d Limit (%)		
Approved by	V:	Leeds Labora	atory				sou O
Sushil Share			,		Print date 24/08/2		BOILY
		i contraction of the contraction					

Project	Name	South Humber	Channel Ma	rine Studie	es	Liqu	uid And P	lastic		Hole ID VC11	
Project	t No.	F15842					Limit Tes	st		Sample Depth	
Engine	er	Roger Tym and	l Partners						Si	2.00m ample Number	•
Client		Yorkshire Forw				Test Met	thod: BS1377: P	art 2: 1990:		008 Sample Type	
						rest ivie	Clause 4.3 and			D	
Descrip	otion	Brown slightly	gravelly CLA	Y.						pecimen Depth 2.00m	
									Sp	ecimen Numbe 1	er
	27										
	25)			
E	23										
- uo	21						/				
etrati						./					
Cone Penetration - mm	19										
Cone	17										
	15										
	13										
	20		24		28		32		36	40	
					Moist	ure Contei	nt - %				
Natural	moistur	e content:			15%	Percentag	e retained on 4	i25μm sieve	:	100	%
Liquid li	imit:				31%	Preparatio	n of sample: W				
Plastic I Plasticit	iimit: ty index:				14% 17%	Remarks:					
	re conter y index:	nt of soil passing	425µm		17% 0.18						
Liquidit	y muex.				0.16						
	100 _										_
		С	L		С		СН		CV	CE	
	80										-
(%)											
)xəpu	60										-
Plasticity Index(%)											
Plasti	40 +										
"	20 -										
	0 +	N	1L	\perp	N	11	МН		MV	ME	
	0	10	20	30	40	50	60	70	80	90 10	00
					L	iquid Limit	: (%)				
Approv	ed by:		Leeds Labo	ratory							•
	,			•		ĺ				ے الت ہے	-
Sushil S	Sharda						Print date 24/0	8/2010	SNGIN	EERING	i

Project Nam	e South Humber	Channel Mai	ine Studies		Liqu	uid And P	astic		Hole ID VC12	
Project No.	F15842					Limit Tes	t		Sample Depth	
Engineer	Roger Tym and	l Partners						S	4.15m ample Number	
Client	Yorkshire Forw	vard			Test Met	:hod: BS1377: Pa	art 2· 1990·		004 Sample Type	
					TOSE IVICE	Clause 4.3 and			D	
Description	Brown clayey S	SAND.							pecimen Depth 4.15m	
Natural moist Liquid limit: Plastic limit: Plasticity inde	ex: tent of soil passing	24 425µm		28 Mois 23% 30% NP NP NP 23%		32 nt - % percentage ret n of sample: Na		36	ecimen Number 1 40	
100	С	L			i I	СН		CV	CE	
80										
Plasticity Index(%)										
city Ir										
lastic 0										
20										
				+						
0	N	1L		N	ЛІ	МН		MV	ME	
	0 10	20	30	40	50	60	70	80	90 100	
				ļ	Liquid Limit	(%)				
Approved by:		Leeds Labor	atory						SOIL O	•
Sushil Sharda						Print date 24/0	8/2010	ENGIN	EERING	
		Revision No.	2.06		Issue Date	27/07/2010		Part of VINC	l Construction UK Limited	

Project Name	South Humber	Channel Ma	rine Studies		Liqu	ıid And F	Plastic		Hole ID VC13
Project No.	F15842					Limit Te	st		Sample Depth
Engineer	Roger Tym and	l Partners						9	0.80m Sample Number
Client	Yorkshire Forw	<i>ı</i> ard			Test Met	hod: BS1377:	Part 2: 199	D:	001 Sample Type
Description	Grey and brow	n mottled ca	adv CLAV			Clause 4.3 an	d 5		D Specimen Depth
Description	Grey and brow	ii iiiottieu sa	idy CLAY						0.80m
27 - 25 - 25 - 25 - 21 - 21 - 21 - 21 - 21	re content: :: ent of soil passing	32 425µm	4 3 2 9	44 Moist 42% 43% 99% 41%		36 nt - % percentage ron n of sample: I		38	pecimen Number 1 40 e: 0%
100	C	L		C	ı İ	СН		CV	CE
80 -									
60 mg/s									
Plasticity Index(%)									
Plastic 0									
20 -					+				
	N	11		N	,	МН		MV	ME
0 -	0 10	20	30	40	50	60	70	80	90 100
	- - V				iquid Limit		. •	55	100
Approved by:		Leeds Labor	atory						SOIL O
Stuart Kirk						Print date 24.	/08/2010	ENGIN	SOIL V NEERING
		Revision No.	2.06		Issue Date	27/07/2010		Part of VINC	CI Construction UK Limited

Project Name	e South Humber	Channel Mari	ne Studies	Liq	uid And Pla	astic		ole ID VC13	
Project No.	F15842				Limit Test	t	Samı	ole Depth	
Engineer	Roger Tym and	l Partners				_		90m le Number	
Client	Yorkshire Forw			Tost Ma	ethod: BS1377: Pa	rt 2: 1000:		003 ple Type	
				Test IVIE	Clause 4.3 and 5			D	
Description	Off white CHA	LK.					1	nen Depth 90m	
							Specim	en Number 1	
						l.			
27									
25 -					•				
돌 23 -									
.e. 21 -					•				
etrati									
Cone Penetration - mm - 17 - 17 - 17 - 17 - 17 - 17 - 17				4					
e 17 -									
15 -			•						
13 -									
20	0	22	24		26	2	28	30	
			Moi	sture Conte	ent - %				
Natural moistu	re content:		20%	Estimated	d percentage reta	nined on 425	um sieve:	28%	
Liquid limit:			25%	Preparati	on of sample: Na		 5.5 7 5.	2573	
Plastic limit: Plasticity index	K :		19% 6%	Remarks:					
Moisture cont	ent of soil passing	425µm	27%						
Liquidity index	<u>C </u>		1.33						
100									
100	С	L		CI	СН	(CV	CE	
80									
60 dex									
ity In									
Plasticity Index(%)									
20									
20									
0	N	IL A		МІ	МН	ľ	ΛV	ME	
	0 10	20	30 40	50	60	70	80 9	0 100	
				Liquid Lim	it (%)				
Approved by:		Leeds Labora	torv					A	
Sushil Sharda		22 23 23 23 23 23 23 23 23 23 23 23 23 2	,		Print date 24/08/		NGINE	SOIL 9	
		Revision No.	2.06	Print date			Part of VINCI Construction UK Limited		

Project	t Name	South Humber	Channel Mar	ine Studi	es	VC14					
Project	t No.	F15842					Limit Test		Sa	mple Depth	
Engine	er	Roger Tym and	l Partners						Sam	0.00m nple Number	
Client		Yorkshire Forw	<i>r</i> ard			Test Met	:hod: BS1377: Part	: 2: 1990:	Sa	001 Imple Type	
Descrip	otion	Brown sandy g	ravelly CLAV				Clause 4.3 and 5		D Specimen Depth		
		Brown sandy g	ravelly CLAT.							0.00m imen Number	
									Spec	1	
	27 —						<u>, </u>				
⊑	25 —						_				
- mn	23					*					
ration	21										
'enetr	19				/.						
Cone Penetration - mm	17										
	15			•							
	13 30		34		38		42		46	50	
						ure Conter					
Notural	maiatur	e content:			20%	Darsantas	e retained on 425	Tum siava	,	56%	
Liquid I	imit:	e content.			40%	Preparatio	n of sample: Wet			36%	
Plastic	limit: ty index:				19% 21%	Remarks:					
Moistu	re conter	nt of soil passing	425µm		46%						
Liquidit	y index:				1.29						
	100 _							_			
		CI	L		CI		СН		CV	CE	
	80										
(%)											
)xəpu	60										
Plasticity Index(%)	40 +									T	
Plasti	40 +							1			
	20										
									D 4) (
	0	N 10	1	25	M	•	MH	70	MV	ME 100	
	0	10	20	30	40	50		70	80	90 100	
					L	iquid Limit	(%)				
Approv	ed by:		Leeds Labora	atory						ecu û	
Sushil S				,			Print date 24/08/2	010	ENGINE	SOILY	
			Revision No.	2.06		Issue Date 27/07/2010 Part of VINCI Construction			nstruction UK Limited		

Project	t Name	South Humber	Channel Mar	ine Studie	:S	Liquid Alid I lastic				Hole ID VC14	
Project	t No.	F15842					Limit Test		Sar	mple Depth	
Engine	er	Roger Tym and	l Partners						Sam	0.80m ıple Numbeı	•
Client		Yorkshire Forw	<i>ı</i> ard			Test Met	:hod: BS1377: Part	: 2: 1990:	Sa	003 mple Type	
Descrip	ntion	Brown sandy s		, CLAV			Clause 4.3 and 5			D Specimen Depth	
Descrip	Scion	Brown Sandy S	ngntiy graven	CLAY.						0.80m	
									Speci	men Numbe 1	er
	27 —										
	25										
- mm	23										
ation	21										
snetra	19										
Cone Penetration - mm	17 +										
ပိ											
	15 +		•								
	13 20		24		28		32		36		
	20		24			ure Conter			36	40	
Natural Liquid I		e content:			15% 28%	_	e retained on 425 n of sample: Wet			13	%
Plastic	limit:				14%	Remarks:					
	ty index: re conter	nt of soil passing	425µm		14% 17%						
Liquidit	y index:				0.21						
	100	CI	L		CI		СН		CV	CE	
	80 +										
%)xət	60										
ty Inc	.									1	
Plasticity Index(%)	40					+					
4											
	20 +										
	0 +	IV	IL	\bot	M	11	МН		MV	ME	
	0	10	20	30	40	50	60	70	80	90 1	00
					L	iquid Limit	(%)				
Approv	ed by:		Leeds Labora	itory							•
Sushil S						1	Print date 24/08/2	010	NGINE	SOIL ERING	
			Revision No.	2.06		Issue Date	27/07/2010		Part of VINCI Cor	nstruction UK Limi	ted

_	e South Humber	r Channel Ma	rine Studies		Liqu	ıid And F	Plastic		Hole ID VC14
Project No.	F15842					Limit Te	st		Sample Depth
Engineer	Roger Tym and	d Partners						9	1.60m Sample Number
Client	Yorkshire Forv	vard			Test Met	hod: BS1377:	Part 2 [.] 1990		005 Sample Type
						Clause 4.3 an			D
Description	Brown sandy s	lightly gravel	ly CLAY.						Specimen Depth 1.60m
27 - 25 - 23 - 21 - 21 - 21 - 21 - 25 - 21 - 21 - 21 - 21 - 21 - 21 - 21 - 21	ure content:	24	1: 3: 1:		_	32 at - % e retained on n of sample: \		36	ecimen Number 1 40
Moisture cont Liquidity index	ent of soil passing	յ 425μm		5% .06					
Liquidity index	.		<u>U</u>	.06					
100						CII		6)//	CF
100	С	L		С	I	СН		CV	CE
100	C	L		С	I	СН		CV	CE
80	C	L		С	I	СН		CV	CE
80	C	L		C	I	СН		CV	CE
80	C	L		C		CH		CV	CE
:ity Index(%) 09 08	C	EL .		C		CH		CV	CE
80	C	EL .		C		CH		CV	CE
Plasticity Index(%) 0 0 08									
Plasticity Index(%) 0 0 0 0 0 0 0 0 0 0 0 0 0	N.	ЛL	30	M	11	МН	70	MV	ME
Plasticity Index(%) 0 0 08			30	M 40		MH 60	70		
Plasticity Index(%) 0 07 08	N.	ЛL 20		M 40	50	MH 60	70	MV	90 100
Plasticity Index(%) 0 0 08	0 10	ЛL		M 40	50 iquid Limit	MH 60 (%)	70	MV 80	ME

Project Nam	e South Humber	Channel Mar	ine Studies	Liq	uid And Plast	ic	Hole ID VC15
Project No.	F15842				Limit Test	S	ample Depth
Engineer	Roger Tym and	l Partners				Sa	1.80m mple Number
Client	Yorkshire Forw	vard		Test Me	thod: BS1377: Part 2:	1990	003 Sample Type
				10301010	Clause 4.3 and 5		D
Description	Greyish brown	sandy CLAY.				Sp	ecimen Depth 1.80m
Natural moist Liquid limit: Plastic limit: Plasticity inde Moisture cont	x: ent of soil passing	42 42 425μm	53% 45% 27% 18% 53%	Preparation Remarks:	46 nt - % I percentage retained on of sample: Natura	♦ 48 d on 425μm sieve:	simen Number 1 50
Liquidity index	C:		1.44				
100	С	L		CI	СН	CV	CE
80							
(%) 60							
Plasticity Index(%)							
asticit 40							
20							
0	N	1L		MI	МН	MV	ME
	0 10	20	30 40	50	60 70	80	90 100
				Liquid Limi	t (%)		
Approved by:		Leeds Labora	atory				soil \$
Sushil Sharda					Print date 24/08/2010	ENGIN	EERING
		Revision No.	2.06	Issue Date	27/07/2010	Part of VINCI	Construction UK Limited

Project Name	South Humber	Channel Mai	rine Studie	S	Liqu	uid And P	lastic		Hole ID VC15
Project No.	F15842					Limit Te	st		Sample Depth
Engineer	Roger Tym and	l Partners						9	2.15m Sample Number
Client	Yorkshire Forw	<i>r</i> ard			Test Met	:hod: BS1377: F	Part 2: 1990	:	004 Sample Type
Description	Crowich brown	aandy CLAV				Clause 4.3 and	d 5		D Specimen Depth
Description	Greyish brown	Sandy CLAY.							2.15m
27 — 25 — 25 — 23 — 21 — 29 — 29 — 21 — 25 — 21 — 25 — 21 — 25 — 25 — 25	re content:	32 425μm		34 Moist 25% 32% 31% 1% 25% -6.00		36 nt - % percentage re n of sample: N		38	ecimen Number 1 40
100 -	C	L		С		СН		CV	CE
80 -									
Plasticity Index(%)									
lasticity - 0 1									
20 -									
0 -	N	IL	1	N	11	МН		MV	ME
0 -	10	20	30	40	50	60	70	80	90 100
				L	iquid Limit	(%)			
Approved by:		Leeds Labor	atory						SOIL O
Sushil Sharda					1	Print date 24/	08/2010	ENGIN	REGING
		Revision No.	2.06		Issue Date	27/07/2010		Part of VINC	CI Construction UK Limited

	ame S	South Humber	Channel M	larine Stud	lies	Liqui	d And Plas	stic	Hole ID VC16		
Project No	o. F	F15842				Li	mit Test			nple Depth	
Engineer	F	Roger Tym and	Partners							0.00m ple Number	
Client	,	Yorkshire Forw	ard			Test Metho	d: BS1377: Part	2: 1990:	Sar	001 nple Type	
Descriptio							ause 4.3 and 5		D Specimen Depth		
Descriptio	'' [Brown clayey S	AND.							0.00m	
									Specir	men Number 2	
2	7										
2	5 🕇										
E 2	3 📙				—						
ig 2	1 -				/•						
netra 1	₉				/						
e Pe					/						
5 1	'										
1	5 📙			•							
1	3 <u> </u>										
	20		22		24		26	28	3	30	
					Moist	ure Content -	. %				
Natural mo		content:			23%	-	rcentage retain		ım sieve:	0%	
Liquid limit Plastic limi					24% NP	Preparation of Remarks:	f sample: Natu	ral			
Plasticity in	ndex:				NP	Kemarks.					
Moisture c Liquidity in		of soil passing	425um		220/						
	dex.				23%						
Liquidity III	dex:				23%						
	dex: 00 —						CII				
		CI			23%		СН	C	V	CE	
10							СН	C	V	CE	
10	80						СН	C	V	CE	
10	00 _						СН	C	V	CE	
10	80 —						СН	C	V	CE	
10	80						CH	С	V	CE	
Plasticity Index(%)	80 —						CH	C	V	CE	
Plasticity Index(%)	80	CL	-		C					CE	
Plasticity Index(%)	80		-				CH		V	CE	
Plasticity Index(%)	00 80 60 40	CL	-	30	C		MH	N	11/		
Plasticity Index(%)	00	CL	- L	30	C N N 40	11	MH 60	N	11/	ME	
Plasticity Index(%)	00	CL	L 20		C N N 40	50	MH 60	N	11/	ME 90 100	
Plasticity Index(%)	00	CL	- L		C N N 40	50 iquid Limit (%	MH 60	N 70	1V 80	ME	

Project	t Name	South Humbe	r Channel M	arine Stud	ies	Liquid	And Plast	ic	Hole ID VC16		
Project	t No.	F15842				Liı	mit Test		Sample Depth 1.20m		
Engine	er	Roger Tym and	d Partners						Sample Numb	er	
Client		Yorkshire Forv	vard				: BS1377: Part 2: use 4.3 and 5	1990:	005 Sample Type D	e	
Descrip	otion	Brown sandy s	slightly grav	elly CLAY.		Clar	13c 4.3 and 3		Specimen Dep 1.20m	oth	
								5	Specimen Num	ber	
									2		
	²⁷ T									7	
	25								•	-	
шш	23									_	
ion -	21										
netrat	19						•/				
Cone Penetration - mm	17										
ပိ							•				
	15 +									_	
	13 20		22		24		26	28		- 30	
	20		22			ure Content - '		20	·		
Notural	maiatur	e content:			15%	Doroontooo rot	rained on 42Eur	n ciova:		14%	
Liquid I		e content:			15% 27%		ained on 425µr sample: Wet sie			14%	
Plastic	limit: ty index:				16% 11%	Remarks:					
		nt of soil passing	յ 425µm		18%						
Liquidit	y index:				0.18						
	100	С	:L		CI		СН	CV	CE		
	80 -										
(%											
)xəpu	60										
Plasticity Index(%)											
Plasti	40 +										
	20										
		*	41				N.411	B 43/	N 4.5		
	0 +	1	/IL	20	M	1	MH	<u>Μ</u> Ψ	ME	100	
	0	10	20	30	40 L	50 iquid Limit (%)	60 70) 80	90	100	
Approv	ed by:		Leeds Lab	oratory					6 P I		
Sushil S						Print (date 24/08/2010	ENGI	NEERIN		
			Revision No.	2.06		Issue Date 2	7/07/2010	Part of VII	NCI Construction UK L	imited	

Project N	Name	South Humber	Channel Ma	rine Studi	es	Liquid And Plastic VC16 VC16					
Project N	No.	F15842					Limit Tes	st		Sample Depth	
Engineer	r	Roger Tym and	d Partners						S	1.80m ample Number	r
Client		Yorkshire Forw	vard			Test Meth	hod: BS1377: F	Part 2: 1990:		006 Sample Type	
Descripti	on						Clause 4.3 and			D pecimen Depth	,
Descripti	OII	Off white claye	ey CHALK.							1.80m	
									Sp	ecimen Numbe 2	er
	27 —										
	25 +					*					
E E	23 📙					-/					
tion	21 📙					/					
netra	19										
e Pe						/					
Cor	17					/					
	15 +				7						
	13 📙										
	10		14		18	_	22		26	30)
					Moist	ure Conten	t - %				
		e content:			15%		retained on 4		e:	16	5%
Liquid lim Plastic lim					20% 14%	Preparation Remarks:	n of sample: V	Vet sieve			
Plasticity	index:				6%						
Moisture Liquidity i		nt of soil passing	425μm		17% 0.50						
						•					
:	100 _T	C	ı		C		СН		CV	CE	7
			_				CIT		CV	CL	
	80 +										-
(%)>											
Inde	60 +										1
Plasticity Index(%)	40										
Plast								1			
	20 +					\nearrow					-
			41	\bot		41	N 41 1		N 434	B 4.5	
	0 +	i	1L	20	N	•	MH	70	MV	ME	1
	0	10	20	30	40	50	60	70	80	90 1	.00
					L	iquid Limit	(%)				
1											
Approved	d bv:		Leeds Labor	ratorv							A
Approved Sushil Sh	-		Leeds Labor	ratory			Print date 24/0	08/2010	ENGIN	SOIL	•

Project Na	ject Name South Humber Channel Marine Studies								Liquid And Plastic					Hole ID VC17			
Project No) .	F15842	<u>)</u>							I	imit 1	Γest			Samp	le Dep	th
Engineer		Roger T	Гут an	d Part	ners									!	Sample	00111 9 Numl 001	oer
Client		Yorkshi	ire Forv	vard					Те		od: BS137 Clause 4.3		1990:			ole Typ	e
Description	า	Brown	sandy (gravel	ly CLA	۲.					lause 4.5	anu 5		;		D nen De	oth
														S		00m en Nun	nber
																2	
27	⁷ T																7
2!	5 +															/•	
E 23	3 📙																
Cone Penetration - mm	1 📙																
anetra 19	9 																
one 1	7 																
ن 1!	5 📙										•						
13																	
1.	20			22	2			24			26			28			¬ 30
								Moi	sture (Content	- %						
Natural mo		e conten	t:					18%			retained			:			9%
Liquid limit Plastic limit								28% 15%		aration arks:	of sampl	e: Wet si	eve				
Plasticity in Moisture co		nt of soil	passino	า 425เ	ım			13% 20%									
Liquidity in				, 1				0.38									
10	00		C	:L			T		CI		СН			CV		CE	
8	30 +						_			1							
(%)																	
Index	60 +									+							
Plasticity Index(%)	40 														\triangleleft		
Plas																	
2	20 +					A	+			+					\dashv		
	0 +		N	/IL			1		MI		МН			MV		ME	
	0		10	2	20	30		40		50	60	70	0	80	90)	100
									Liquid	Limit (%)						
Approved k	 oy:			Lee	ds Labo	oratory											
	ushil Sharda									Pi	rint date	24/08/2010		ENGI	VEE	RIN	_
				Revis	sion No.	2.	06		Issue		27/07/2			Part of VIN	CI Constru	ıction UK I	imited

Project	t Name	South Humbe	r Channel N	larine Stud	ies	Liquid	And Plasti	ic	Hole ID VC17		
Project	t No.	F15842				Lin	nit Test		Sample Dept	h	
Engine	er	Roger Tym and	d Partners					:	0.60m Sample Numb	er	
Client		Yorkshire Forv	vard				BS1377: Part 2: 1	1990:	003 Sample Type	e	
Descrip	otion	Brown sandy s	slightly grav	elly CLAY.		Clau	se 4.3 and 5		D Specimen Depth		
								Sı	0.60m pecimen Num	ber	
									2		
	27 —									7	
	25										
E	23 —										
π - uc											
etratic	21 +										
Cone Penetration - mm	19 —										
Con	17									-	
	15									-	
	13 📙									_	
	20		22		24 Moist	: ure Content - %	26 %	28	:	30	
					101010	die content					
Natural Liquid li		e content:			17% 27%		ained on 425µm sample: Wet sie			16%	
Plastic I	limit:				11%	Remarks:	sample, wet sie	ve			
	ty index: re conter	nt of soil passing	. 425um		16% 20%						
Liquidit		nt or oon paconing	, 120µ		0.56						
	100 T	C	L		С	l (СН	CV	CE		
	80 +										
%)xəp	60										
ity Inc	.										
Plasticity Index(%)	40										
	20 +										
	23										
	0 +	N	ЛL		M	11	MH	MV	ME		
	0	10	20	30	40	50 iquid Limit (%)	60 70	80	90	100	
					L	iquiu LIIIII (70)					
Approv	ed by:		Leeds Lab	oratory					S OI		
Sushil S	Sharda					Print d			VEERIN		
			Revision No	2.06		Issue Date 2	7/07/2010	Part of VIN	CI Construction UK L	imited	

Project Nam	e South Humber	Channel Mar	rine Studies		Liquid And Plastic Limit Test Hole ID VC17 Sample Depth						
Project No.	F15842					Limit	Test		Sar	nple Depth	1
Engineer	Roger Tym and	l Partners							Sam	1.80m ple Numbe	er
Client	Yorkshire Forw	<i>ı</i> ard			Test Met	hod: BS1	377: Part 2	: 1990:	Sa	005 mple Type	
Description			W CLAV			Clause 4			D Specimen Depth		
Description	Brown sandy s	lightly gravell	y CLAY.						-	1.80m	
									Speci	men Numb 2	oer
27 -											
25 -					<i>*</i>						
E 23 -											
ation -				1							
Cone Penetration - mm - 17 - 17 - 17 - 17 - 17 - 17 - 17											
e 17 -											
15 -											
13 -											
	0	24	28	}		32		3	6	4	0
			N	∕loist	ure Conten	ıt - %					
Natural moist	ure content:		17	7%	Percentage	retaine	d on 425u	m sieve		1	0%
Liquid limit:	are content.		28	3%	Preparatio					-	070
Plastic limit: Plasticity inde	x:			3% 5%	Remarks:						
Moisture cont	ent of soil passing	425µm		9%							
Liquidity inde	<u>C. </u>		0.4	40							
100										1 05	_
	С	L		CI		СН		С	V	CE	
80											_
(%)>											
Xə 60											1
Plasticity Index(%)										1	
Plas											
20					$\overline{}$						-
	l N			M		МН		I.	1 V	ME	
0	0 10	20	30 4	+ 40	50	60			İ		⊣ 100
				L	iquid Limit	(%)					
Approved by:		Leeds Labora	atory					<u> </u>			•
Sushil Sharda			,			Print date	24/08/2010		NGINE	SOIL SRING	
		Revision No.	2.06		Issue Date	27/07			Part of VINCI Cor	nstruction UK Lin	nited

Project Nam	e South Humber	Channel Mar	ine Studies	Liquid And Plastic Hole ID VC18				
Project No.	F15842				Limit Test	Sample Depth		
Engineer	Roger Tym and	l Partners				0.10m Sample Number		
Client	Yorkshire Forw	<i>ı</i> ard		Test Me	thod: BS1377: Part 2: 1	001 1990: Sample Type		
Description	Brown slightly		,		Clause 4.3 and 5	D Specimen Depth		
Description	Brown slightly	graverry CLAY	•			0.10m		
Natural moist Liquid limit: Plastic limit: Plasticity inde Moisture cont	x: ent of soil passing	34 425µm	87% 40% 20% 20% 102%	Preparation Remarks:	42 nt - % ge retained on 425μm on of sample: Wet sie			
Liquidity inde	C.		4.10					
100	С	L		CI	СН	CV CE		
80								
ndex(
Plasticity Index(%)				_				
Plast								
20			│ 					
	M	11		MI	МН	MV ME		
0	0 10	20	30 40	50	60 70	•		
		·-		Liquid Limi				
Approved by:		Leeds Labora	atory			_		
Sushil Sharda		Locus Labore			Print date 24/08/2010	ENGINEERING		
		Revision No.	2.06	Issue Date	27/07/2010	Part of VINCI Construction UK Limited		

-	e South Humber	r Channel Ma	arine Studio	es		id And P Limit Te		Hole ID VC18 Sample Depth			
Project No.	F15842					Limit ie	SL		Sample Dep 0.70m	th	
Engineer	Roger Tym and	d Partners						S	ample Num 002	ber	
Client	Yorkshire Forv	vard				hod: BS1377: I Clause 4.3 and			Sample Typ D		
Description	Brown sandy g	gravelly CLAY	' .		l			S	pecimen De 0.70m	pth	
27 - 25 - 23 - 21 - 21 - 21 - 25 - 21 - 25 - 25 - 25		22		24 Moist 18% 22% 15%	_	26 t - % e retained on an of sample: V		28	ecimen Nur 2	30 34%	
Plasticity inde Moisture cont Liquidity index	ent of soil passing	ι 425μm		7% 27% 1.71							
Liquidity index	. .			1.71							
100	C	L		С	· •	СН		CV	CE		
80											
Plasticity Index(%) 6 9											
Plastic 05											
20										\dashv	
0	N	/IL		N	11	МН		MV	ME		
	0 10	20	30	40 L	50 iquid Limit	60 (%)	70	80	90	100	
Approved by:		Leeds Labo	ratory						er	ı_ 0	
Sushil Sharda							08/2010	ENGIN	Valide Bulkaanibu:		
		Revision No.	2.06		Issue Date	27/07/2010		Part of VINC	l Construction UK	Limited	

Project Nam	e South Humber	Channel Mari	ine Studies	Liqu	uid And Plast	Hole ID VC18
Project No.	F15842				Limit Test	Sample Depth
Engineer	Roger Tym and	d Partners				5.00m Sample Number
Client	Yorkshire Forw	vard		Test Me	thod: BS1377: Part 2: 1	005 1990: Sample Type
Description					Clause 4.3 and 5	D Specimen Depth
Description	Brown sandy g	graverry CLAY.				5.00m
Natural moist Liquid limit: Plastic limit: Plasticity inde Moisture cont	x: ent of soil passing	14 425µm	15% 21% 12% 9% 23%	_	22 nt - % e retained on 425µm on of sample: Wet sie	
Liquidity inde	<u>C</u>		1.22			
100	C	L		CI	СН	CV CE
80						
Plasticity Index(%)						
ticity 40						
Plas						
20				\nearrow		
0	N	▲ 1L		MI	МН	MV ME
	0 10	20	30 40	50	60 70	80 90 100
				Liquid Limit	t (%)	
Approved by:		Leeds Labora	tory			SOIL O
Sushil Sharda					Print date 24/08/2010	ENGINEERING
		Revision No.	2.06	Issue Date	27/07/2010	Part of VINCI Construction UK Limited

Project Name	e South Humber	r Channel Ma	rine Studies	Li	quid And Pl		Hole ID VC19 Sample Depth				
Project No.	F15842				Limit Tes	t	Sample De	epth			
Engineer	Roger Tym and	d Partners					0.00m Sample Nu				
							001				
Client	Yorkshire Forv	vard		Test I	Method: BS1377: Pa Clause 4.3 and		Sample T	ype			
Description	Brown CLAY.					-	Specimen [
							0.00m Specimen N				
							2				
27 -											
21 -											
25 -											
돈 23 -							~				
- u											
tration - 21 -											
- 19 A			•								
Cone Penetration - mm - 17 - 17 - 17 - 17 - 17 - 17 - 17											
_											
15 -											
13 -											
4	0	42	44		46	4	48	50			
			N	loisture Cor	ntent - %						
Natural moistu	ıre content:		550	% Estimat	ted percentage ret	ained on 425	µm sieve:	0%			
Liquid limit:			459	% Prepara	ation of sample: Na		•				
Plastic limit: Plasticity inde:	c.			Remark	(S:						
	 ent of soil passing	425μm	559	%							
Liquidity index	:										
100	C	L		CI	СН		CV CE				
80											
(%)											
X 60											
Plasticity Index(%)											
lastic 04											
20											
0	l N	/IL		MĻ	МН	1	MV MI	E			
	0 10	20	30 4		İ	70	80 90	100			
	_ 10	20		Liquid Li		. 0	20 30	100			
				Liquiu Li	11111 (70)						
Approvad b		Loode Laber	ratony								
Approved by: Sushil Sharda		Leeds Labor	ratory		Print date 24/08	3/2010	SI NGINEERI	DIL 💠			

Project Nam	e South Humber	r Channel Mari	ine Studies	Liqu	uid And Plast	Hole ID VC19	
Project No.	F15842				Limit Test	Sample Depth	
Engineer	Roger Tym and	d Partners				1.00m Sample Number	
Client	Yorkshire Forv	vard		Test Met	.hod: BS1377: Part 2: 1	1990: Sample Type	
					Clause 4.3 and 5	D	
Description	Brownish grey	sandy gravelly	/ CLAY.			Specimen Depth 1.00m	
Natural moist Liquid limit: Plastic limit: Plasticity inde	x: ent of soil passing	32 3425µm	34 Mois 36% 35% 16% 19% 51% 1.84		36 nt - % e retained on 425µm n of sample: Wet sie		
Elquiaity inde	\.		1.04				
100	C	1		:1	СН	CV CE	
		_		,1		CV	
80							
(%) 60							
Plasticity Index(%)							
asticil 0							
20							
0	N	/IL		ЛІ	МН	MV ME	
	0 10	20	30 40	50	60 70	80 90 100)
			1	Liquid Limit	(%)		
Approved by:		Leeds Labora	tory			1 4	
Sushil Sharda		Locus Labora	.cor y		Print date 24/08/2010	ENGINEERING	,
		Revision No.	2.06	Issue Date	27/07/2010	Part of VINCI Construction UK Limited	

Project	Name	South Humber	Channel Mar	ine Studie	es	Liqu	uid And Plast	Hole ID VC19	
Project	t No.	F15842					Limit Test	Sample Depth	
Engine	er	Roger Tym and	l Partners					1.65m Sample Number	
Client		Yorkshire Forw				Test Met	.hod: BS1377: Part 2:	006 : 1990: Sample Type	
						Test Wick	Clause 4.3 and 5	D	
Descrip	otion	Brown sandy s	lightly gravelly	/ CLAY.				Specimen Depth 1.65m	
Cone Penetration - mm	27 — 25 — 23 — 21 — 19 — 17 —							Specimen Number 2	
	13 +		2/		20		22	26 (0	
	20		24		28 Moist	ure Conter	32 nt - %	36 40	
Liquid li Plastic l Plasticit	imit: limit: ty index: re conter	e content: nt of soil passing	425µm		19% 31% 15% 16% 24% 0.56		e retained on 425µr n of sample: Wet sie		
	100	Cl	L		С		СН	CV CE	
	80 +								
(%									
Plasticity Index(%)	60					-+			
icity I	40 -					_			
Plast	40 +								
	20					+			
		B. /		_		_	NAL	NAV	
	0 +	N	1		N N		MH	MV ME	
	0	10	20	30	40 L	50 iquid Limit	60 70	0 80 90 100	
Approv			Leeds Labora	tory				SOIL	
Sushil S	Sharda		Davidation Pt	2.00		January D. 1	Print date 24/08/2010		
			Revision No.	2.06		Issue Date	27/07/2010	Part of VINCI Construction UK Limited	

Projec	t Name	South Humber	Channel Mar	ine Studi	es	Liqu	uid And Pla	stic		Hole ID VC20
Projec	t No.	F15842					Limit Test		Sar	nple Depth
Engine	eer	Roger Tym and	l Partners						Sam	0.30m ple Number
Client		Yorkshire Forw	<i>ı</i> ard			Test Met	:hod: BS1377: Par	t 2: 1990:	Sa	001 mple Type
Descri	ption	Brown CLAY.					Clause 4.3 and 5		Spec	D imen Depth
									Speci	0.30m men Number
										1
	27								I	
	25									
E	23									
u - uc	21									
etratic										
Cone Penetration - mm	19									
Con	17									
	15									
	13 📙									
	40		44		48	ure Conter	52	Ţ	56	60
					IVIOISE	ure Conter	IL - 70			
		e content:			67%		percentage retai		µm sieve:	0%
Liquid Plastic					52% 26%	Preparatio Remarks:	n of sample: Nat	ural		
	ty index:				26%					
	re conter ty index:	nt of soil passing	425µm		67% 1.58					
	.,									
	100 _T	C			C		СН		CV	CE
			-					· ·	. v	CL
	80 +									
(%)xe	60 -									
Plasticity Index(%)	,									
astici	40									
₫	20 +					1				
	20 +									
	0 +	IV	1L		N	11	МН	ı	MV	ME
	0	10	20	30	40	50	60	70	80	90 100
					L	iquid Limit	(%)			
Approv	od bu		Leeds Labora	ator.				T		
Sushil	-		reens rangis	atory			Print date 24/08/2		NGINE	SOIL ?
			Revision No.	2.06		Issue Date	27/07/2010		Part of VINCI Con	struction UK Limited

Project	Name	South Humber	Channel Mar	rine Studie	es	Liqu	ıid And Pl	astic		Hole ID VC20 Sample Depth 1.00m			
Project	t No.	F15842					Limit Tes	t	Sa	ample Depth	l		
Engine	er	Roger Tym and	l Partners						Sai	1.00m mple Numbe	er		
Client		Yorkshire Forw				Test Met	hod: BS1377: Pa	art 2·1990). 9	002 ample Type			
			varu			Test Wick	Clause 4.3 and			D			
Descrip	otion	Brown CLAY.								ecimen Dept 1.00m			
Cone Penetration - mm	27		54	•	58	•	62			cimen Numb			
	50		54		58 Moist	ure Conter	62 nt - %		66	7	0		
Liquid li Plastic l Plasticit	imit: limit: ty index: re conter	e content: nt of soil passing	425μm		73% 58% 24% 34% 73% 1.44		percentage ret n of sample: Na		425μm sieve:	0'	%		
	100 _T	CI	L I		C		СН	_	CV	CE	٦		
_	80 +					$\neg \vdash$							
lex(%)	60 -			$\perp \perp$									
Plasticity Index(%)										1			
lastici	40					-	A	+			-		
۵	20 +												
	20												
	0	IV			IV		МН		MV	ME	\bot		
	0	10	20	30	40 L	50 iquid Limit	60 (%)	70	80	90	100		
Approv	ed by:		Leeds Labora	atory						SOIL	•		
Sushil S	Sharda		Davidica N	2.00		January D. 1		3/2010		SERING			
			Revision No.	2.06		Issue Date	27/07/2010		Part of VINCI C	onstruction UK Lim	псеа		

Project Name	e South Humber	Channel Mar	ine Studies		Liq	uid A	nd Plas	tic		Hole ID VC20	
Project No.	F15842					Lim	it Test		Sa	mple Dept	n
Engineer	Roger Tym and	l Partners							San	3.60m nple Numb	er
Client	Yorkshire Forw	<i>ı</i> ard			Test Me	thod: B	S1377: Part 2	: 1990:	Sa	005 ample Type	<u> </u>
Description			,				e 4.3 and 5			D cimen Dep	
Description	Brown slightly	gravelly CLAY	•							3.60m	
									Spec	imen Num 1	ber
27 -											_
25 -						1					-
돌 23 - '											_
- 12 ation					/ *						_
Cone Penetration - mm - 17 - 17 - 17 - 17 - 17 - 17 - 17				1							-
о 9 17 -											=
ර 15 -											
13 - 2	0	24	28	₹		32)	3	6		1 1 0
	•	21			ure Conte		•	J			
N				-0/	In .		1 /25				70/
Natural moistu Liquid limit:	ire content:			5% 9%	Preparation		ned on 425µ mple: Wet s			1	7%
Plastic limit: Plasticity inde:	x:			6% 3%	Remarks:						
Moisture cont	ent of soil passing	425µm	16	6%							
Liquidity index	<u>C</u>		0.	00							
100									22. 6	1 05	_
	С	L		С	ı	Cł	1	C	CV	CE	
80											
(%):											
Spul 60											
Plasticity Index(%)										1	
Plasi						_					
20					+						
	N	11		N	11	М	H	ĸ	ЛV	ME	
0	0 10	20	30	40	50		1		80	90	 100
			-		iquid Limi		I	J			
Approved by:		Leeds Labora	ntony								
Approved by: Sushil Sharda		reens ranou	atory			Print date	24/08/2010		NGINE	SOII ERINI	_ ?
		Revision No.	2.06		Issue Date		07/2010		Part of VINCI Co	nstruction UK Li	mited

Project	t Name	South Humber	Channel Mar	rine Studio	es	Liqu	uid And Pla	stic		Hole ID VC21
Project	t No.	F15842					Limit Test		San	nple Depth
Engine	er	Roger Tym and	l Partners						Sam	0.00m ple Number
Client		Yorkshire Forw	<i>ı</i> ard			Test Met	hod: BS1377: Part	2: 1990:	Sa	001 mple Type
Descrip	otion	Brown CLAY.					Clause 4.3 and 5		Spec	D imen Depth
		Brown CD							·	0.00m men Number
									эресп	1
	27 —								T	
	25 —									
٤										•
ш - u	23 —									
ration	21									
Cone Penetration - mm	19									
Sone	17					•				
	15									
	13									
	40		42		44		46	2	18	50
					Moist	ure Conter	nt - %			
Natural	moistur	e content:			67%	Estimated	percentage retai	ned on 425	µm sieve:	0%
Liquid li Plastic l					46% 24%	Preparatio Remarks:	n of sample: Natu	ural		
Plasticit	ty index:				22%	remarks.				
	re conter :y index:	nt of soil passing	425µm		67% 1.95					
	100 _T	C	L		CI		СН	(CV	CE
	80 +									
(%)xə	60 +									
ty Ind	,									
Plasticity Index(%)	40									
₫										
	20 +									
	0 +	IV	1L	$\downarrow \downarrow \downarrow$	M	I	МН	ı	MV	ME
	0	10	20	30	40	50		70	80	90 100
					Li	iquid Limit	(%)			
Ληηνον	rod by:		Leeds Labora	aton.				<u> </u>		
Approv Sushil S			Leeus Labora	atory			Print date 24/08/20	210	NGINE	SOIL ? ERING
			Revision No.	2.06		Issue Date	27/07/2010	210	Part of VINCI Con	struction UK Limited

Project Name	e South Humber	Channel M	larine Stud	ies	_	And Plas	stic		ole ID /C21	
Project No.	F15842				Liı	mit Test		Samp	ole Dept .00m	h
Engineer	Roger Tym and	d Partners						Sampl	e Numb	er
Client	Yorkshire Forw	vard				: BS1377: Part 2	2: 1990:		003 ple Type)
Description	Grey slightly o	rganic CLA\	<i>/</i> .		Cla	use 4.3 and 5			D nen Dep	th
									.00m en Num	ber
									1	
27 _T										1
25 -										
투 23 -							→			
.e 23 .e 21 -					. /					
etratic										
Cone Benetration - mm - 17 - 17 - 17 - 17 - 17 - 17 - 17										
등 17 			▼							
15 -										
13										
10	0	104		108 Moist	1 ture Content - °	L12	116		12	20
					Lare Content					
Natural moistu	ire content:			86%	Estimated per	centage retain		sieve:	(0%
Natural moistu Liquid limit: Plastic limit:	ire content:				Estimated pero Preparation of Remarks:	centage retain		sieve:	(0%
Liquid limit: Plastic limit: Plasticity inde	с	(05		86% 109% 39% 70%	Preparation of	centage retain		sieve:	(0%
Liquid limit: Plastic limit: Plasticity inde	c ent of soil passing	425µm		86% 109% 39%	Preparation of	centage retain		sieve:	()%
Liquid limit: Plastic limit: Plasticity inde: Moisture conto	c ent of soil passing	425µm		86% 109% 39% 70% 86%	Preparation of	centage retain		sieve:	(0%
Liquid limit: Plastic limit: Plasticity inde: Moisture conto	c ent of soil passing			86% 109% 39% 70% 86%	Preparation of Remarks:	centage retain		sieve:	CE	0%
Liquid limit: Plastic limit: Plasticity index Moisture conto Liquidity index	c ent of soil passing :			86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	centage retain sample: Natui	ral	sieve:		0%
Liquid limit: Plastic limit: Plasticity index Moisture conto Liquidity index 100	c ent of soil passing :			86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	centage retain sample: Natui	ral	sieve:		0%
Liquid limit: Plastic limit: Plasticity index Moisture conto Liquidity index 100	c ent of soil passing :			86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	centage retain sample: Natui	ral	sieve:		0%
Liquid limit: Plastic limit: Plasticity index Moisture conto Liquidity index 100	c ent of soil passing :			86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	centage retain sample: Natui	ral	sieve:		0%
Liquid limit: Plastic limit: Plasticity index Moisture conto Liquidity index 100	c ent of soil passing :			86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	centage retain sample: Natui	ral	sieve:		0%
Liquid limit: Plastic limit: Plasticity index Moisture conto Liquidity index 100 80 (%) 60 40	c ent of soil passing :			86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	centage retain sample: Natui	ral	sieve:		0%
Liquid limit: Plastic limit: Plasticity index Moisture conto Liquidity index 100	c ent of soil passing :			86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	centage retain sample: Natui	ral	sieve:		0%
Liquid limit: Plastic limit: Plasticity index Moisture conto Liquidity index 100 80 (%) 60 40	cent of soil passing:	L IL		86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	Centage retain sample: Natur	CV	sieve:		0%
Liquid limit: Plastic limit: Plasticity index Moisture conto Liquidity index 100 80 (%) 60 20	cent of soil passing:	L	30	86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	Centage retain sample: Nature CH MH 60 7	CV		CE	100
Liquid limit: Plastic limit: Plasticity index Moisture conto Liquidity index 100 80 (%) 60 20	cent of soil passing:	L IL	30	86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	Centage retain sample: Nature CH MH 60 7	CV		CE	
Liquid limit: Plastic limit: Plasticity index Moisture contuitiquidity index 100 80 (%) 60 20 0	cent of soil passing:	1L 20		86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	Centage retain sample: Nature CH MH 60 7	CV		CE	100
Liquid limit: Plastic limit: Plasticity index Moisture conto Liquidity index 100 80 (%) 60 20	cent of soil passing:	L IL		86% 109% 39% 70% 86% 0.67	Preparation of Remarks:	CH CH 60 7	CV MV 70 80		ME O	100

Project I	Name	South Humber	r Channel Ma	arine Studies	Liquid And Plasti Limit Test					Hole ID VC21
Project I	No.	F15842					Limit Tes	st		Sample Depth
Enginee	r	Roger Tym and	d Partners						S	3.10m ample Number
Client		Yorkshire Forv	vard			Test Met	hod: BS1377: F	Part 2: 199	0:	005 Sample Type
	•						Clause 4.3 and			D
Descript	ion	Greyish brown	ı slightly grav	elly CLAY.						pecimen Depth 3.10m ecimen Number
	27 T 25 T 23 T						,			1
m - no	21									
trat	19 —									
one P¢	17									
Ū	15 +		•							
	13									
	30		34	3	8		42		46	50
Liquid lim Plastic lir Plasticity	nit: mit: index: conte	e content: nt of soil passing	յ 425µm	3 1 2 2	6% 8% 5% 3% 7%	_	e retained on 4 n of sample: V		eve:	5%
	100									
	100	C	L		CI		СН		CV	CE
	80									
Plasticity Index(%)	60 -									
ticity Ir	40 -									
olasi	40 +						1		1	I
								1		
	20 -			<u> </u>						
	20 -	1	ЛL		M	1	МН		MV	ME
	20 -	· ·	ЛL 20	30	40	50	60	70	MV 80	90 100
Approved Sushil Sh	20 - 0 - 0 d by:	1	1		40	50	60	70	80	

Project Nan	ne South Humbe	r Channel M	arine Studie	S	_	d And Pl		Sample Depth		
Project No.	F15842				L	imit Tes	t	Sar		th
Engineer	Roger Tym an	d Partners						Sam	ple Numb	per
Client	Yorkshire For	ward				od: BS1377: Pa		Sa	004 mple Typ	е
Description	Brown sandy	slightly grave	elly CLAY.		C	lause 4.3 and	5	Spec	D cimen Dep	oth
							_	Speci	0.70m men Num 1	nber
27										
25										
									•	
ے 23 د										
Cone Penetration - mm 19 17										-
Pene 19							•			1
9 17 O										
15										
13										
	20	22		24 Moist	ure Content	26	28	3		30
				IVIOIS	are content	70				
Natural mois Liquid limit:	ture content:			16% 27%	Percentage r Preparation of					13%
Plastic limit:				14%	Remarks:	or sample. w	ct sieve			
Plasticity inde	ex: ntent of soil passing	1 425um		13% 18%						
Liquidity inde		J - 1"		0.31						
100		CL		С	I	СН	C'	V	CE	
80										
%) % 60	1									
Plasticity Index(%)										
Plastic 05	1									
20	,									
0	1	ИL		N N	1	МН	N		ME	
	0 10	20	30	40 L	50 iquid Limit (%	60 %)	70	80	90	100
Approved by	•	Leeds Labo	oratorv							
	•				1		1		S 🗀 I	
Sushil Shard	a				Pri	nt date 24/08	8/2010	NGINE	ERIN	6

Project	t Name	South Humber	Channel Mar	ine Studie	:S	Liqu	uid And Pla	stic		Hole ID VC22
Project	t No.	F15842					Limit Test		San	nple Depth
Engine	er	Roger Tym and	l Partners						Sam	2.00m ple Number
Client		Yorkshire Forw	<i>r</i> ard			Test Met	:hod: BS1377: Part	2: 1990:	Sai	003 mple Type
Descrip	ntion	Brown sandy s		, CLAV			Clause 4.3 and 5			D imen Depth
Descrip	Jeion	brown sandy s	ngntiy graven	CLAT.					·	2.00m men Number
	²⁷ T									1
	25									
шш	23						<i></i>			
- - - 00	21									
netrat	19 —									
Cone Penetration - mm					/					
So	17 +									
	15			Y						
	13 _		2/		20		22		100	
	20		24		28 Moist	ure Conter	32 nt - %	3	86	40
Natural Liquid li		e content:			16% 29%	_	e retained on 425 n of sample: Wet			9%
Plastic I					14%	Remarks:	ii oi sairipie. Wet	sieve		
	ty index:	nt of soil passing	42Eum		15% 18%					
	y index:	it or son passing	425μπ		0.27					
	100 _T	C			CI		СН		CV	CE
			_							
	80 +									
(%)xa	60 -									
y Inde	. "									
Plasticity Index(%)	40					_				
풉										
	20 +			A						
	0 +	IV	IL	$\downarrow \downarrow \downarrow$	M	11	МН	1	ΜV	ME
	0	10	20	30	40	50	60	70	80	90 100
					L	iquid Limit	(%)			
Approv	ed by:		Leeds Labora	itory						soil 🌣
Sushil S	Sharda						Print date 24/08/20	10		ERING
			Revision No.	2.06		Issue Date	27/07/2010		Part of VINCI Con	struction UK Limited

Project	t Name	South Humber	Channel Mar	ine Studi	es	Liqu	iid And Pla	stic		Hole ID VC23	
Project	t No.	F15842					Limit Test		Sa	mple Depth	
Engine	er	Roger Tym and	l Partners						Sam	0.00m ple Number	
Client		Yorkshire Forw	<i>r</i> ard			Test Met	hod: BS1377: Part	: 2: 1990:	Sa	001 Imple Type	
Descrip	ntion						Clause 4.3 and 5			D cimen Depth	
Descrip	Julion	Brown sandy g	Tavelly CLAY.							0.00m	
Cone Penetration - mm	27 — 25 — 23 — 21 — 19 — 17 — 15 —								Spec	imen Number 1	
	15 20		24		28		32		36	40	
					Moist	ure Conter	nt - %				
Liquid li Plastic l Plasticit	imit: limit: ty index: re conter	e content: nt of soil passing	425μm		21% 30% 14% 16% 48% 2.13	_	e retained on 425 n of sample: Wet			58%	
	100	Cl	L		CI		СН		CV	CE	
	80 -										
(%)											
Plasticity Index(%)	60 +										
ticity	40 +									1	
Plas								1			
	20					+					
	0 +	l N	IL		M	II	мн		MV	ME	
	0	10	20	30	40	50	i	70	80	90 100)
					Li	iquid Limit	(%)				
Approv	ed by:		Leeds Labora	itory							-
Sushil S							Print date 24/08/2	010	ENGINE	ERING	-
			Revision No.	2.06		Issue Date	27/07/2010		Part of VINCI Co	nstruction UK Limited	

Project N	lame	South Humber	Channel Ma	rine Stud	ies	Liqu	uid And F	Plastic		Hole ID VC23	
Project N	lo.	F15842					Limit Te	st		Sample Depth	
Engineer		Roger Tym and	l Partners						S	1.25m ample Number	r
		Yorkshire Forw				Toot Mot	thod: BS1377:	Dout 2: 100		005 Sample Type	
Client						rest iviet	Clause 4.3 an			D	
Description	on	Brown slightly	gravelly CLA	Y.						pecimen Depth 1.25m	
									Sp	ecimen Numbe 1	er
										_	
	²⁷ T										
	25 📙										
E E	23 📙										
- uo	21 📙										
etrati											
Cone Penetration - mm	19 —					/					
Coné	17 🕂										
	15 📙										
	13 📙										
	20		24		28		32		36	40)
					Moist	ure Conter	nt - %				
Natural m	oistur	e content:			17%	Percentage	e retained on	425µm si	eve:	15	5%
Liquid lim Plastic lim					31% 15%	Preparatio Remarks:	n of sample: \	Net sieve			
Plasticity	index:				16%	Nemaiks.					
Moisture Liquidity i		nt of soil passing	425µm		20% 0.31						
1	100 —				<u> </u>		CII		CVI	CE	7
		С	L		C		СН		CV	CE	
	80										-
(%)											
Index	60 +										1
Plasticity Index(%)	40										
Plast								1			
	20 +					\nearrow		\perp			-
									D 404		
	0 +	N	i		l N	•	MH		MV	ME	4
	0	10	20	30	40	50	60	70	80	90 1	.00
					L	iquid Limit	(%)				
Approved	l by:		Leeds Labo	ratorv				Ι		_	
Sushil Sha	-			,			Print date 24/	/08/2010	ENGIN	SOIL BERING	•
Susmi Sn											

Project Nar	me South Humber	r Channel Mar	ine Studies	Liqu	uid And Plast	Hole ID VC23
Project No.	F15842				Limit Test	Sample Depth
Engineer	Roger Tym and	d Partners				2.20m Sample Number
Client	Yorkshire Forv	vard		Test Me	thod: BS1377: Part 2: 1	007 1990: Sample Type
					Clause 4.3 and 5	D
Description	Brown sandy s	slightly gravell	y CLAY.			Specimen Depth 2.20m
	20 sture content:	24	28 Mo 16% 31% 14% 17%		32 nt - % e retained on 425µm on of sample: Wet sie	
Moisture con Liquidity ind	ntent of soil passing ex:	յ 425µm	19% 0.29			
1000						
100)	1		CI	СН	CV CE
80						
(%) se 60						
Plasticity Index(%)						
Sticit.						
20						
,	0 1	ЛL		MI	МН	MV ME
	0 10	20	30 40	50	60 70	80 90 100
				Liquid Limi	t (%)	
Approved by	<i>J</i> :	Leeds Labora	atory			soil \$
Sushil Shard			,	Print date 24/08/2010 ENGINEERINI		
		Revision No.	2.06	Issue Date	27/07/2010	Part of VINCI Construction UK Limited

i roject itali	ne South Humber	r Channel M	larine Stud	ies	Liquid	And Plasti	С	Hole ID VC24	
Project No.	F15842				Lir	nit Test		Sample Dept	h
Engineer	Roger Tym and	d Partners					9	0.00m Sample Numb	er
Client	Yorkshire Forv	ward			Test Method:	BS1377: Part 2: 1	990:	001 Sample Type	<u> </u>
					Clau	se 4.3 and 5		D	
Description	Grey CLAY.							pecimen Dep 0.00m	
							Sp	ecimen Num 1	ber
27									7
25									-
E 23					<u> </u>				1
Cone Penetration - mm 19 17									
etrati									
Pene 19			/						1
ğ 17									-
15									-
13									_
í	50	52		54	!	56	58	(60
				Moist	ture Content - 9	%			
Natural moist Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde	ex: tent of soil passing	ე 425μm		70% 54% 25% 29% 70% 1.55		entage retained sample: Natural	on 425µm sieve	e: (0%
Liquid limit: Plastic limit: Plasticity inde Moisture con	ex: tent of soil passing	ე 425μm		54% 25% 29% 70%	Preparation of		on 425μm sieve	<u>.</u>	0%
Liquid limit: Plastic limit: Plasticity inde Moisture con	ex: tent of soil passing x:			54% 25% 29% 70% 1.55	Preparation of Remarks:	sample: Natural			0%
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde	ex: tent of soil passing x:	g 425μm CL		54% 25% 29% 70%	Preparation of Remarks:		on 425μm sieve	CE	0%
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde	ex: tent of soil passing x:			54% 25% 29% 70% 1.55	Preparation of Remarks:	sample: Natural			0%
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde 100	ex: tent of soil passing x:			54% 25% 29% 70% 1.55	Preparation of Remarks:	sample: Natural			0%
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde 100	ex: tent of soil passing x:			54% 25% 29% 70% 1.55	Preparation of Remarks:	sample: Natural			0%
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde 100	ex: tent of soil passing x:			54% 25% 29% 70% 1.55	Preparation of Remarks:	sample: Natural			0%
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde 100 80 (%) X 80 60	ex: tent of soil passing x:			54% 25% 29% 70% 1.55	Preparation of Remarks:	sample: Natural			0%
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde 100	ex: tent of soil passing x:			54% 25% 29% 70% 1.55	Preparation of Remarks:	sample: Natural			0%
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde 100 80 (%) 60 40	ex: tent of soil passing x:	CL CL		54% 25% 29% 70% 1.55	Preparation of Remarks:	CH CH	CV	CE	0%
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde 100 80 (%) 60 40	ex: tent of soil passing x: C	ΛL	30	54% 25% 29% 70% 1.55	Preparation of Remarks:	CH MH	CV	CE	
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde 100 80 (%) 60 40	ex: tent of soil passing x:	CL CL	30	54% 25% 29% 70% 1.55	Preparation of Remarks:	CH CH	CV	CE	100
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde 100 80 (%) 60 40 20	ex: tent of soil passing x:	ЛL 20		54% 25% 29% 70% 1.55	Preparation of Remarks:	CH MH	CV	CE	100
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde 100 80 (%) 60 40	ex: tent of soil passing x: C N 0 10	ΛL		54% 25% 29% 70% 1.55	Preparation of Remarks:	CH MH 60 70	CV MV 80	CE	100

	ne South Humbe	r Channel M	larine Stud	ies		nd Plastic		Hole ID VC24	
Project No.	F15842				Lim	it Test		Sample Depth 1.00m	
Engineer	Roger Tym an	d Partners						Sample Number	r
Client	Yorkshire For	ward				61377: Part 2: 199 4.3 and 5	0:	Sample Type D	
Description	Dark grey slig	htly gravelly	CLAY.				S	Specimen Depth 1.00m	ı
27 25 23 21 21 19 17 15 13	40	44		48 Moist	52 Ture Content - %	•	Sp	1.00m pecimen Number 1	
Liquid limit: Plastic limit: Plasticity ind				73% 51% 23% 28%	Percentage retair Preparation of sa Remarks:	•	eve:	7%	6
Liquid limit: Plastic limit: Plasticity ind Moisture cor	ex: ntent of soil passinç	g 425µm		51% 23% 28% 78%	Preparation of sa	•	eve:	7%	6
Liquid limit: Plastic limit: Plasticity indo Moisture con Liquidity indo	ex: ntent of soil passing ex:			51% 23% 28% 78% 1.96	Preparation of sal Remarks:	mple: Wet sieve			6
Liquid limit: Plastic limit: Plasticity ind	ex: ntent of soil passing ex:	g 425µm		51% 23% 28% 78%	Preparation of sal Remarks:	mple: Wet sieve	eve:	7% CE	6
Liquid limit: Plastic limit: Plasticity indo Moisture cor Liquidity indo	ex: ntent of soil passing ex:			51% 23% 28% 78% 1.96	Preparation of sal Remarks:	mple: Wet sieve			6
Liquid limit: Plastic limit: Plasticity indo Moisture con Liquidity indo 100	ex: ex: ex:			51% 23% 28% 78% 1.96	Preparation of sal Remarks:	mple: Wet sieve			
Liquid limit: Plastic limit: Plasticity inde Moisture cor Liquidity inde	ex: ntent of soil passing ex:			51% 23% 28% 78% 1.96	Preparation of sal Remarks:	mple: Wet sieve			6
Liquid limit: Plastic limit: Plasticity indo Moisture con Liquidity indo 100	ex: ntent of soil passing ex:			51% 23% 28% 78% 1.96	Preparation of sal Remarks:	mple: Wet sieve			6
Liquid limit: Plastic limit: Plasticity inde Moisture cor Liquidity inde 100 80 (%) 60 40	ex: Intent of soil passing ex:			51% 23% 28% 78% 1.96	Preparation of sal Remarks:	mple: Wet sieve			6
Liquid limit: Plastic limit: Plasticity inde Moisture con Liquidity inde 100 80 60 40	ex: Intent of soil passing ex:	CL CL	30	51% 23% 28% 78% 1.96	Preparation of sal Remarks:	mple: Wet sieve	CV	CE	000
Liquid limit: Plastic limit: Plasticity inde Moisture cor Liquidity inde 100 80 (%) 60 20	ex: ntent of soil passing ex:	CL CL	30	51% 23% 28% 78% 1.96	Preparation of sal Remarks:	mple: Wet sieve	CV	CE	
Liquid limit: Plastic limit: Plasticity index Moisture cor Liquidity index (%) 80 (%) 60 20	ex: Intent of soil passing ex:	ML 20		51% 23% 28% 78% 1.96	Preparation of sal Remarks: CH M 50 6	mple: Wet sieve	CV	CE	000
Individual limit: Plastic limit: Plasticity index Moisture cor Individual limit: 100 80 (%) 60 20	ex: Intent of soil passing ex: O O O O O O O O O O O O O	CL CL		51% 23% 28% 78% 1.96	Preparation of sal Remarks: CH M 50 6	H 70	CV MV 80	CE	.00

Project	Name	South Humber	Channel Ma	arine Stud	ies	Liqu	uid And P	lastic		Hole ID VC24	
Project	: No.	F15842					Limit Tes	st	9	Sample Depth	
Engine	or	Roger Tym and	1 Dartnore						Sa	3.00m ample Number	
	CI									007	
Client		Yorkshire Forw	<i>v</i> ard			Test Met	thod: BS1377: P Clause 4.3 and			Sample Type D	
Descrip	tion	Brown sandy C	CLAY.			<u>I</u>			Sp	ecimen Depth 3.00m	
									Spe	ecimen Numbe	er
										1	
	27									1	
	25										
Ε											
E - C	23					_	•				
ration	21										
enet	19				/						
Cone Penetration - mm	17										
Ű	15										
	13 \				/0		52		FC		
	40		44		48 Moist	ure Conter	52 at - %		56	60	
					WOISE	are conter	70				
Natural Liquid li		e content:			21% 49%		percentage re n of sample: N		25µm sieve:	0%	
Plastic li					24%	Remarks:	n or sample. N	aturai			
	y index:	nt of soil passing	425um		25% 21%						
Liquidity		nt or son passing	123μπ		-0.12						
	100 _T	C	L		CI		СН		CV	CE	1
	80 +										
(%)×											
Inde	60 +										
Plasticity Index(%)	40 +									1	
Plas											
	20										
						.			B 40 4		
	0 +	N	i		M		МН		MV	ME	ļ
	0	10	20	30	40	50	60	70	80	90 10	00
					Li	iquid Limit	: (%)				
Λ κα τα τι τ	ad b		ا ماماما داد -	roto».							
Approve Sushil S			Leeds Labo	iatory					ENGIN	SOIL EERING	•
24311113			Revision No.	2.06		Issue Date	Print date 24/0 27/07/2010	08/2010	Part of VINCI	Construction UK Limite	ed

Project	Name	South Humber	Channel Mar	ine Studie	ies Liquid And Plasti					Hole ID VC25	
Project	No.	F15842					Limit Tes	t	S	ample Depth	
Engine	er	Roger Tym and	Partners						Sa	0.00m mple Number	•
Client		Yorkshire Forw				Test Met	hod: BS1377: Pa	art 2: 1990).	001 Sample Type	
			aru			TCSt IVICE	Clause 4.3 and			D	
Descrip	tion	Brown CLAY.								ecimen Depth 0.00m	
Cone Penetration - mm	27				•				Spe	1	er
	20		24		28 Moist	ure Conter	32 nt - %		36	40	
Liquid lii Plastic li Plasticit	mit: imit: :y index: re conter	e content: nt of soil passing	425µm		66% 28% 16% 12% 66% 4.17		percentage ret n of sample: Na		ч2 <i>э</i> µш мече.	0%	
	100 _T	C			CI		СН		CV	CE	1
	80 +									62	
(%											
ndex(º	60										
Plasticity Index(%)	40 -										
Plast								1			
	20					+					-
	0 +	IV			M	II	МН		MV	ME	
	0	10	20	30	40 Li	50 iquid Limit	60 (%)	70	80	90 1	00
Approve Sushil S			Leeds Labora	atory					ENGIN	SOIL EERING	•
545/111 5			Revision No.	2.06		Issue Date	Print date 24/08 27/07/2010	8/2010	Part of VINCI	Construction UK Limit	ted

Project Name	Project Name South Humber Channel Marine Studies					uid And	Plastic		Hole ID VC25	
Project No.	F15842					Limit T	est		Sample Depth	
Engineer	Roger Tym and	l Partners							0.55m Sample Number	•
	Yorkshire Forw				Toot Mo	thod: BS137	7. Dout 2. 10		002 Sample Type	
Client					rest ivie	Clause 4.3			D	
Description	Brown sandy s	lightly grave	lly CLAY.						Specimen Depth 0.55m	
								S	pecimen Numbe 1	er
								<u> </u>		
27										
25 -										
돌 23 -										
.e. 21 -			•							
etrati]	
Cone Penetration - mm 19 - 17 - 17 - 17 - 17 - 17 - 17 - 17 -			5							
9 17 -										
15 -										
13										
30)	32	\$	34		36		38	40	
				Moist	ure Conte	nt - %				
Natural moistu	ıre content:			17%	Percentac	je retained o	on 425µm s	sieve:	8%	, D
Liquid limit:				33%	Preparation	on of sample				
Plastic limit: Plasticity index	C			16% 17%	Remarks:					
Moisture conto	ent of soil passing	425µm		19% 0.18						
Liquidity index	•			J.16						
100										
	С	L		С	l	СН		CV	CE	
80 -										-
(%)										
op luger										-
city I										
Plasticity Index(%)										
20										-
				_						
0 -	N			N		MH		MV	ME	_
	0 10	20	30	40	50	60	70	80	90 10	00
				L	iquid Limi	t (%)				
		T								
Approved by:		Leeds Labo	ratory							A
Approved by: Sushil Sharda		Leeds Labo	ratory			Print date	24/08/2010	ENGI	SOIL SOIL	•

	Project Name South Humber Channel Marine Studies					And Plast	tic	Hole ID VC25		
Project No.	F15842				Li	mit Test		Sample Depth		
Engineer	Roger Tym and	l Partners						1.32m Sample Number		
Client	Yorkshire Forw	vard			Test Method	: BS1377: Part 2:	1990:	005 Sample Type		
						use 4.3 and 5		D		
Description	Brown sandy g	ravelly CLAY						Specimen Depth 1.32m		
							S	pecimen Number 1	r	
27										
27 -										
25 -								_		
E 23 -								•		
. <u>i</u> j 21 -						\				
netra 19 -										
Cone Penetration - 12 - 17 - 17 - 17 - 17 - 17 - 17 - 17										
_										
15 -				•						
13 -				2.						
2	20	22		24 Moist	ure Content -	26 %	28	30		
				1010101	die content	70				
Natural moist	ure content:			15%	Percentage re	tained on 425µı	m sieve:	52%	6	
Liquid limit				26%	_		01/0			
Liquid limit: Plastic limit:				26% 13%	_	sample: Wet si	eve			
Plastic limit: Plasticity inde		425um		13% 13%	Preparation of		eve			
Plastic limit: Plasticity inde	tent of soil passing	425µm		13%	Preparation of		eve			
Plastic limit: Plasticity inde Moisture cont	tent of soil passing	425μm		13% 13% 32%	Preparation of		eve			
Plastic limit: Plasticity inde Moisture cont	tent of soil passing x:			13% 13% 32%	Preparation of Remarks:		eve	CE		
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100	tent of soil passing x:			13% 13% 32% 1.46	Preparation of Remarks:	sample: Wet si		CE		
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100	tent of soil passing x:			13% 13% 32% 1.46	Preparation of Remarks:	sample: Wet si		CE		
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100	tent of soil passing x:			13% 13% 32% 1.46	Preparation of Remarks:	sample: Wet si		CE		
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100	tent of soil passing x:			13% 13% 32% 1.46	Preparation of Remarks:	sample: Wet si		CE		
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100	tent of soil passing x:			13% 13% 32% 1.46	Preparation of Remarks:	sample: Wet si		CE		
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100 80 (%) 60	tent of soil passing x:			13% 13% 32% 1.46	Preparation of Remarks:	sample: Wet si		CE		
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100	tent of soil passing x:			13% 13% 32% 1.46	Preparation of Remarks:	sample: Wet si		CE		
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100 80 (%) 60 40 20	tent of soil passing x:			13% 13% 32% 1.46	Preparation of Remarks:	CH CH		CE		
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100 80 60 40	tent of soil passing x:		30	13% 13% 32% 1.46	Preparation of Remarks:	sample: Wet si	CV			
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100 80 (%) 60 40 20	tent of soil passing x:	L IL		13% 13% 32% 1.46	Preparation of Remarks:	CH MH 60 70	CV	ME		
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100 80 (%) 60 20 0	tent of soil passing x: CI N 0 10	IL 20	30	13% 13% 32% 1.46	Preparation of Remarks:	CH MH 60 70	CV	ME 90 10	00	
Plastic limit: Plasticity inde Moisture cont Liquidity inde: 100 80 (%) 60 40 20	tent of soil passing x: CI N 0 10	L IL	30	13% 13% 32% 1.46	Preparation of Remarks:	CH MH 60 70	CV MV 0 80	ME 90 10		

Projec	t Name	South Humber	Channel Mar	rine Studi	es	Liquid And Plastic Hole ID VC26				
Projec	t No.	F15842					Limit Test		Sample Depth 0.00m	
Engine	eer	Roger Tym and	l Partners							ple Number
Client		Yorkshire Forw	<i>ı</i> ard			Test Met	:hod: BS1377: Part	2: 1990:	Sai	001 nple Type
Descri	ntion	Grey CLAY.					Clause 4.3 and 5			D imen Depth
D 00011	pt.011	CIEY CLAT.								0.00m nen Number
									эресп	1
	27 —		<u> </u>							
	25 —									
۶										
- m	23						/	<u> </u>		
ratior	21									
Penet	19					/				
Cone Penetration - mm	17				-					
	15									
	13									
	50		54		58		62	6	6	70
					Moist	ure Conter	nt - %			
Natura	l moistur	e content:			83%	Estimated	percentage retair	ned on 425	um sieve:	0%
Liquid l	limit:				61%	Preparatio	n of sample: Natu			
Plastic Plastici	limit: ty index:				25% 36%	Remarks:				
Moistu	re conter	nt of soil passing	425µm		83%					
Liquiai	ty index:				1.61					
	100 _									
		CI	L		CI		СН		CV	CE
	80									
(%)										
Plasticity Index(%)	60 +									
ticity	` 40 									
Plas								1		
	20					_				
	0 +	N.	1L	+	M	11	МН	N	ЛV	ME
	0 +	10	20	30	40	50	İ	70	1	90 100
					Li	iquid Limit	(%)			
			1	-1				<u> </u>		
Approv Sushil	-		Leeds Labora	atory			Drint data		NGINE	SOIL † ERING
			Revision No.	2.06		Issue Date	Print date 24/08/20 27/07/2010		Part of VINCI Con	struction UK Limited

Project Name	Project Name South Humber Channel Marine Studies					nd Plastic	C	Hole ID VC26		
Project No.	F15842				Limi	t Test		Sample Depth		
Engineer	Roger Tym and	l Partners					9	1.05m ample Number		
Client	Yorkshire Forw				Test Method: BS	1277: Dart 2: 10		002 Sample Type		
						4.3 and 5		D		
Description	Brown sandy s	lightly grave	lly CLAY.					pecimen Depth 1.05m		
							Sp	ecimen Number 1		
²⁷ T										
25 -										
돌 23 -					•	•				
.e. 21 -										
etrat										
Cone Penetration - mm 19 - 17 - mm										
ğ 17 -										
15 -										
13										
20)	24	28		32		36	40		
			N	loisture	e Content - %					
Natural moistu	re content:		169	% Pe	rcentage retain	ed on 425µm :	sieve:	26%		
Liquid limit: Plastic limit:			31 ^o		eparation of sar marks:	nple: Wet siev	е			
Plasticity index			169	%	illaiks.					
Moisture conte	ent of soil passing	425µm	22 ⁰ 0.4							
				<u> </u>						
100 -	C			Cl	CII		CVI	CE		
		_		CI	СН		CV	CE		
80 -										
(%										
<u> </u>	1									
60 - 60 -										
icity Index(9										
Plasticity Index(%)										
Plasticity Index(9										
20 -	N	i		MI	MI	1	MV	ME		
20 -	N 10	1L 20	30 4)	50 6	Ī	MV 80	ME 90 100		
20 -	1	i	30 4)	Ť	1	İ	•		
0 -	1	20)	50 6	1	İ	90 100		
20 -	1	i)	50 6	1	80	•		

Project Nam	Project Name South Humber Channel Marine Studies					Liquid And Plastic				Hole ID VC26	
Project No.	F15842					Limi	t Test		Sample Depth 3.60m		
Engineer	Roger Tym and	l Partners							Sample Number		
Client	Yorkshire Forw	<i>ı</i> ard			Test Me	ethod: BS:	1377: Part 2	: 1990:	005 Sample Type		
Description	Brown sandy s		CLAV				4.3 and 5			D cimen Dept	h
Description	Brown sandy s	lignly gravell	y CLAY.							3.60m	
									Speci	men Numb 1	er
27 -											
					•						
25 -											
E 23 -				<i>f</i>							
ration -											
enetr 19 -											
Cone Penetration - mm - 17 - 17 - 17			✓								
15 -											
13 -											
2	0	24	:	28		32		3	6	40	0
				Moist	ure Conte	nt - %					
Natural moist	ure content:			14%	Percentag	ge retaine	ed on 425µ	m sieve:		1	5%
Liquid limit: Plastic limit:				28% 13%	Preparation		nple: Wet s	ieve			
Plasticity inde			•	15%	Remarks.						
Moisture cont Liquidity index	ent of soil passing	425µm		17% 0.27							
100	C	L		С		СН		С	V	CE	٦
80											1
(%) 60											
ty Ind											1
Plasticity Index(%)					+						_
20			A								7
0	N	IL		N	11	MI	1	N	۸V	ME	_
	0 10	20	30	40	50	60	0 7	0	80	90	100
				L	iquid Limi	t (%)					
Approved by:		Leeds Labor	ratorv								^
Sushil Sharda			,			Print date	24/08/2010		NGINE	SOIL ERING	. •
		Revision No.	2.06		Issue Date		7/2010		Part of VINCI Co	nstruction UK Lim	nited

Project Name South Humber Channel Marine Studies					=	And Plast	ic	Hole ID VC27		
Project No.	F15842				Lir	nit Test		Sample Depth 4.77m		
Engineer	Roger Tym an	d Partners						Sample Number 004		
Client	Yorkshire Forv	vard				BS1377: Part 2: se 4.3 and 5	1990:	Sample Type D		
Description	Brown slightly	gravelly CLA	Y.					Specimen De 4.77m	epth	
								Specimen Nu	mber	
27	_								_	
25										
E 23										
ation 21										
eneti 19				•					_	
Cone Penetration - mm 19 17										
ں 15			•							
13		24	28			+ 32	36		⊣ 40	
Natural mois	ture content:				re Content - 9 Percentage reta	6 ained on 425µr	n sieve:		10%	
Liquid limit: Plastic limit: Plasticity indo Moisture con Liquidity inde	tent of soil passing	յ 425µm	30 14 16 17 0.1	% % % %		sample: Wet sie				
100		L		CI		СН	CV	CE		
80										
60 60	-									
Plasticity Index(%)	-									
20						-				
a	N N	ЛL		М		МН	MV	ME		
	0 10	20	30 4	0	50	60 70) 80	90	100	
				Lie	quid Limit (%)					
Approved by		Leeds Labo	ratory					80	ir 💠	
Sushil Shard	a	Revision No.	2.00		Print d			of VINCI Construction UK		
		Revision No.	2.06		ssue Date 2	7/07/2010	Part	or virger construction UK	шинеа	

Project Name South Humber Channel Marine Studies					Liquid And Plastic				Hole ID VC28
Project No.	F15842					Limit To	est		Sample Depth
Engineer	Roger Tym and	l Partners						:	0.00m Sample Number
Client	Yorkshire Forw	<i>ı</i> ard			Test Met	hod: BS1377	: Part 2: 19	90:	001 Sample Type
Description						Clause 4.3 a	nd 5		D Specimen Depth
Description	Brown sandy g	lavelly CLAY.							0.00m
Liquidity index	re content: c ent of soil passing	24 425µm	19 29 14 19 29		_	32 at - % e retained or n of sample:		36	pecimen Number 1 40
100	С	L		С	I	СН		CV	CE
80					-		+		
(%) 60									
Plasticity Index(%)									
lastici 04									
20									
25									
0	N	i i		1	11	МН		MV	ME
	0 10	20	30 4	40 L	50 iquid Limit	60 (%)	70	80	90 100
Approved by:		Leeds Labora	atory						SOIL
Sushil Sharda		Revision No.	2.06		Issue Date	Print date 27/07/201	4/08/2010		NEERING CI Construction UK Limited
1		NEVISION NO.	2.00		issue Dale	21/01/203		i dit Oi VIIV	

Project Name South Humber Channel Marine Studies				Liqu	id And Plasti	Hole ID VC28
Project No.	F15842				Limit Test	Sample Depth
Engineer	Roger Tym and	l Partners				0.70m Sample Number
Client	Yorkshire Forw	<i>ı</i> ard		Test Met	hod: BS1377: Part 2: 1	004 1990: Sample Type
Description			CLAV		Clause 4.3 and 5	D Specimen Depth
Description	Brown sandy s	lightly gravelly	CLAY.			0.70m
27 - 25 - 26 - 27 - 28 - 29 - 29 - 21 - 20 - 21 - 20 - 21 - 21 - 21 - 21 - 21 - 21 - 21 - 21	ure content: x: ent of soil passing	24 425µm	28 Mois 16% 28% 14% 14% 19% 0.36	_	32 at - % e retained on 425µm n of sample: Wet sie	
100						
100	С	L	С	;I	СН	CV CE
80						
(%)						
Plasticity Index(%)						
sticity 05						
Plas						
20						
0	N	1L		ΛI	МН	MV ME
	0 10	20	30 40	50	60 70	80 90 100
			I	iquid Limit	(%)	
Approved by:		Leeds Laborat	orv			SOIL O
Sushil Sharda					Print date 24/08/2010	ENGINEERING ENGINEERING
		Revision No.	2.06	Issue Date	27/07/2010	Part of VINCI Construction UK Limited

Project Nam	Project Name South Humber Channel Marine Studi								Hole ID VC28		
Project No.	F15842					Limit	Test		Sample Depth 1.90m		
Engineer	Roger Tym and	l Partners							Sample Number		
Client	Yorkshire Forw	<i>ı</i> ard			Test Me	ethod: BS1	377: Part 2	: 1990:	: 006 : Sample Type		
Description			II. CLAV			Clause 4			D Specimen Depth		<u> </u>
Description	Brown sandy s	libritly grave	IIY CLAY.							1.90m	
									Specii	nen Numb 1	er
27 -											
25 -					•						
E 23 -											
- 12 agi.											
Cone Penetration - mm - 17 - 17 - 17											
e 17 -											
ن 15 -											
13 - 2	0	24		28		32		36	j	40)
				Moist	ure Conte	nt - %					
Natural moist	ire content:			14%	Percentag	ne retaine	d on 425µ	m sieve		13	1%
Liquid limit:				28%	Preparation	on of sam	ple: Wet si				
Plastic limit: Plasticity inde	x:			12% 16%	Remarks:						
Moisture cont Liquidity index	ent of soil passing	425µm		17% 0.31							
Liquidity index	λ.			0.31							
100	С					CII		C\	/	CE	7
		L		C		СН		C,	/	CE	
80											-
(%)×											
Plasticity Index(%)											
officity 40											_
Plas											
20			A		-						-
0	N	1L	+	N	II .	МН		M	V	ME	
	0 10	20	30	40	50	60	7	0 8	30	90 1	⊣ .00
				L	iquid Limi	t (%)					
Approved by:		Leeds Labo	ratory								•
Sushil Sharda						Print date	24/08/2010		IGINE	ERING	
		Revision No.	2.06		Issue Date	27/07/	/2010	Р	art of VINCI Con	struction UK Limi	ted

Project Name South Humber Channel Marine Studies					Liquid	And Pla	stic	Hole ID VC29		
Project No.	F15842				Lin	nit Test		Sample Dep	oth	
Engineer	Roger Tym ar	d Partners						0.00m Sample Num	nber	
Client	Yorkshire For	ward			Test Method:	BS1377: Part	2: 1990:	001 Sample Ty	pe	
Description	Brown CLAY.					se 4.3 and 5		D Specimen Depth		
27	DIOWII CEAT.							0.00m Specimen Nu 1		
25										
E 23				•						
etration 21										
Cone Penetration - mm 19 17										
15										
13	<u> </u> 60	64		68			76		 80	
Natural mois Liquid limit: Plastic limit: Plasticity ind Moisture con Liquidity inde	ex: ntent of soil passin	g 425µm		100% 67% 26% 41% 100% 1.80	Estimated perc Preparation of s Remarks:			sieve:	0%	
100		CL		С	1	СН	CV	CE		
80) -									
(%) 60) -									
Plasticity Index(%))									
20)			_						
		ML		N	11	МН	MV	ME		
0	0 10	20	30	40	50	i	70 80	•	100	
				L	iquid Limit (%)					
Approved by Sushil Shard	r:	Leeds Lab	oratory	L	iquid Limit (%)	ate 24/08/20		SO SINEERIN		

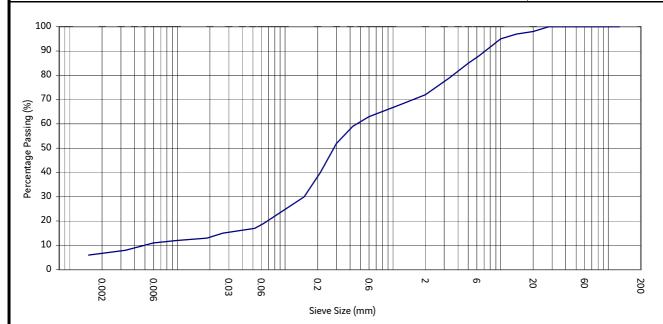
Project Nam	e South Humber	r Channel Mar	ine Studies	Liq	uid And Plast	ic Hole ID VC29
Project No.	F15842				Limit Test	Sample Depth
Engineer	Roger Tym and	d Partners				2.00m Sample Number
Client	Yorkshire Forv	vard		Test Me	thod: BS1377: Part 2:	990: 006 Sample Type
Description	Brown sandy s	lightly gravell	, CLAV		Clause 4.3 and 5	D Specimen Depth
Becompaion	brown sandy s	siigiitiy graveii	y CLAT.			2.00m
Natural moist Liquid limit: Plastic limit: Plasticity inde Moisture cont	x: ent of soil passing	24 24	17% 33% 15% 18%	Preparation Remarks:	32 nt - % ge retained on 425µm on of sample: Wet sie	
Liquidity index	C.		0.17			
100	C	L		CI	СН	CV CE
80						
Plasticity Index(%)						
city In						
Plastic 05						
20						
		41		MI	N 411	NA)/
0	0 10	/IL 20	30 40	MI 50	MH 60 70	MV ME 80 90 100
	0 10	20	50 40	Liquid Limi		. 50 50 100
		T				
Approved by: Sushil Sharda		Leeds Labora	itory		Print data 27/09/2010	SOIL ♦
		Revision No.	2.06	Issue Date	Print date 24/08/2010 27/07/2010	Part of VINCI Construction UK Limited

Projec	t Name	South Humber	Channel Mar	ine Studie	es	Liqu	iid And Pla	stic		Hole ID VC30
Projec	t No.	F15842					Limit Test		Sa	mple Depth
Engine	eer	Roger Tym and	l Partners			San	0.00m nple Number			
Client									Si	001 ample Type
Descri	ntion	Greyish brown	CLAV				Clause 4.3 and 5			D cimen Depth
Descri	ption	Greyisii brown	CLAY.							0.00m imen Number
									Spec	1
	27 —									
								•		
E	25 —									
- mr	23						-			
ration	21									
eneti	19				 	•/				
Cone Penetration - mm	17									
	15									
	13									
	50		54		58		62		66	70
					Moist	ure Conter	nt - %			
Natura	l moistur	e content:			100%	Fetimated	percentage reta	ined on 42	Sum sieve:	0%
Liquid I	limit:	e content.			60%	Preparatio	n of sample: Nat		oμin sieve.	070
Plastic Plastici	limit: ty index:				26% 34%	Remarks:				
Moistu	re conter	nt of soil passing	425µm		100%					
Liquidit	ty index:				2.18					
	100									
	100	CI	L		CI		СН		CV	CE
	80 -									
(%										
₆)xəpı	60									
city In	,									
Plasticity Index(%)	40 +			+ 1			A	1		
	20									
	0 +	IV	i i		M	•	МН		MV	ME
	0	10	20	30	40	50	60	70	80	90 100
					Li	iquid Limit	(%)			
A n n :: -:	rod by		Looda Labarr	ntor.				1		
Approv Sushil	-		Leeds Labora	itory			Duint date		ENGINE	SOIL ? ERING
			Revision No.	2.06		Issue Date	Print date 24/08/2 27/07/2010	2010	Part of VINCI Co	onstruction UK Limited

Project Nam	e South Humber	Channel Mai	rine Studies		Liqu	uid And P	lastic		Hole ID VC30
Project No.	F15842				Limit Tes	it	:	Sample Depth	
Engineer	Roger Tym and	l Partners				S	1.00m Sample Number		
Client	Yorkshire Forw	vard			Test Met	:hod: BS1377: P		003 Sample Type	
						Clause 4.3 and			D
Description	Greyish brown	CLAY.							pecimen Depth 1.00m
27 - 25 - 25 - 27 - 27 - 28 - 29 - 21 - 21 - 21 - 21 - 21 - 21 - 21 - 21	ure content: x: ent of soil passing	54 425µm	7 5 2 3	58 Moist 75% 58% 27% 81% 75%		62 nt - % percentage rei		66	ecimen Number 1
100	С	L		С	I	СН		CV	CE
80									
Plasticity Index(%)									
sticity I									
Plast						A			
20					$\overline{}$				
_	N	1L	+	I.	11	МН		MV	ME
0	0 10	20	30	40	50	60	70	80	90 100
					iquid Limit				
Approved by:		Leeds Labor	atorv						SOIL O
Sushil Sharda					<u> </u>	Print date 24/0	8/2010	ENGIN	SOILY
		Revision No.	2.06		Issue Date	27/07/2010		Part of VINCI	Construction UK Limited

Project Name	e South Humber	Channel Mar	ne Studies		Liq	uid A	nd Plas	tic		Hole ID VC30	
Project No.	F15842					Limi	t Test		Sa	mple Depth	1
Engineer Roger Tym and Partners										1.66m Sample Number	
			Toot Mo	thad: DC	1377: Part 2	o. 1000.		004 mple Type			
Client	Yorkshire Forw	rward			rest ivie		4.3 and 5	2. 1990.		D	
Description	Brown slightly	sandy slightly	gravelly CLA	<i>1</i> .					-	cimen Dept 1.66m	
									Spec	imen Numb 1	er
										<u>-</u>	
27 -											
25 -											
.0. 21 -											
etrati											
Cone Penetration - mm - 17 - 17 - 17 - 17 - 17 - 17 - 17			,								
9 17 -											
15 -			4								
13 -											
2	0	24	28			32		3	6	4	0
			N	1oist	ure Conte	nt - %					
Natural moist	ure content:		17'	%	Percentag	je retain	ed on 425µ	ım sieve:		1	2%
Liquid limit: Plastic limit:			29 ⁰		Preparation Remarks:	on of sar	mple: Wet s	ieve			
Plasticity inde			159	%	Nemaiks.						
Moisture cont Liquidity index	ent of soil passing 	425µm	20 ⁰ 0.4								
	<u>. </u>		<u> </u>		l						
100	C					CII			·	CE	_
		L		С	'	СН			.V	CE	
80											_
(%):											
ndex 60											=
Plasticity Index(%)										1	
Plast						_					
20					\nearrow						_
						B # 1			4)/	N 45	
0	N 10	1		<u>N</u>	•	MI			ΛV	ME	
	0 10	20	30 4		50	6	υ 7	0	80	90	100
				L	iquid Limi	ι (%)					
Approved by:		Leeds Labora	torv					<u> </u>			_
Sushil Sharda						Print date	24/08/201		NGINE	SOIL ERINC	-9
1		Revision No.	2.06		Issue Date		7/2010		Part of VINCI Co	nstruction UK Lin	nited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
Project No.	F15842	Distribution	VC01 Sample Depth
			0.76m
Engineer	Roger Tym and Partners		Sample Number
			003
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown slightly clayey gravelly SAND		Specimen Depth
			0.76m
			Specimen No.
			1



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT			SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 6

 Silt:
 12

 Sand:
 54

 Gravel:
 28

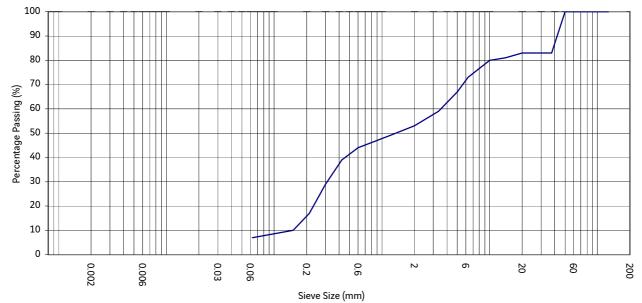
 Cobbles:
 0

General remarks

	WET	SEDIMENTATIO	N DATA					
Sieve size mm	Cumulative	% S	ieve size	mm	Cumulative	%	Equivalent	Cumulative
	passing				passing		particle	% passing
			14.0		97		diameter	
			10.0		95		0.0521	17
			6.3		88		0.0264	15
125.0	100		5.0		85		0.0188	13
100.0	100		3.35		79		0.0098	12
75.0	100		2.00		72		0.0060	11
63.0	100		1.18		68		0.0033	8
50.0	100		0.600)	63		0.0015	6
37.5	100		0.425		59			
28.0	100		0.300)	52			
20.0	98		0.212		40			
			0.150)	30			
			0.063		19			

Approved by:	Leeds Laboratory				soı∟≎
Stuart Kirk			Print date	24/08/2010	ENGINEERING
	Revision No. 3.02	Issue Date	27/07/20	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
		B:	VC01
Project No.	F15842	Distribution	Sample Depth
•			1.00m
Engineer	Roger Tym and Partners		Sample Number
· ·			004
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2	Sample type
		B3 1377. Part 2. 1330. 3.2	D
Description	Brown gravelly SAND.		Specimen Depth
			1.00m
			Specimen No.
			1



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT			SAND		G	RAVE	L	COBBLES

PARTICLE SIZE % General remarks

7 Silt and clay:

Sand: 46 Gravel: 47 0

Cobbles:

Sample size was insufficient to be representative of particle size distribution

	WET	SIEVE DATA			
Sieve size mm	Cumulative	% Sieve	e size mn	n Cumulative	%
	passing			passing	
			14.0	81	
			10.0	80	
			6.3	73	
125.0	100		5.0	67	
100.0	100		3.35	59	
75.0	100		2.00	53	
63.0	100		1.18	49	
50.0	100		0.600	44	
37.5	83		0.425	39	
28.0	83		0.300	29	
20.0	83		0.212	17	
			0.150	10	
			0.063	7	

Approved by: Sushil Sharda Leeds Laboratory Print date 24/08/2010 Revision No. 3.02 Issue Date 27/07/2010 Part of VINCI Construction UK Limited			0.000				
Sushii Sharda Print date 24/08/2010	Approved by:	Leeds Laboratory					soi∟∳
Revision No. 3.02 Issue Date 27/07/2010 Part of VINCI Construction UK Limited	Sushil Sharda				Print date	24/08/2010	ENGINEERING
		Revision No. 3.02		Issue Date	27/07/20	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
i roject ivallic	South Hamber chainer warme stadies		VC01
Project No.	F15842	Distribution	Sample Depth
Engineer	Roger Tym and Partners		2.90m Sample Number
Engineer	Roger Tylli and Partilets		005
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2	Sample type
			D
Description	Light brown slightly clayey SAND and GRAV	EL	Specimen Depth 2.90m
			Specimen No.
			1
100			
90			
80			
70			
%) 60 H			
assi			
Percentage Passing (%)			
9 40 H			
g 30			
20		/	
		1	
10			
о Ш		0 0 6	
	0.2 0.06 0.03 0.006	0.6	200
	Sieve	Size (mm)	
CLAY			AVEL COBBLES
	Genera	remarks	
PARTICLE SIZE	%		
Silt and clay: Sand:	9 44		
Sand: Gravel:	47		
Cobbles:	0		
Ci	WET SIEVE DATA	m Cumulativa	
Sieve size m	nm Cumulative % Sieve size m passing	m Cumulative % passing	
	passing 14.0	92	
	10.0	87	
	6.3	73	
125.0	100 5.0	66	
100.0	100 3.35	59	
75.0 63.0	100 2.00 100 1.18	53 49	
50.0	100 1.18	49 42	
37.5	100 0.425	35	
28.0	100 0.300	21	
20.0	98 0.212	13	
	0.150	10 9	
Approved by:	0.063 Leeds Laboratory	9	•
Approved by:	Leeus Laboratory		SOIL ? ENGINEERING
Stuart Kirk		Print date 24/08/2010	
	Revision No. 3.02	Issue Date 27/07/2010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC02
Project No.	F15842	Distribution	Sample Depth
Engineer	Roger Tym and Partners		0.00m Sample Number
_			001
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2	Sample type B
Description	Brown gravelly SAND.		Specimen Depth
			0.00m Specimen No.
			1
100			
90			
80			
70			
%) 60			
Percentage Passing (%)			
40 Lutage		/	
30			
20			
10			
0 111	0.06	0. 0. 6	60
		e Size (mm)	
	Fine Medium Coarse Fine	Medium Coarse Fine Medium	n Coarse
CLAY		AND GRAVE	
	Gener	al remarks	
PARTICLE SIZE	%		
Silt and clay:	14		
Sand: Gravel:	56 30		
Cobbles:	0		
	WET SIEVE DATA		
Sieve size n		nm Cumulative % passing	
	14.0	96	
	10.0	91	
125.0	6.3 100 5.0	83 78	
100.0	100 3.35	74	

	WE	T SIEVE D	ATA			
Sieve size mm	Cumulative	%	Sieve size mm	Cumulative	%	
	passing			passing		
			14.0	96		
			10.0	91		
			6.3	83		
125.0	100		5.0	78		
100.0	100		3.35	74		
75.0	100		2.00	70		
63.0	100		1.18	68		
50.0	100		0.600	63		
37.5	100		0.425	58		
28.0	100		0.300	43		
20.0	98		0.212	30		
			0.150	25		
			0.063	14		
pproved by:	Leed	ds Laborat	ory		•	SOIL
ushil Sharda			-			ENGINEERING

Print date

27/07/2010

Issue Date

24/08/2010

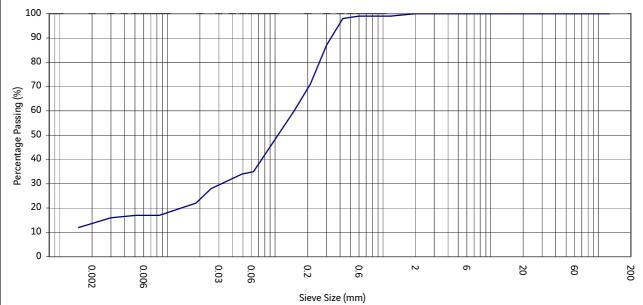
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Sushil Sharda

Revision No.

3.02

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
		Distribution	VC06
Project No.	F15842	Distribution	Sample Depth
			0.00m
Engineer	Roger Tym and Partners		Sample Number
			001
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type
		BS 1377. Falt 2. 1990. 9.2, 9.3	В
Description	Brown silty SAND.		Specimen Depth
			0.00m
			Specimen No.
			1



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT			SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 13

 Silt:
 22

 Sand:
 64

 Gravel:
 0

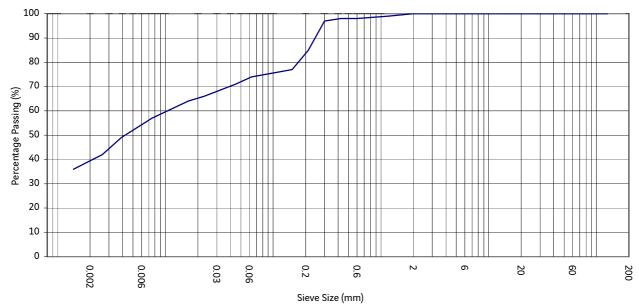
 Cobbles:
 0

General remarks

	WE.	T SIEVE I	DATA			SEDIMENTA	TION DATA
Sieve size mm	Cumulative	%	Sieve size	mm Cumulative	%	Equivalent	Cumulative
	passing			passing		particle	% passing
			14.0	100		diameter	
			10.0	100		0.0492	34
			6.3	100		0.0254	28
125.0	100		5.0	100		0.0184	22
100.0	100		3.35	100		0.0084	17
75.0	100		2.00	100		0.0051	17
63.0	100		1.18	99		0.0030	16
50.0	100		0.600	99		0.0015	12
37.5	100		0.425	98			
28.0	100		0.300	87			
20.0	100		0.212	71			
			0.150	60			
			0.063	35			

Approved by:	Leeds Laboratory					soı∟♦
Sushil Sharda				Print date	24/08/2010	ENGINEERING
	Revision No. 3.03	2	Issue Date	27/07/20)10	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
Duaisat Na	F15842	Distribution	VC06 Sample Depth
Project No.	F15842		4.68m
Engineer	Roger Tym and Partners		Sample Number
			004
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown sandy CLAY.		Specimen Depth
			4.68m
			Specimen No.
			1



$CL\Delta Y$	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 39

 Silt:
 35

 Sand:
 26

 Gravel:
 0

 Cobbles:
 0

General remarks

	WE.	T SIEVE I	DATA			SEDIMENTA	TION DATA
Sieve size mm	Cumulative	%	Sieve size	mm Cumulative	%	Equivalent	Cumulative
	passing			passing		particle	% passing
			14.0	100		diameter	
			10.0	100		0.0449	71
			6.3	100		0.0229	66
125.0	100		5.0	100		0.0163	64
100.0	100		3.35	100		0.0075	57
75.0	100		2.00	100		0.0039	49
63.0	100		1.18	99		0.0026	42
50.0	100		0.600	98		0.0014	36
37.5	100		0.425	98			
28.0	100		0.300	97			
20.0	100		0.212	85			
			0.150	77			
			0.063	74			

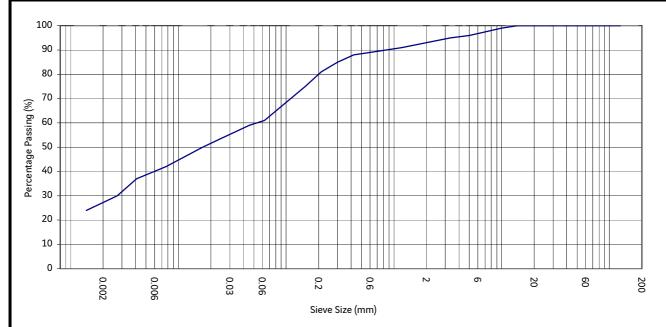
Approved by:	Leeds Laboratory				soı∟≎
Sushil Sharda			Print date	24/08/2010	ENGINEERING
	Revision No. 3.02	Issue Date	27/07/20)10	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC08
Project No.	F15842	Distribution	Sample Depth
Engineer	Roger Tym and Partners		1.70m Sample Number 002
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2	Sample type B
Description	Greyish brown SAND.	1	Specimen Depth 1.70m
			Specimen No. 1
100			
90			
70			
60 +			
Percentage Passing (%)			
20			
10	<u> </u>		
	0.06	0.6	200
		ize (mm)	
CLAY		codium Coarse Fine Medium	COBBLES
PARTICLE SIZE	General r	emarks	
Silt and clay:	9		
Sand: Gravel:	91 0		
Cobbles:	0		
	WET SIEVE DATA		
Sieve size m	m Cumulative % Sieve size mm passing	Cumulative % passing	
	14.0 10.0	100 100	
125.0	6.3 100 5.0	100 100	
100.0	100 3.35	100	
75.0 63.0	100 2.00 100 1.18	100 100	
50.0	100 0.600	99	
37.5	100 0.425	99	
28.0 20.0	100 0.300 100 0.212	98 94	
20.0	0.150	68	
Approved by:	0.063 Leeds Laboratory	9	soi⊾ ♦
Sushil Sharda		Print date 24/08/2010	ENGINEERING
	Revision No. 3.02	Issue Date 27/07/2010	Part of VINCI Construction UK Limited

Proj	ect N	lame	Sc	utl	n H	un	nbe	er (Cha	nn	el N	√laı	ine	e St	tud	ies						Pa	rti	cl	e	Si	ze	-								e ID)		
Droi	ect N	lo.	E 1	.58	<i>(</i> ,2																	Di			_		_						Ç-			:08 e De	nth		
Pioj	ecti	10.	LI	.50	42																						_	_						3	3.0	0m	-		
Eng	ineer	2	Ro	ge	r Ty	/m	ar	nd	Par	tne	ers																						Sar	np	le 00	Nui	mbe	er	
Clie	nt		Yc	rks	shir	e I	For	Wá	ard												DC	127	'7· D)art	ာ.	10	an.	02		Sample type									
D			D.		C	Λ Λ	ı.									BS 1377: Part 2: 1990: 9.2										B Specimen Depth													
Desc	cripti	on	Br	ow	n S	·Αι	ND.	•																			3.00m												
																																	Sp	oec		nen	No		
																											1												
	100]		Т	Т	\top	ТТ	П	П			_	_	Т	П	П		Т	T	Ŧ	H					Т		П	П						П	Ш		\neg		
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	80 -							\parallel									\perp								+		Н										4		
	70 -							1									_																						
%) bu	60 -					Ш										\perp											Ц	Ш							Ш				
Passi	50 -																																						
ıtage	40 -														\parallel	/																							
Percentage Passing (%)	40 -													/												П													
۵															$/\!\!\!\!/$												П	Ш											
	20 -																										Н										\dashv		
	10 -			+		H								/	\parallel												H	\parallel									-		
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			0.002			0.006	2				0.03	3		90			0.2													-	>			>			200		
																:	Siev	e Si	ze (ı	mm)																		
				F	ine	•	N	1e	diu	m	Co	oar	se		Fi	ne	r	Лe	diu	m	С	oar	se	Τ	Fi	ne		Me	ediu	ım	C	oar	se						
	С	LAY					່ຣ	S I	LT							SAND GRAV								/E	L			C	C	ЭB	B —	LE	S						
															Ī	General remarks																							
PAR	TICLE	SIZE										%																											
Silt a	and c	lav:										10																											
Sand		.uy.										90																											
Grav												0																											
Cobl	bles:											0																											
										ET:	SIE		DA																										
9	Sieve	size m	ım		Cu	ımı	ulat				%			Si	eve	size	n	nm	Cı	ımı			_	(%														
							pa	aSS	sing							14.0)					assin 100																	
																10.0						100																	
																6.3						100																	
		25.0						10								5.0						100																	
		00.0 75.0						10								3.35						100																	
		63.0	100 100									2.00 100 1.18 99																											
		50.0						10								0.60					98																		
		37.5						10								0.425						98																	
		28.0 20.0						10							0.300 97 0.212 89																								
	4	_∪.∪						ΤĆ	,0							0.21 0.15						64																	
																0.06						10							-										
	roved	-							Lee	eds	Lak	oor	ato	ry																_	SOIL •								
Sush	nil Sh	arda														Print date 24/08/2010							ENGINEERING																
									Revi	isio	n No).		3.0	2			Print date											Part of VINCI Construction UK Limited										

Project Nan	ne S	South Hum	nber	Channel Mari	ne Stud	dies		Partio		_				Hole VC0	
Project No.	I	F15842						Distri	ibuti	on			Sa	mple [
Engineer	ı	Roger Tym	and	Partners									San	4.00r nple N	m umber
													007 Sample type		
Client	lient Yorkshire Forward BS 1377: Part 2: 1990: 9.2							2	Sample type L						
Description	l	Brown SAN	ND.												
100					T T T T T T T										
90															
80															
70						/									
(%) T															
Percentage Passing (%)						-									
96 50 H						-									
6 uta															
Pe 30					/	/									
20															
10					711										
0 111			 >	. 0	 .e	0.2	0.6	2		<u>Ш</u>	Ш	20	 		
	000	0.006	8	0.03	0.06							0		•	200
						Sieve S	Size (mm)								
		Fine	Me	dium Coars	e F	ine Me	edium Co	parse	Fine	м	ediur	n Coa	arse		
CLA -	AY		SI	LT		SA	ND			GR	AVI	EL		CO	BBLES —
						General	remarks								
PARTICLE SIZ	ZE			%											
Silt and clay:				5											
Sand:				95											
Gravel:				0											
Cobbles:				0											
				WET SIEVE D		<u> </u>									
Sieve size	mm	n Cumi			Siev	e size mn	n Cumulat		%						
			pas	sing		14.0		ssing L00							
						10.0		100							
						6.3		100							
125.0				00		5.0		100							
100.0 75.0				00 00		3.35 2.00		L00 L00							
63.0				00		1.18		L00 L00							
50.0				00		0.600		100							
37.5				00		0.425		100							
28.0 20.0				00 00		0.300 0.212		99 94							
20.0			Τ(JU		0.212		94 57							
				I		0.063		5							
Approved by	:			Leeds Labora	tory			ı							
Sushil Shard	a							Print date	24/0	8/2010	6	ENGINEERING			
				Revision No.	3.02		Issue Date	27/0	7/2010			Part of \	VINCI Co	onstructio	n UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC11
Project No.	F15842	Distribution	Sample Depth 1.00m
Engineer	Roger Tym and Partners		Sample Number 004
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown slightly gravelly sandy CLAY		Specimen Depth 1.00m
			Specimen No. 3



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

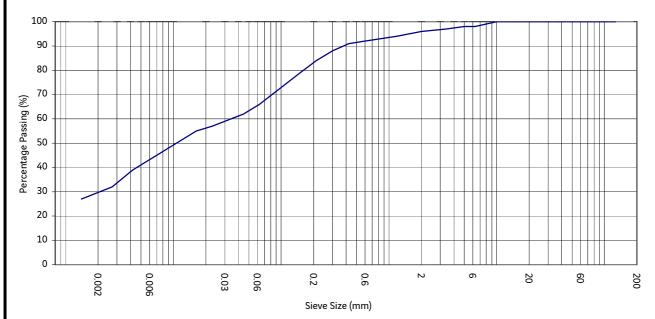
General remarks

	WE	T SIEVE I	DATA				SEDIMENTA	TION DATA
Sieve size mm	Cumulative	%	Sieve size	mm	Cumulative	%	Equivalent	Cumulative
	passing				passing		particle	% passing
			14.0		100		diameter	
			10.0		99		0.0457	59
			6.3		97		0.0234	53
125.0	100		5.0		96		0.0168	50
100.0	100		3.35		95		0.0077	42
75.0	100		2.00		93		0.0041	37
63.0	100		1.18		91		0.0027	30
50.0	100		0.600		89		0.0014	24
37.5	100		0.425		88			
28.0	100		0.300		85			
20.0	100		0.212		81			
			0.150		75			
			0.063		61			

Approved by:	Leeds Laboratory				soı∟≎
Stuart Kirk			Print date	24/08/2010	ENGINEERING
	Revision No. 3.02	Issue Date	27/07/20	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC12		
Project No.	F15842	Distribution	Sample Depth		
Engineer	Roger Tym and Partners		3.70m Sample Number 005		
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2	Sample type L		
Description	Brown slightly clayey SAND.	<u> </u>	Specimen Depth 3.70m		
			Specimen No. 1		
100					
80					
70					
e Passii					
Percentage Passing (%)					
20	<u> </u>				
10	 				
0 1	0.006	0 2 6	20 60 200		
	Sieve Si	ze (mm)			
CLAY	Fine Medium Coarse Fine Me	dium Coarse Fine Media	COBBLES		
PARTICLE SIZE	General ro	emarks			
Silt and clay:	8				
Sand: Gravel:	92 0				
Cobbles:	0				
	WET SIEVE DATA				
Sieve size m	m Cumulative % Sieve size mm passing	Cumulative % passing			
	14.0 10.0	100 100			
125.0	6.3 100 5.0	100 100			
100.0	100 3.35	100			
75.0 63.0	100 2.00 100 1.18	100 100			
50.0	100 1.18	100			
37.5	100 0.425	100			
28.0	100 0.300	99			
20.0	100 0.212 0.150	98 82			
Approved by:	0.063 Leeds Laboratory	8			
Sushil Sharda	Leeds Laboratory	Print date 24/08/2010	ENGINEERING		
	Revision No. 3.02	Issue Date 27/07/2010	Part of VINCI Construction UK Limited		

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
Project No.	F15842	Distribution	VC14 Sample Depth 1.00m
Engineer	Roger Tym and Partners		Sample Number 004
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown slightly gravelly sandy CLAY		Specimen Depth 1.00m Specimen No. 3



$CL\Delta Y$	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT			SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 29

 Silt:
 36

 Sand:
 31

 Gravel:
 4

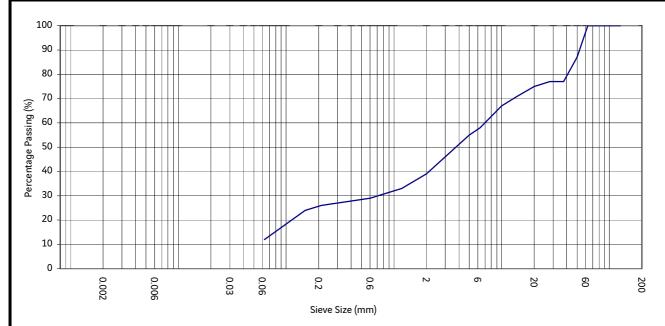
 Cobbles:
 0

General remarks

	WE	Γ SIEVE I	DATA				SEDIMENTA	TION DATA
Sieve size mm	Cumulative	%	Sieve size	mm	Cumulative	%	Equivalent	Cumulative
	passing				passing		particle	% passing
			14.0		100		diameter	
			10.0		100		0.0447	62
			6.3		98		0.0229	57
125.0	100		5.0		98		0.0163	55
100.0	100		3.35		97		0.0076	46
75.0	100		2.00		96		0.0042	39
63.0	100		1.18		94		0.0027	32
50.0	100		0.600		92		0.0014	27
37.5	100		0.425		91			
28.0	100		0.300		88			
20.0	100		0.212		84			
			0.150		79			
			0.063		66			

Approved by:	Leeds Laboratory				soı∟≎
Stuart Kirk			Print date	24/08/2010	ENGINEERING
	Revision No. 3.02	Issue Date	27/07/20	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC15
Project No.	F15842	Distribution	Sample Depth
L .			2.36m
Engineer	Roger Tym and Partners		Sample Number 005
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2	Sample type B
Description	Grey slightly clayey sandy GRAVEL		Specimen Depth
			2.36m
			Specimen No.
			1



$CL\Delta Y$	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT			SAND		G	RAVE	L	COBBLES

PARTICLE SIZE %

General remarks

Silt and clay: 12 Sand: 27

Gravel: 58

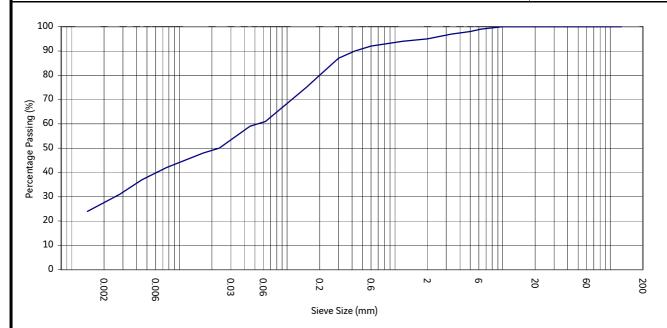
Cobbles: 3 Sample size was insufficient to be representative of particle size distribution

	WE	T SIEVE	DATA		
Sieve size mm	Cumulative	%	Sieve size mr	n Cumulative	%
	passing			passing	
			14.0	71	
			10.0	67	
			6.3	58	
125.0	100		5.0	55	
100.0	100		3.35	48	
75.0	100		2.00	39	
63.0	100		1.18	33	
50.0	87		0.600	29	
37.5	77		0.425	28	
28.0	77		0.300	27	
20.0	75		0.212	26	
			0.150	24	
			0.063	12	

			0.003				
Approved by:	Leeds Labora	tory					soi∟♦
Stuart Kirk					Print date	24/08/2010	ENGINEERING
	Revision No.	3.02		Issue Date	27/07/	2010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID	
		Distribution	VC17	
Project No.	F15842	Distribution	Sample Depth 0.20m	
Engineer	Roger Tym and Partners		Sample Number	
Liigiileei	Reger Tym and Farancie	er Tym and Partners Sample Numb		
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2	Sample type	
Description	Grey slightly gravelly SAND.		B Specimen Depth	
Description	Citey slightly gravelly SAND.		0.20m	
			Specimen No.	
			1	
100				
90				
80				
₹ 70 ₩				
.ig 60		/		
8 50 Has				
Percentage Passing (%)				
arcer 40				
<u>ه</u> 30 				
20				
10				
0				
Ŭ -	0.06	0.6	200 60 20	
		ze (mm)	O	
	Sieve Si	ze (mm)		
		dium Coarse Fine Me	dium Coarse	
CLAY	SILT SA	ND GRA	COBBLES	
	General r	emarks		
PARTICLE SIZE	%			
	_			
Silt and clay: Sand:	8 85			
Sand: Gravel:	7			
Cobbles:	0			
Ci	WET SIEVE DATA	Cumulativa		
Sieve size m	m Cumulative % Sieve size mm passing	Cumulative % passing		
	14.0	100		
	10.0	100		
	6.3	98		
125.0	100 5.0	98		
100.0	100 3.35	96		
75.0 63.0	100 2.00 100 1.18	93 88		
50.0	100 1.18	78		
37.5	100 0.425	68		
28.0	100 0.300	51		
20.0	100 0.212	32		
	0.150 0.063	18 8		
Approved by:	Leeds Laboratory	<u> </u>	_	
	Lectus Laboratory		SOIL ? ENGINEERING	
Sushil Sharda	Pavisian Na 202	Print date 24/08/2010	Part of VINCI Construction UK Limited	
	Revision No. 3.02	Issue Date 27/07/2010	rait of vilver construction UK Limited	

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
Project No.	F15842	Distribution	VC17 Sample Depth
			2.80m
Engineer	Roger Tym and Partners		Sample Number
			006
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown slightly gravelly sandy CLAY		Specimen Depth
			2.80m
			Specimen No.
			3



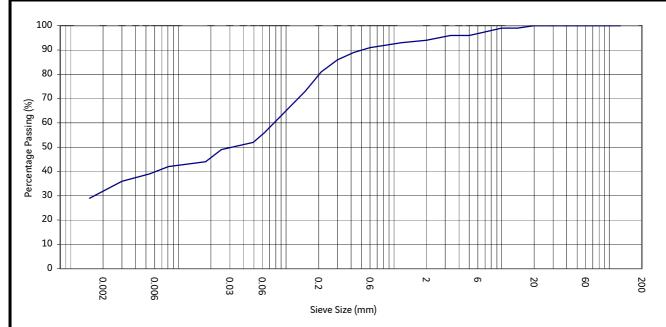
$CL\Delta Y$	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

General remarks

	WET SIEVE DATA							TION DATA
Sieve size mm	Cumulative	%	Sieve size	mm	Cumulative	%	Equivalent	Cumulative
	passing				passing		particle	% passing
			14.0		100		diameter	
			10.0		100		0.0452	59
			6.3		99		0.0234	50
125.0	100		5.0		98		0.0167	48
100.0	100		3.35		97		0.0076	42
75.0	100		2.00		95		0.0045	37
63.0	100		1.18		94		0.0028	31
50.0	100		0.600		92		0.0014	24
37.5	100		0.425		90			
28.0	100		0.300		87			
20.0	100		0.212		81			
			0.150		75			
			0.063		61			

Approved by:	Leeds Laboratory			soı∟♦		
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 3.02	ļ	ssue Date	27/07/20	10	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC18
Project No.	F15842	Distribution	Sample Depth 1.10m
Engineer	Roger Tym and Partners		Sample Number
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown slightly gravelly sandy CLAY		Specimen Depth 1.10m
			Specimen No. 3



$CL\Delta Y$	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 31

 Silt:
 24

 Sand:
 39

 Gravel:
 6

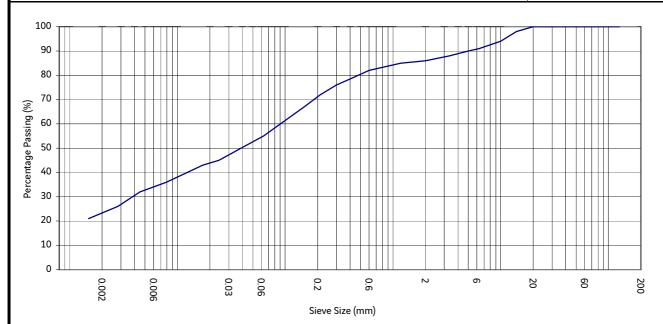
 Cobbles:
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General remarks

	WET SIEVE DATA							TION DATA
Sieve size mm	Cumulative	%	Sieve size	mm	Cumulative	%	Equivalent	Cumulative
	passing				passing		particle	% passing
			14.0		99		diameter	
			10.0		99		0.0496	52
			6.3		97		0.0251	49
125.0	100		5.0		96		0.0179	44
100.0	100		3.35		96		0.0081	42
75.0	100		2.00		94		0.0054	39
63.0	100		1.18		93		0.0030	36
50.0	100		0.600		91		0.0015	29
37.5	100		0.425		89			
28.0	100		0.300		86			
20.0	100		0.212		81			
			0.150		73			
			0.063		56			

Approved by:	Leeds Laboratory				soı∟≎
Stuart Kirk			Print date	24/08/2010	ENGINEERING
	Revision No. 3.02	Issue Date	27/07/20	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
Project No.	F15842	Distribution	VC19 Sample Depth
'			1.52m
Engineer	Roger Tym and Partners		Sample Number
			005
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown slightly gravelly sandy CLAY		Specimen Depth
			1.52m
			Specimen No.
			3



$CL\Delta Y$	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 23

 Silt:
 32

 Sand:
 31

 Gravel:
 14

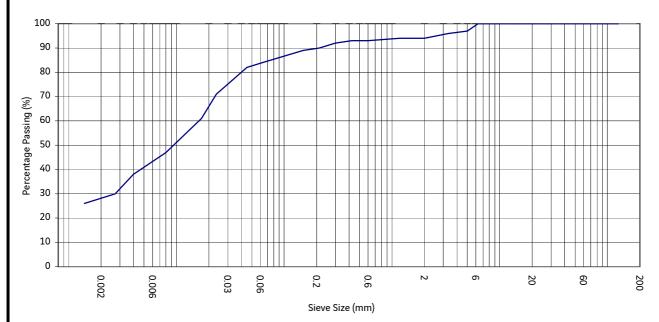
 Cobbles:
 0

General remarks

	WE.	SEDIMENTA	TION DATA				
Sieve size mm	Cumulative	%	Sieve size	mm Cumulative	%	Equivalent	Cumulative
	passing			passing		particle	% passing
			14.0	98		diameter	
			10.0	94		0.0471	52
			6.3	91		0.0242	45
125.0	100		5.0	90		0.0172	43
100.0	100		3.35	88		0.0079	36
75.0	100		2.00	86		0.0045	32
63.0	100		1.18	85		0.0028	26
50.0	100		0.600	82		0.0015	21
37.5	100		0.425	79			
28.0	100		0.300	76			
20.0	100		0.212	72			
			0.150	67			
			0.063	55			

Approved by:	Leeds Laboratory					soı∟♦
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 3.02	ļ	ssue Date	27/07/20	10	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC20
Project No.	F15842	Distribution	Sample Depth 1.77m
Engineer	Roger Tym and Partners		Sample Number 004
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown sandy CLAY with shell fragments.		Specimen Depth 1.77m Specimen No. 3



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT			SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 28

 Silt:
 56

 Sand:
 11

 Gravel:
 6

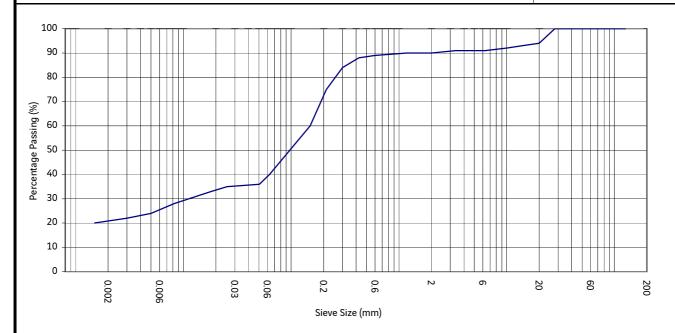
 Cobbles:
 0

General remarks

	WET				SEDIMENTATI	ON DATA		
Sieve size mm	Cumulative	% S	ieve size	mm	Cumulative	%	Equivalent	Cumulative
	passing				passing		particle	% passing
			14.0		100		diameter	
			10.0		100		0.0452	82
			6.3		100		0.0235	71
125.0	100		5.0		97		0.0171	61
100.0	100		3.35		96		0.0080	47
75.0	100		2.00		94		0.0040	38
63.0	100		1.18		94		0.0027	30
50.0	100		0.600		93		0.0014	26
37.5	100		0.425		93			
28.0	100		0.300		92			
20.0	100		0.212		90			
			0.150		89			
			0.063		84			

Approved by:	Leeds Laboratory					soı∟♦
Sushil Sharda				Print date	24/08/2010	ENGINEERING
	Revision No. 3.03	2	Issue Date	27/07/20)10	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
			VC21
Project No.	F15842	Distribution	Sample Depth
			2.88m
Engineer	Roger Tym and Partners		Sample Number
			004
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type
		BS 1377. Part 2. 1990. 9.2, 9.3	L
Description	Grey slightly gravelly sandy CLAY		Specimen Depth
			2.88m
			Specimen No.
			3



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT			SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 21

 Silt:
 18

 Sand:
 52

 Gravel:
 10

 Cobbles:
 0

General remarks

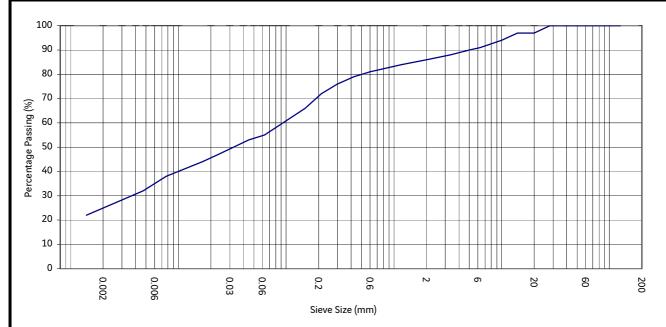
Sample size was insufficient to be representative of particle size distribution

Particle density: 2.65Mg/m³ Assumed

			i ai tici	c defibility. 2.0	Jivig/ III	Assume	u .
	WE	T SIEVE	DATA			SEDIMENTA	TION DATA
Sieve size mm	Cumulative	%	Sieve size n	nm Cumulative	%	Equivalent	Cumulative
	passing			passing		particle	% passing
			14.0	93		diameter	
			10.0	92		0.0507	36
			6.3	91		0.0254	35
125.0	100		5.0	91		0.0181	33
100.0	100		3.35	91		0.0082	28
75.0	100		2.00	90		0.0050	24
63.0	100		1.18	90		0.0030	22
50.0	100		0.600	89		0.0015	20
37.5	100		0.425	88			
28.0	100		0.300	84			
20.0	94		0.212	75			
			0.150	60			
			0.063	40			

				-		
Approved by:	Leeds Laboratory	/				soi∟♦
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 3	.02	Issue Date	27/07/20	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC23
Project No.	F15842	Distribution	Sample Depth 0.48m
Engineer	Roger Tym and Partners		Sample Number 002
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown slightly gravelly sandy CLAY		Specimen Depth 0.48m
			Specimen No. 3



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 25

 Silt:
 30

 Sand:
 31

 Gravel:
 14

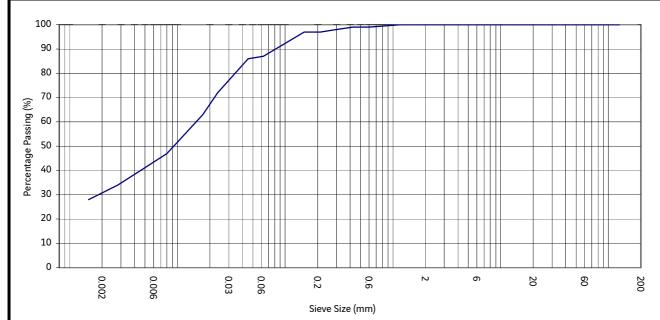
 Cobbles:
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General remarks

	WE.	T SIEVE I	DATA			SEDIMENTA	TION DATA
Sieve size mm	Cumulative	%	Sieve size	mm Cumulative	%	Equivalent	Cumulative
	passing			passi	ng	particle	% passing
			14.0	97		diameter	
			10.0	94		0.0452	53
			6.3	91		0.0233	47
125.0	100		5.0	90		0.0167	44
100.0	100		3.35	88		0.0077	38
75.0	100		2.00	86		0.0047	32
63.0	100		1.18	84		0.0029	28
50.0	100		0.600	81		0.0014	22
37.5	100		0.425	79			
28.0	100		0.300	76			
20.0	97		0.212	72			
			0.150	66			
			0.063	55			

Approved by:	Leeds Laboratory				soı∟≎
Stuart Kirk			Print date	24/08/2010	ENGINEERING
	Revision No. 3.02	Issue Date	27/07/20	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
		Distribution	VC24
Project No.	F15842	Distribution	Sample Depth
			0.00m
Engineer	Roger Tym and Partners		Sample Number
			002
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type
		B3 1377. Falt 2. 1990. 9.2, 9.3	В
Description	Brown CLAY.		Specimen Depth
			0.00m
			Specimen No.
			1



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 31

 Silt:
 56

 Sand:
 13

 Gravel:
 0

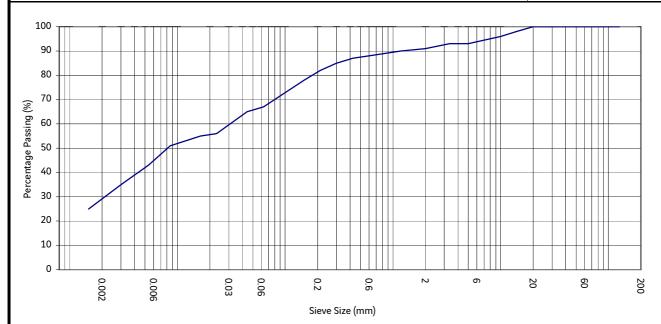
 Cobbles:
 0

General remarks

	WE	T SIEVE I	DATA			SEDIMENTA	TION DATA
Sieve size mm	Cumulative	%	Sieve size	mm Cumulative	%	Equivalent	Cumulative
	passing			passing		particle	% passing
			14.0	100		diameter	
			10.0	100		0.0454	86
			6.3	100		0.0237	72
125.0	100		5.0	100		0.0172	63
100.0	100		3.35	100		0.0080	47
75.0	100		2.00	100		0.0042	39
63.0	100		1.18	100		0.0028	34
50.0	100		0.600	99		0.0015	28
37.5	100		0.425	99			
28.0	100		0.300	98			
20.0	100		0.212	97			
			0.150	97			
			0.063	87			

Approved by:	Leeds Laboratory			soı∟♦		
Sushil Sharda				Print date	24/08/2010	ENGINEERING
	Revision No. 3.03	2	Issue Date	27/07/20)10	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
Project No.	F15842	Distribution	VC24 Sample Depth
1 10,000 140.	1 200 12		2.00m
Engineer	Roger Tym and Partners		Sample Number
	V 1 1: 5		005
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown slightly gravelly sandy CLAY		Specimen Depth
			2.00m
			Specimen No.
			3



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 28

 Silt:
 38

 Sand:
 25

 Gravel:
 9

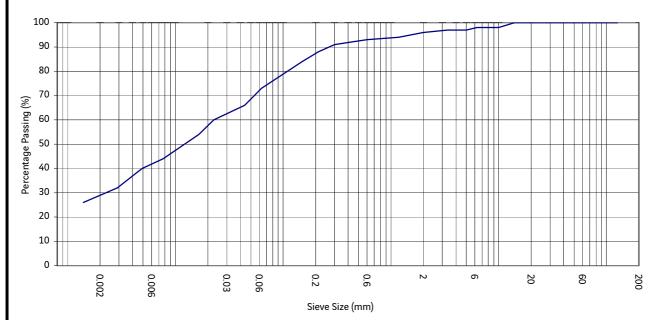
 Cobbles:
 0

General remarks

	WE.	T SIEVE I	DATA			SEDIMENTA	TION DATA
Sieve size mm	Cumulative	%	Sieve size	mm Cumulative	%	Equivalent	Cumulative
	passing			passing		particle	% passing
			14.0	98		diameter	
			10.0	96		0.0444	65
			6.3	94		0.0231	56
125.0	100		5.0	93		0.0164	55
100.0	100		3.35	93		0.0086	51
75.0	100		2.00	91		0.0054	43
63.0	100		1.18	90		0.0030	35
50.0	100		0.600	88		0.0015	25
37.5	100		0.425	87			
28.0	100		0.300	85			
20.0	100		0.212	82			
			0.150	78			
			0.063	67			

Approved by:	Leeds Laboratory					soı∟♦
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 3.02	ļ	ssue Date	27/07/20	10	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
			VC25
Project No.	F15842	Distribution	Sample Depth
			0.89m
Engineer	Roger Tym and Partners		Sample Number
			003
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type
		B3 1377. Part 2. 1990. 9.2, 9.3	L
Description	Brown slightly gravelly slightly sandy CLAY		Specimen Depth
			0.89m
			Specimen No.
			3



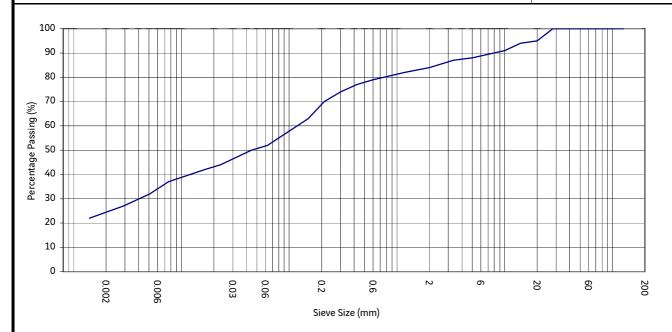
$CL\Delta Y$	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

General remarks

	WE.	T SIEVE I	DATA				SEDIME	ENTATION DATA
Sieve size mm	Cumulative	%	Sieve size	mm Cumu	lative	%	Equivalent	Cumulative
	passing				passing		particle	% passing
			14.0		100		diameter	
			10.0		98		0.0440	66
			6.3		98		0.0227	60
125.0	100		5.0		97		0.0165	54
100.0	100		3.35		97		0.0077	44
75.0	100		2.00		96		0.0049	40
63.0	100		1.18		94		0.0029	32
50.0	100		0.600		93		0.0014	26
37.5	100		0.425		92			
28.0	100		0.300		91			
20.0	100		0.212		88			
			0.150		84			
			0.063		73			

Approved by:	Leeds Laboratory				soi∟♦			
Stuart Kirk			Print date	24/08/2010	ENGINEERING			
	Revision No. 3.02	Issue Date	27/07/20	010	Part of VINCI Construction UK Limited			

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC26
Project No.	F15842	Distribution	Sample Depth
Engineer	Roger Tym and Partners		1.40m Sample Number 003
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown slightly gravelly sandy CLAY		Specimen Depth 1.40m Specimen No. 3



$CL\Delta Y$	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 24

 Silt:
 28

 Sand:
 32

 Gravel:
 16

 Cobbles:
 0

General remarks

	WE	T SIEVE I	DATA				SEDIMENTA	TION DATA
Sieve size mm	Cumulative	%	Sieve size	mm	Cumulative	%	Equivalent	Cumulative
	passing				passing		particle	% passing
			14.0		94		diameter	
			10.0		91		0.0447	50
			6.3		89		0.0231	44
125.0	100		5.0		88		0.0165	42
100.0	100		3.35		87		0.0076	37
75.0	100		2.00		84		0.0051	32
63.0	100		1.18		82		0.0029	27
50.0	100		0.600		79		0.0014	22
37.5	100		0.425		77			
28.0	100		0.300		74			
20.0	95		0.212		70			
			0.150		63			
			0.063		52			

Approved by:	Leeds Laboratory				soi∟♦			
Stuart Kirk			Print date	24/08/2010	ENGINEERING			
	Revision No. 3.02	Issue Date	27/07/20	010	Part of VINCI Construction UK Limited			

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
			VC27
Project No.	F15842	Distribution	Sample Depth
			0.00m
Engineer	Roger Tym and Partners		Sample Number
			001
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type
		B3 1377. Part 2. 1990. 9.2, 9.3	D
Description	Brown gravelly clayey SAND		Specimen Depth
			0.00m
			Specimen No.
			2



$CL\Delta Y$	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 10

 Silt:
 6

 Sand:
 56

 Gravel:
 28

0

Cobbles:

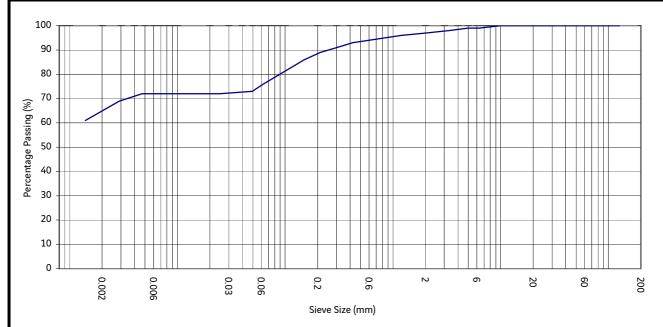
General remarks

Sample size was insufficient to be representative of particle size distribution

	WE	T SIEVE I	DATA			SEDIMENTA	TION DATA
Sieve size mm	Cumulative	%	Sieve size	mm Cumulative	%	Equivalent	Cumulative
	passing			passing		particle	% passing
			14.0	85		diameter	
			10.0	83		0.0497	16
			6.3	79		0.0251	15
125.0	100		5.0	77		0.0177	15
100.0	100		3.35	75		0.0093	14
75.0	100		2.00	72		0.0057	14
63.0	100		1.18	69		0.0031	12
50.0	100		0.600	63		0.0015	10
37.5	100		0.425	60			
28.0	100		0.300	52			
20.0	92		0.212	41			
			0.150	30			
			0.063	17			

Approved by:	Leeds Laboratory			•		soil 4			
Stuart Kirk			P	rint date	24/08/2010	ENGINEERING			
	Revision No. 3.02	lssı	ue Date	27/07/20	10	Part of VINCI Construction UK Limited			

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC29
Project No.	F15842	Distribution	Sample Depth
Engineer	Roger Tym and Partners		1.00m Sample Number 005
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type B
Description	Brown slightly gravelly CLAY.		Specimen Depth 1.00m
			Specimen No. 1



$CL\Delta Y$	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 64

 Silt:
 12

 Sand:
 21

 Gravel:
 3

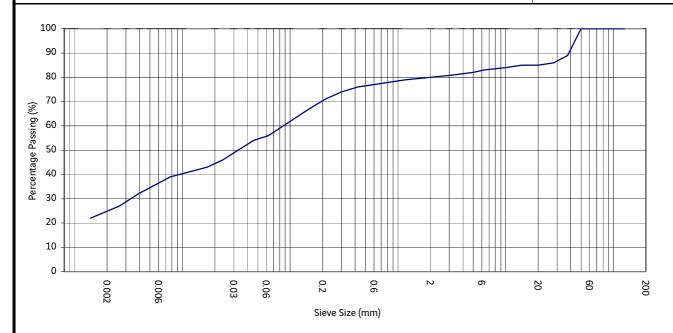
 Cobbles:
 0

General remarks

	WET	SEDIMENTATI	ON DATA					
Sieve size mm	Cumulative	%	Sieve size	mm	Cumulative	%	Equivalent	Cumulative
	passing				passing		particle	% passing
			14.0		100		diameter	
			10.0		100		0.0495	73
			6.3		99		0.0248	72
125.0	100		5.0		99		0.0176	72
100.0	100		3.35		98		0.0079	72
75.0	100		2.00		97		0.0047	72
63.0	100		1.18		96		0.0029	69
50.0	100		0.600		94		0.0014	61
37.5	100		0.425		93			
28.0	100		0.300		91			
20.0	100		0.212		89			
			0.150		86			
			0.063		76			

Approved by:	Leeds Laboratory					soı∟♦
Sushil Sharda				Print date	24/08/2010	ENGINEERING
	Revision No. 3.03	2	Issue Date	27/07/20)10	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID
		D :	VC29
Project No.	F15842	Distribution	Sample Depth
			1.00m
Engineer	Roger Tym and Partners		Sample Number
			003
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type
		BS 1377. Part 2. 1990. 9.2, 9.3	L
Description	Brown gravelly sandy CLAY		Specimen Depth
			1.00m
			Specimen No.
			3



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT			SAND		G	RAVE	L	COBBLES

0

Cobbles:

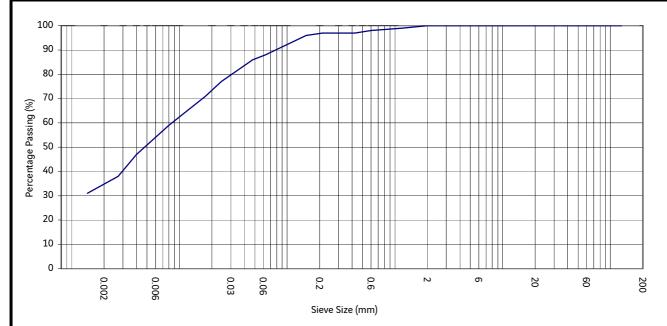
General remarks

Sample size was insufficient to be representative of particle size distribution

						J		
	WE.	T SIEVE D	DATA				SEDIMENTAT	ION DATA
Sieve size mm	Cumulative	%	Sieve size	mm	Cumulative	%	Equivalent	Cumulative
	passing				passing		particle	% passing
			14.0		85		diameter	
			10.0		84		0.0458	54
			6.3		83		0.0237	46
125.0	100		5.0		82		0.0170	43
100.0	100		3.35		81		0.0077	39
75.0	100		2.00		80		0.0039	32
63.0	100		1.18		79		0.0026	27
50.0	100		0.600		77		0.0014	22
37.5	89		0.425		76			
28.0	86		0.300		74			
20.0	85		0.212		71			
			0.150		67			
			0.063		56			

Approved by:	Leeds Laboratory			•		soi∟♦
Stuart Kirk			P	rint date	24/08/2010	ENGINEERING
	Revision No. 3.02	lssı	ue Date	27/07/20	10	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC30
Project No.	F15842	Distribution	Sample Depth
Engineer	Roger Tym and Partners		0.65m Sample Number 002
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown mottled grey very silty CLAY.		Specimen Depth 0.65m Specimen No. 1



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT			SAND		G	RAVE	L	COBBLES

 PARTICLE SIZE
 %

 Clay:
 35

 Silt:
 53

 Sand:
 12

 Gravel:
 0

 Cobbles:
 0

General remarks

	WE.	SEDIMENTA	TION DATA				
Sieve size mm	Cumulative	%	Sieve size	mm Cumulative	%	Equivalent	Cumulative
	passing			passing		particle	% passing
			14.0	100		diameter	
			10.0	100		0.0479	86
			6.3	100		0.0245	77
125.0	100		5.0	100		0.0175	71
100.0	100		3.35	100		0.0080	59
75.0	100		2.00	100		0.0040	47
63.0	100		1.18	99		0.0027	38
50.0	100		0.600	98		0.0014	31
37.5	100		0.425	97			
28.0	100		0.300	97			
20.0	100		0.212	97			
			0.150	96			
			0.063	88			

Approved by:	Leeds Laborator	ry				soı∟♦
Sushil Sharda				Print date	24/08/2010	ENGINEERING
	Revision No.	3.02	Issue Date	27/07/20	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Particle Size	Hole ID VC30
Project No.	F15842	Distribution	Sample Depth 2.85m
Engineer	Roger Tym and Partners		Sample Number 007
Client	Yorkshire Forward	BS 1377: Part 2: 1990: 9.2, 9.5	Sample type L
Description	Brown slightly gravelly sandy CLAY		Specimen Depth 2.85m
			Specimen No. 3



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	COBBLES
CLAY		SILT		*	SAND		GRAVEL		COBBLES	

 PARTICLE SIZE
 %

 Clay:
 26

 Silt:
 34

 Sand:
 33

 Gravel:
 8

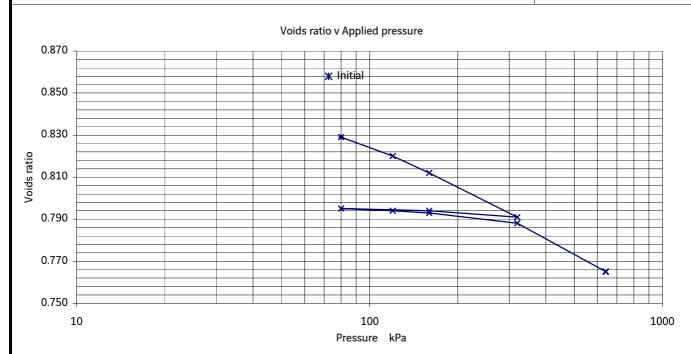
 Cobbles:
 0

General remarks

	WE	SIEVE DATA		SEDIMENTA	ATION DATA
Sieve size mm	Cumulative	% Sieve size	mm Cumulative	% Equivalent	Cumulative
	passing		passing	particle	% passing
		14.0	98	diameter	
		10.0	98	0.0447	58
		6.3	95	0.0231	51
125.0	100	5.0	94	0.0165	48
100.0	100	3.35	94	0.0077	40
75.0	100	2.00	92	0.0049	36
63.0	100	1.18	91	0.0029	30
50.0	100	0.600	89	0.0014	24
37.5	100	0.425	87		
28.0	100	0.300	84		
20.0	100	0.212	2 80		
		0.150	74		
		0.063	60		

Approved by:	Leeds Laboratory					soı∟♦
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 3.02	ļ	ssue Date	27/07/20	10	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID
			VC08
Project No.	F15842	Consolidation	Sample Depth
'			4.00m
Engineer	Roger Tym and Partners		Sample Number
Ĭ	•		007
Client	Yorkshire Forward	DC1277: Deat F: 1000: 2.0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Brown SAND.		Specimen Depth
			4.00m
			Specimen Number
			1

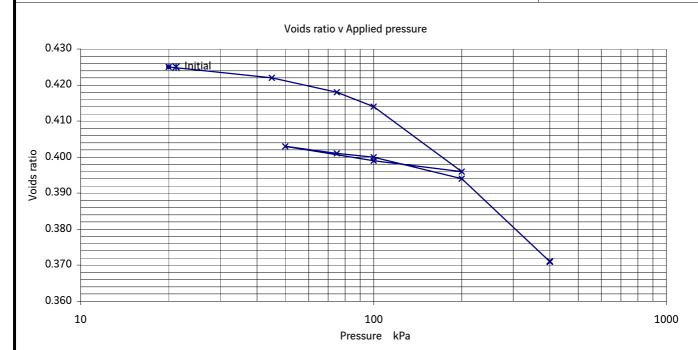


Specimen details	Specimen details				Laboratory coefficients					
Trimmings moisture content	21	%	Pressure	Pressure Compressibility		Consolidation c_{ν}		Voids ratio		
Diameter	75.0	mm	kPa	m^2/MN	m²/ye	ear				
Height	19.90	mm		m _v	log time	root time				
Bulk density	1.85	Mg/m³	80	0.20	41	12		0.829		
Dry density	1.44	Mg/m³	120	0.12	N/D	0.32		0.820		
Initial moisture content	29	%	160	0.11	N/D	0.16		0.812		
Initial voids ratio	0.858		320	0.072	8.9	1.6		0.791		
Saturation	89	%	160					0.794		
Particle density Measured	2.67	Mg/m³	80					0.795		
Final moisture content	27	%	120	0.019	N/D	180		0.794		
			160	0.013	N/D	160		0.793		
			320	0.016	N/D	2.8		0.788		
			640	0.040	13	5.3		0.765		

Specimen prepared as per BS1377: Part 1: 1990: Clause 8.6 Test performed at an average temperature of 20.5°C (No correction required)
Specimen cut and tested with longest axis in an horizontal orientation. N/D is not determined, where it is not possible to identify end of primary.

Approved by:	Leeds Laboratory				soi ∟ ♦
Sushil Sharda			Print date	24/08/2010	ENGINEERING
	Revision No. 2.03	Issue Date	27/07/2	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID
,			VC11
Project No.	F15842	Consolidation	Sample Depth
			1.00m
Engineer	Roger Tym and Partners		Sample Number
	•		004
Client	Yorkshire Forward	DC1277, David Ft 1000, 2.0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Brown slightly gravelly CLAY.		Specimen Depth
			1.00m
			Specimen Number
			1

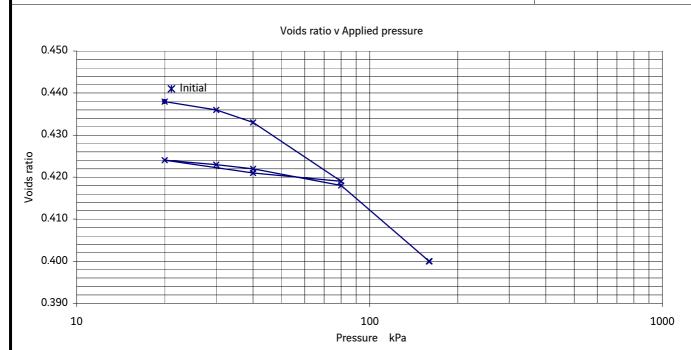


Specimen details			Laboratory coefficients					
Trimmings moisture content	15	%	Pressure	Pressure Compressibility		dation c _v	C_sec	Voids ratio
Diameter	75.1	mm	kPa	m^2/MN	m²/ye	ear		
Height	19.93	mm		m _v	log time	root time		
Bulk density	2.16	Mg/m³	20	#NUM!	Swelled	Swelled		0.425
Dry density	1.86	Mg/m³	45	0.086	29	19		0.422
Initial moisture content	16	%	75	0.11	5.5	5.6		0.418
Initial voids ratio	0.425		100	0.12	2.8	2.8		0.414
Saturation	100	%	200	0.13	5.5	3.7		0.396
Particle density Measured	2.65	Mg/m³	100					0.399
Final moisture content	16	%	50					0.403
			75	0.059	5.4	7.5		0.401
			100	0.031	4.6	7.7		0.400
			200	0.040	8.7	5.0		0.394
			400	0.082	3.8	2.4		0.371

Specimen prepared as per BS1377: Part 1: 1990: Clause 8.6 Test performed at an average temperature of 20.5°C (No correction required)
Specimen cut and tested with longest axis in an horizontal orientation.

Approved by:	Leeds Laboratory				soi ∟ ♦
Sushil Sharda			Print date	24/08/2010	ENGINEERING
	Revision No. 2.03	Issue Date	27/07/2	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID
			VC14
Project No.	F15842	Consolidation	Sample Depth
			1.00m
Engineer	Roger Tym and Partners		Sample Number
	- ,		004
Client	Yorkshire Forward	DC1277, Dov.+ Ft 1000, 2.0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Brown slightly gravelly CLAY.		Specimen Depth
			1.00m
			Specimen Number
			1



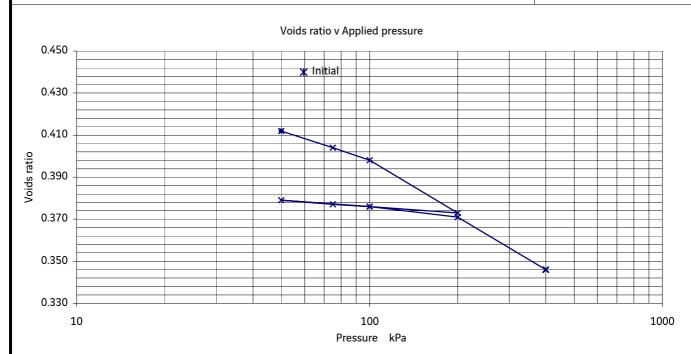
Specimen details	Specimen details			Laboratory coefficients					
Trimmings moisture content	16	%	Pressure	Pressure Compressibility		dation c _v	C_sec	Voids ratio	
Diameter	75.0	mm	kPa	m^2/MN	m²/ye	ear			
Height	19.92	mm		m _v	log time	root time			
Bulk density	2.15	Mg/m³	20	0.11	23	25		0.438	
Dry density	1.84	Mg/m³	30	0.17	2.8	2.2		0.436	
Initial moisture content	17	%	40	0.21	1.1	1.0		0.433	
Initial voids ratio	0.441		80	0.24	3.6	3.7		0.419	
Saturation	103	%	40					0.421	
Particle density Measured	2.65	Mg/m³	20					0.424	
Final moisture content	17	%	30	0.066	N/D	14		0.423	
			40	0.097	10	8.4		0.422	
			80	0.067	7.9	6.0		0.418	
			160	0.16	4.0	3.2		0.400	

Specimen prepared as per BS1377: Part 1: 1990: Clause 8.6 Test performed at an average temperature of 20.5°C (No correction required)

Specimen cut and tested with longest axis in an horizontal orientation. N/D is not determined, where it is not possible to identify end of primary.

Approved by:	Leeds Laborato	ory				soi∟ ♦
Sushil Sharda				Print date	24/08/2010	ENGINEERING
	Revision No.	2.03	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID
			VC17
Project No.	F15842	Consolidation	Sample Depth
Í			2.80m
Engineer	Roger Tym and Partners		Sample Number
	- ,		006
Client	Yorkshire Forward	DC1277, Dov.+ Ft 1000, 2.0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Brown sandy slightly gravelly CLAY.	Specimen Depth	
			2.80m
			Specimen Number
			1

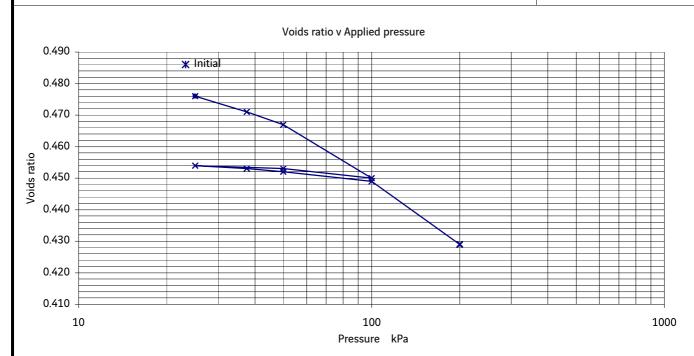


Specimen details			Laboratory coefficients					
Trimmings moisture content	17	%	Pressure Compressibility		Consolidation c_{ν}		C_sec	Voids ratio
Diameter	74.9	mm	kPa m²/MN		m²/year			
Height	18.83	mm		m _v	log time	root time		
Bulk density	2.17	Mg/m³	50	0.40	1.3	1.3		0.412
Dry density	1.85	Mg/m³	75	0.23	0.99	0.96		0.404
Initial moisture content	18	%	100	0.16	0.49	0.51		0.398
Initial voids ratio	0.440		200	0.18	2.5	2.2		0.373
Saturation	106	%	100					0.376
Particle density Measured	2.66	Mg/m³	50					0.379
Final moisture content	13	%	75	0.055	N/D	7.4		0.377
			100	0.036	6.2	6.9		0.376
			200	0.033	7.6	7.8		0.371
			400	0.091	2.7	2.2		0.346
4								

Specimen prepared as per BS1377: Part 1: 1990: Clause 8.6 Test performed at an average temperature of 20.4°C (No correction required)
Specimen cut and tested with longest axis in an horizontal orientation. N/D is not determined, where it is not possible to identify end of primary.

Approved by:	Leeds Laboratory						soi ∟ ♦
Sushil Sharda					Print date	24/08/2010	ENGINEERING
	Revision No.	2.03	Issu	ue Date	27/07/2	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID VC18
Project No.	F15842	Consolidation	Sample Depth
			1.10m
Engineer	Roger Tym and Partners		Sample Number
	3		003
Client	Yorkshire Forward	D04077 D . 5 4000 0 0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Brown sandy gravelly CLAY.	•	Specimen Depth
	, ,		1.10m
			Specimen Number
			1



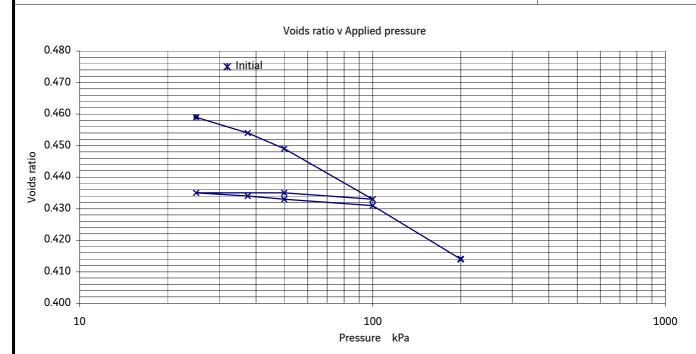
Specimen details				Lak	oratory coeffic	cients		
Trimmings moisture content	18	%	Pressure	Compressibility	Consoli	dation c _v	C_sec	Voids ratio
Diameter	75.0	mm	kPa	m^2/MN	m²/ye	ear		
Height	18.71	mm		m _v	log time	root time		
Bulk density	2.15	Mg/m³	25	0.29	1.5	1.6		0.476
Dry density	1.81	Mg/m³	37.5	0.29	1.3	1.3		0.471
Initial moisture content	19	%	50	0.20	N/D	0.22		0.467
Initial voids ratio	0.486		100	0.23	3.1	2.9		0.450
Saturation	104	%	50					0.453
Particle density Measured	2.69	Mg/m³	25					0.454
Final moisture content	17	%	37.5	0.022	N/D	6.8		0.453
			50	0.039	4.0	3.6		0.452
			100	0.052	10.0	6.5		0.449
			200	0.13	3.7	3.6		0.429
4								

Specimen prepared as per BS1377: Part 1: 1990: Clause 8.6 Test performed at an average temperature of 20.4°C (No correction required)

Specimen cut and tested with longest axis in an horizontal orientation. N/D is not determined, where it is not possible to identify end of primary.

Approved by:	Leeds Laborato	ory				soi∟ ♦
Sushil Sharda				Print date	24/08/2010	ENGINEERING
	Revision No.	2.03	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

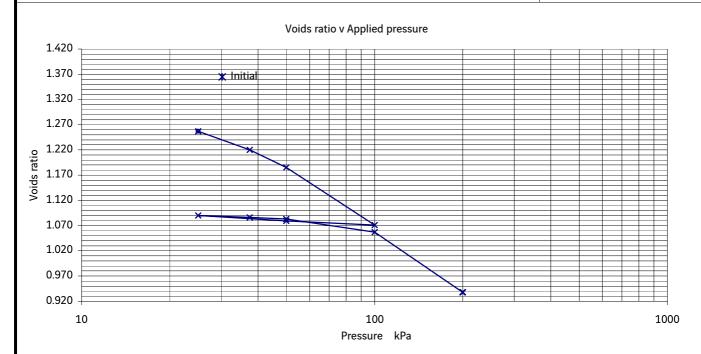
Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID
			VC19
Project No.	F15842	Consolidation	Sample Depth
'			1.52m
Engineer	Roger Tym and Partners		Sample Number
			005
Client	Yorkshire Forward	DC1277, Davit F. 1000, 2.0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Brown sandy gravelly CLAY.		Specimen Depth
			1.52m
			Specimen Number
			1



Specimen details				Laboratory coefficients					
Trimmings moisture content	19	%	Pressure	Compressibility	Consoli	dation c _v	C_sec	Voids ratio	
Diameter	75.0	mm	kPa	m^2/MN	m²/ye	ear			
Height	18.83	mm		m _v	log time	root time			
Bulk density	2.14	Mg/m³	25	0.43	3.6	3.6		0.459	
Dry density	1.81	Mg/m³	37.5	0.31	1.7	1.6		0.454	
Initial moisture content	18	%	50	0.26	0.83	0.77		0.449	
Initial voids ratio	0.475		100	0.22	4.3	3.6		0.433	
Saturation	103	%	50					0.435	
Particle density Measured	2.67	Mg/m³	25					0.435	
Final moisture content	16	%	37.5	0.092	62	15		0.434	
			50	0.013	58	10		0.433	
			100	0.034	11	8.8		0.431	
			200	0.12	4.7	4.2		0.414	

Approved by:	Leeds Laborat	ory				soi ∟ ♦
Sushil Sharda				Print date	24/08/2010	ENGINEERING
	Revision No.	2.03	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID
,			VC20
Project No.	F15842	Consolidation	Sample Depth
			1.77m
Engineer	Roger Tym and Partners		Sample Number
	•		004
Client	Yorkshire Forward	BS1377: Part 5: 1990: 3.0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Brown sandy CLAY with shell fragments.		Specimen Depth
			1.77m
			Specimen Number
			1

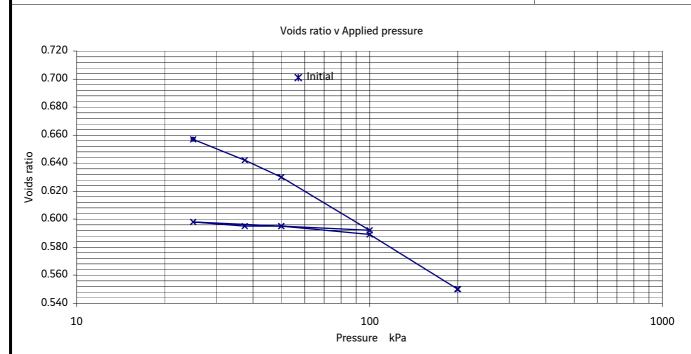


Specimen details				Lak	oratory coeffic	cients		
Trimmings moisture content	49	%	Pressure	Compressibility	Consoli	dation c _v	C_sec	Voids ratio
Diameter	74.9	mm	kPa	m^2/MN	m²/ye	ear		
Height	18.78	mm		m _v	log time	root time		
Bulk density	1.74	Mg/m³	25	1.9	2.2	2.1		1.257
Dry density	1.12	Mg/m³	37.5	1.3	N/D	0.17		1.220
Initial moisture content	56	%	50	1.2	N/D	0.16		1.185
Initial voids ratio	1.365		100	1.0	1.1	1.1		1.071
Saturation	108	%	50					1.079
Particle density Measured	2.64	Mg/m³	25					1.090
Final moisture content	36	%	37.5	0.13	9.7	7.5		1.086
			50	0.14	7.7	5.6		1.083
			100	0.25	7.0	4.3		1.057
			200	0.58	0.99	0.99		0.938

Specimen prepared as per BS1377: Part 1: 1990: Clause 8.6 Test performed at an average temperature of 18.5°C (No correction required)
Specimen cut and tested with longest axis in an horizontal orientation. N/D is not determined, where it is not possible to identify end of primary.

Approved by:	Leeds Laborato	ory				\$ □IL ♦
Sushil Sharda				Print date	24/08/2010	ENGINEERING
	Revision No.	2.03	Issue Date	27/07/2	1010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID
			VC21
Project No.	F15842	Consolidation	Sample Depth
1 ′			2.88m
Engineer	Roger Tym and Partners		Sample Number
	- ,		004
Client	Yorkshire Forward	DC1277, Dove F. 1000, 2.0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Grey slightly gravelly sandy CLAY		Specimen Depth
			2.88m
			Specimen Number
			1

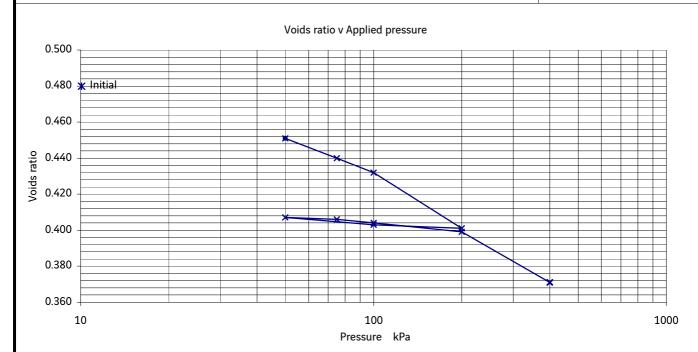


Specimen details				Laboratory coefficients				
Trimmings moisture content	23	%	Pressure	Compressibility	Consoli	dation c _v	C_sec	Voids ratio
Diameter	74.9	mm	kPa	m^2/MN	m²/ye	ear		
Height	18.89	mm		m _v	log time	root time		
Bulk density	2.02	Mg/m³	25	1.1	1.6	1.6		0.657
Dry density	1.62	Mg/m³	37.5	0.72	0.96	0.95		0.642
Initial moisture content	25	%	50	0.61	0.47	0.47		0.630
Initial voids ratio	0.701		100	0.46	2.0	2.1		0.592
Saturation	97	%	50					0.595
Particle density Measured	2.76	Mg/m³	25					0.598
Final moisture content	19	%	37.5	0.12	N/D	3.4		0.595
			50	0.036	74	10		0.595
			100	0.078	11	6.9		0.589
			200	0.24	1.7	1.9		0.550
			ı					

Specimen prepared as per BS1377: Part 1: 1990: Clause 8.6 Test performed at an average temperature of 18.5°C (No correction required)
Specimen cut and tested with longest axis in an horizontal orientation. N/D is not determined, where it is not possible to identify end of primary.

Approved by:	Leeds Laboratory					soi ∟ ♦
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 2.0	3	Issue Date	27/07/2	010	Part of VINCI Construction UK Limited

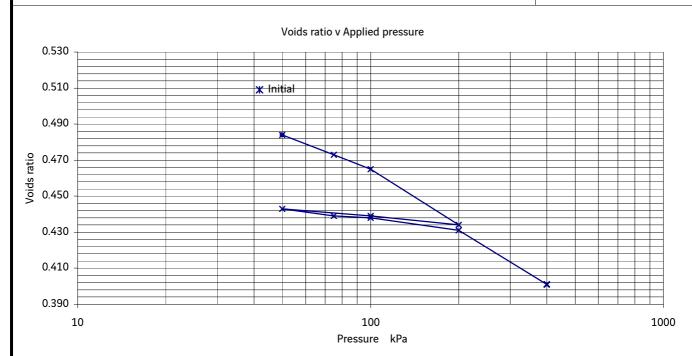
Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID
			VC23
Project No.	F15842	Consolidation	Sample Depth
			0.48m
Engineer	Roger Tym and Partners		Sample Number
Ĭ	• ,		002
Client	Yorkshire Forward	DC1277: Deat F: 1000: 2.0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Brown gravelly sandy CLAY		Specimen Depth
			0.48m
			Specimen Number
			1



Compressibility m ² /MN	Consoli	dation c	_	
m ² /MN	_	aac. 5 5 _V	C_sec	Voids ratio
	m²/ye	ar		
m _v	log time	root time		
0.40	1.1	1.2		0.451
0.30	1.1	1.3		0.440
0.24	0.74	0.71		0.432
0.22	2.0	1.4		0.401
				0.403
				0.407
0.040	4.0	3.0		0.406
0.036	4.1	5.1		0.404
0.041	6.1	4.7		0.399
0.098	1.8	1.9		0.371
	0.40 0.30 0.24 0.22 0.040 0.036 0.041	m v log time 0.40 1.1 0.30 1.1 0.24 0.74 0.22 2.0 0.040 4.0 0.036 4.1 0.041 6.1	m v log time root time 0.40 1.1 1.2 0.30 1.1 1.3 0.24 0.74 0.71 0.22 2.0 1.4 0.040 4.0 3.0 0.036 4.1 5.1 0.041 6.1 4.7	m v log time root time 0.40 1.1 1.2 0.30 1.1 1.3 0.24 0.74 0.71 0.22 2.0 1.4 0.040 4.0 3.0 0.036 4.1 5.1 0.041 6.1 4.7

Approved by:	Leeds Laboratory					soi ∟ ♦
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 2.0	3	Issue Date	27/07/2	010	Part of VINCI Construction UK Limited

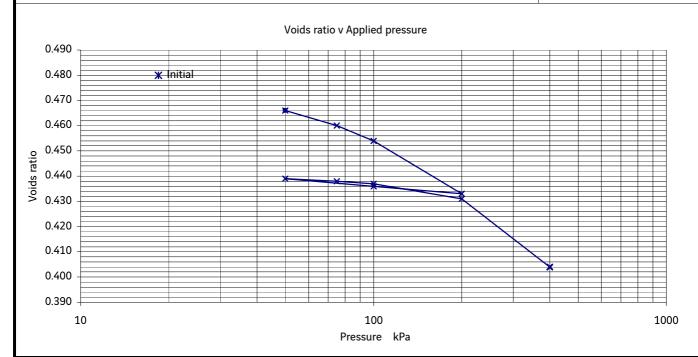
Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID VC24
Project No.	F15842	Consolidation	Sample Depth
			2.00m
Engineer	Roger Tym and Partners		Sample Number
Ĭ	3		005
Client	Yorkshire Forward	201277 B + 5 1000 2.0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Brown slightly gravelly sandy CLAY		Specimen Depth
	3 7 3 3		2.00m
			Specimen Number
			1



Specimen details				Lak	oratory coeffic	ients		
Trimmings moisture content	18	%	Pressure	Compressibility	Consolidation c_{ν}		C_sec	Voids ratio
Diameter	75.0	mm	kPa	m^2/MN	m²/ye	ear		
Height	18.82	mm		m _v	log time	root time		
Bulk density	2.13	Mg/m³	50	0.34	1.5	1.1		0.484
Dry density	1.78	Mg/m³	75	0.28	1.2	1.3		0.473
Initial moisture content	20	%	100	0.24	0.80	0.80		0.465
Initial voids ratio	0.509		200	0.21	2.3	2.1		0.434
Saturation	103	%	100					0.439
Particle density Measured	2.69	Mg/m³	50					0.443
Final moisture content	17	%	75	0.12	4.2	4.5		0.439
			100	0.038	4.0	4.2		0.438
			200	0.046	5.2	4.4		0.431
			400	0.11	2.3	2.2		0.401
4								

Approved by:	Leeds Laboratory					soi ∟ ♦
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 2.0	3	Issue Date	27/07/2	010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID
			VC25
Project No.	F15842	Consolidation	Sample Depth
'			0.89m
Engineer	Roger Tym and Partners		Sample Number
Ĭ	• ,		003
Client	Yorkshire Forward	DC1277: D-++ F: 1000: 2.0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Brown gravelly sandy CLAY		Specimen Depth
			0.89m
			Specimen Number
			1



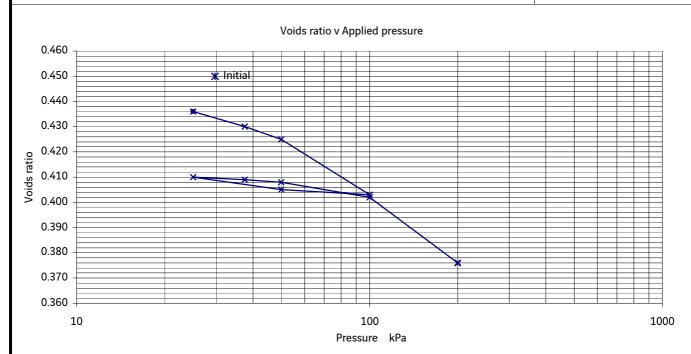
Specimen details				Lak	oratory coeffic	ients		
Trimmings moisture content	20	%	Pressure Compressibility		Consoli	dation c _v	C_sec	Voids ratio
Diameter	75.0	mm	kPa	m^2/MN	m²/ye	ar		
Height	18.84	mm		m _v	log time	root time		
Bulk density	2.11	Mg/m³	50	0.19	11	14		0.466
Dry density	1.80	Mg/m³	75	0.17	5.4	5.2		0.460
Initial moisture content	18	%	100	0.16	3.0	3.7		0.454
Initial voids ratio	0.480		200	0.15	12	6.1		0.433
Saturation	97	%	100					0.436
Particle density Measured	2.66	Mg/m³	50					0.439
Final moisture content	16	%	75	0.037	N/D	14		0.438
			100	0.028	6.7	8.5		0.437
			200	0.040	16	8.1		0.431
			400	0.094	8.8	5.9		0.404

Specimen prepared as per BS1377: Part 1: 1990: Clause 8.6 Test performed at an average temperature of 18.5°C (No correction required)

Specimen cut and tested with longest axis in an horizontal orientation. N/D is not determined, where it is not possible to identify end of primary.

Approved by:	Leeds Laborate	ory				801 ♦
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No.	2.03	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

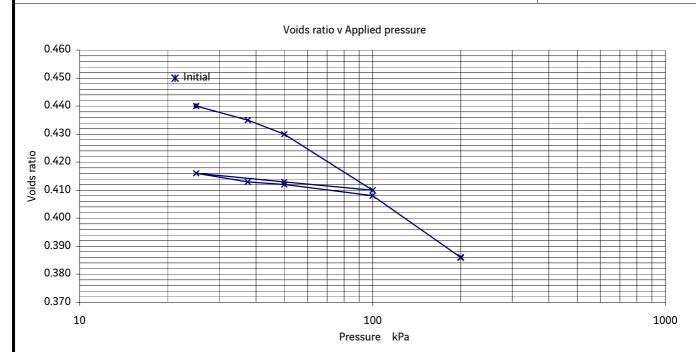
Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID
			VC26
Project No.	F15842	Consolidation	Sample Depth
1 ′			1.40m
Engineer	Roger Tym and Partners		Sample Number
Ĭ	· ,		003
Client	Yorkshire Forward	DC1277, Dove F. 1000, 2.0	Sample Type
		BS1377: Part 5: 1990: 3.0	L
Description	Brown gravelly sandy CLAY		Specimen Depth
			1.40m
			Specimen Number
			1



Specimen details				Lal	poratory coeffic	ients		
Trimmings moisture content	17	%	Pressure	Compressibility	Consoli	dation c _v	C_sec	Voids ratio
Diameter	75.0	mm	kPa	m^2/MN	m²/ye	ar		
Height	18.74	mm		m _v	log time	root time		
Bulk density	2.16	Mg/m³	25	0.39	0.90	0.92		0.436
Dry density	1.83	Mg/m³	37.5	0.34	0.79	0.82		0.430
Initial moisture content	18	%	50	0.31	0.53	0.77		0.425
Initial voids ratio	0.450		100	0.30	1.5	1.3		0.403
Saturation	104	%	50					0.405
Particle density Measured	2.66	Mg/m³	25					0.410
Final moisture content	16	%	37.5	0.053	5.8	8.6		0.409
			50	0.070	2.7	3.2		0.408
			100	0.088	3.6	2.4		0.402
			200	0.18	1.7	1.6		0.376

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	Revision No.	2.03	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited	

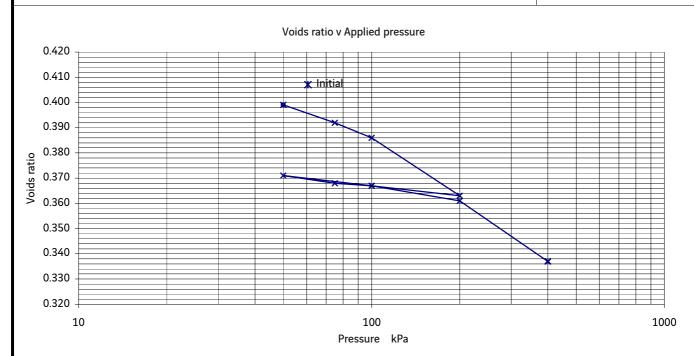
Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID
,			VC29
Project No.	F15842	Consolidation	Sample Depth
			1.00m
Engineer	Roger Tym and Partners		Sample Number
	•		003
Client	Yorkshire Forward	BS1377: Part 5: 1990: 3.0	Sample Type
		BS1377. Part 5. 1990. 5.0	L
Description	Brown gravelly sandy CLAY		Specimen Depth
			1.00m
			Specimen Number
			1



Specimen details				Lab	oratory coeffic	ients		
Trimmings moisture content	13	%	Pressure	Compressibility	Consoli	dation c _v	C_sec	Voids ratio
Diameter	75.1	mm	kPa	m^2/MN	m²/ye	ear		
Height	18.81	mm		m _v	log time	root time		
Bulk density	2.16	Mg/m³	25	0.27	2.7	2.1		0.440
Dry density	1.87	Mg/m³	37.5	0.27	1.4	1.4		0.435
Initial moisture content	16	%	50	0.28	1.3	1.3		0.430
Initial voids ratio	0.450		100	0.29	3.4	2.7		0.410
Saturation	94	%	50					0.413
Particle density Measured	2.71	Mg/m³	25					0.416
Final moisture content	15	%	37.5	0.18	58	13		0.413
			50	0.031	2.8	4.2		0.412
			100	0.053	6.1	4.6		0.408
			200	0.16	3.6	3.1		0.386

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	Revision No.	2.03	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Oedometer	Hole ID VC30
Project No.	F15842	Consolidation	Sample Depth
ĺ			2.85m
Engineer	Roger Tym and Partners		Sample Number
			007
Client	Yorkshire Forward	BS1377: Part 5: 1990: 3.0	Sample Type
		B31377. Part 5. 1990. 5.0	L
Description	Brown gravelly sandy CLAY	·	Specimen Depth
			2.85m
			Specimen Number
			1



		1	Lab	oratory coeffic	ients		
15	%	Pressure	Compressibility	Consoli	dation c _v	C_sec	Voids ratio
74.9	mm	kPa	m^2/MN	m²/ye	ar		
18.72	mm		m _v	log time	root time		
2.17	Mg/m³	50	0.12	6.5	8.6		0.399
1.88	Mg/m³	75	0.20	2.4	1.8		0.392
16	%	100	0.18	1.2	1.5		0.386
0.407		200	0.17	2.9	2.3		0.363
102	%	100					0.367
2.64	Mg/m³	50					0.371
15	%	75	0.072	66	7.3		0.368
		100	0.033	4.2	5.4		0.367
		200	0.043	4.3	4.2		0.361
		400	0.088	2.7	2.0		0.337
	74.9 18.72 2.17 1.88 16 0.407 102 2.64	74.9 mm 18.72 mm 2.17 Mg/m³ 1.88 Mg/m³ 16 % 0.407 102 % 2.64 Mg/m³	74.9 mm kPa 18.72 mm 2.17 Mg/m³ 50 1.88 Mg/m³ 75 16 % 100 0.407 200 102 % 100 2.64 Mg/m³ 50 15 % 75 100 200	74.9 mm kPa m²/MN 18.72 mm m _V 2.17 Mg/m³ 50 0.12 1.88 Mg/m³ 75 0.20 16 % 100 0.18 0.407 200 0.17 102 % 100 2.64 Mg/m³ 50 15 % 75 0.072 100 0.033 200 0.043	74.9 mm kPa m²/MN m²/ye 18.72 mm m v log time 2.17 Mg/m³ 50 0.12 6.5 1.88 Mg/m³ 75 0.20 2.4 16 % 100 0.18 1.2 0.407 200 0.17 2.9 102 % 100 2.64 Mg/m³ 50 15 % 75 0.072 66 100 0.033 4.2 200 0.043 4.3	74.9 mm kPa m²/MN m²/year 18.72 mm m v log time root time 2.17 Mg/m³ 50 0.12 6.5 8.6 1.88 Mg/m³ 75 0.20 2.4 1.8 16 % 100 0.18 1.2 1.5 0.407 200 0.17 2.9 2.3 102 % 100 2.64 Mg/m³ 50 15 % 75 0.072 66 7.3 100 0.033 4.2 5.4 200 0.043 4.3 4.2	74.9 mm kPa m²/MN m²/year 18.72 mm m √ log time root time 2.17 Mg/m³ 50 0.12 6.5 8.6 1.88 Mg/m³ 75 0.20 2.4 1.8 16 % 100 0.18 1.2 1.5 0.407 200 0.17 2.9 2.3 102 % 100 2.64 Mg/m³ 50 15 % 75 0.072 66 7.3 100 0.033 4.2 5.4 200 0.043 4.3 4.2

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Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No.	2.03	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

Project Name Project No. Engineer Client	South Humb F15842 Roger Tym a Yorkshire Fo	nd Partner		dies	Cor Me	npres asure	ned Tria sion Wi ment Of finitive	thout		Sar Sam	Hole I VC02 nple D 5.00n ple Nu 003 mple 1	epth n ımber	
Description	Brown grave				B	S1377: ———	Part 7: 199	90: 8		Spec	L cimen 5.00n	Depth	
400 _]
300													
Deviator stress kPa													
100													
0 0		5		10	Strain	0/0	15		20			2	25
Shear strength Test type	parameters	С	158 kPa	φ Undistur) °	Appare Sing	nt c gle stage	158	kPa			
Test number Cell pressure Deviator stress Corrected devia Membrane cor Membrane thic Moisture conte Bulk density Dry density Diameter	ator stress rection ckness		kPa kPa kPa kPa mm % Mg/m³ Mg/m³		1 25 317.94 316 2.14 0.467 15 2.18 1.89 84.23								
Length Failure strain Cu Rate of strain Mode of failure High density ru Remarks		embrane us	mm mm % kPa %/min sed. Specim	Co	196.73 20.3 158 2.03 ompound	axis ir	n a vertica	al orientati	on.				
Approved by:		Leeds L	aboratory						ENF	SINE			<u> </u>
Sushil Sharda		Revision N	No. 2.03		Issue Date	Print dat	te 24/08/ /07/2010					UK Limited	

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Project No.	restrength parameters c 105 k type number pressure ator stress ected deviator stress enbrane thickness sture content density Mg/n									Dea				nent initi							nple 1.60	m .		
Engineer	neer Roger Tym and Partners t Yorkshire Forward ription Brown CLAY 200 100 5 r strength parameters c 105									PIG	255u	re (Den	mu	ve i	vieti	iiou		,	Sam	ple N 002		er	
Client	Yorks	hire F	orwar	d							В	S137	77: Pa	rt 7:	1990): 8				Sai	mple L		9	
Description	Browi	n CLA	·Υ																		imer 1.60 men 1	m		
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	300 200 100 100 5 strength parameters c 10 //pe umber ressure or stress																							Ì
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tor s	Yorkshire Forward Pition Brown CLAY 300 200 100 5 Strength parameters c 10 Type Ty																							Ì
Devia	strength parameters c 10 resumber ressure or stress tred deviator stres																							Ì
	200 100 100 5 strength parameters c 100 //pe umber ressure for stress cted deviator stress crane correction crane thickness																							Ì
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0 +																								Ì
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Shear strength	param	eters	(С	1	05 k	Pa		ф		0.	0 °		Арр	aren	nt c		105	k F	Pa				
Test type							l	Undi	sturk	oed 1				5	Singl	e sta	ige							
Cell pressure						k	Pa			10			+						-					
Deviator stress							Pa		:	212.5														
							Pa Pa			210														
		l					nm			0.48														
Moisture conte							%			20														
Bulk density										2.12														
Dry density Diameter						_	m ⁻ nm			1.76 84.1														
Length							nm			196.1														
Failure strain							%			18.9														
Cu Rate of strain							Pa			105 2.04														
Rate of strain Mode of failure	e					%/ N	ш		Co	2.04 mpo														
		atex n	nembra	ane u	sed.	Spe	cime	en cu				t axi	s in a	a ver	tical	orie	ntati	on.	<u> </u>					
Remarks Sche	eduled	as mı	ultistag	ge tes	t. No	obse	erve	d fail	ure o	of fire	st sta	ige s	so ru	n un	til te	ermir	natio	n.						
Approved by:		atory	'														=	101	_4	<u> </u>				
Stuart Kirk												Prin	nt date	2	4/08/2	010		ENC	112	VE		IIN		
	nsity Mg/r ter m strain k strain %/m of failure ensity rubber latex membrane used. Spec ks Scheduled as multistage test. No obse									Issue	e Date			7/201				Part o	f VIN	CI Con	structio	n UK L	imited	

·			nber	r Cha	innel	Ma	rine	Stud	lies			Co	mpr	ess	ed Ti ion \	Nit	hout					Hole VC0- ple [4	
Engineer	ar strength parameters c 107 kPa type t number pressure iator stress rected deviator stress rected deviator stress rected deviator stress kPa rected deviato									Pro				nent initi							3.00i ole N	n umb		
Client	Yorks	hire	Forw	vard								В	S137	77: Pa	art 7: 1	1990): 8				San	004 nple L		
Description	Browi	n slig	jhtly	grav	elly	CLA	<u> </u>				<u>I</u>											men 3.01ı nen l 1	n .	
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	200																							
iress	Yorkshire Forward Brown slightly gravelly CLAY 300 200 100 5 strength parameters c 107 ype umber ressure tor stress created deviator stress							/																
iator si	Brown slightly gravelly CLAY 300 200 200 5 strength parameters c 107 ype number ressure tor stress cted deviator stress brane correction brane thickness ture content density Mg ensity Mg ensity Mg eter th e strain																							
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				[5				1	0	St	rain	%	1	15				20)				25
	param	eters	5	С		10	07 k			ф		0.	0 °		Арра				107	kP	а			
Test type Test number									Undi	sturk	oed 1				S	Singl	e sta	ge						
Cell pressure							k	Pa			20			+						1				
Deviator stress										:	215.													
											214													
											0.46													
Moisture conte								%			14													
Bulk density							_				2.23													
Dry density Diameter							_				1.9! 84.0													
Length											84.0 196.0													
Failure strain								%			19.4													
Cu Data of strain											107 2.04													
Rate of strain Mode of failure	9						%0/ N	ш		Co		4 ound												
		atex i	mem	nbrar	ne us	ed.	Spe	cime	en cu					s in	a ver	tical	orie	ntati	on.					
-							-					-												
Approved by:				Lee	ds La	abora	atory	,														S		_
Stuart Kirk											1		Prir	nt date	24	4/08/2	010	6	ENE		1E			
	ed deviator stress kPa ane correction kPa ane thickness mm re content % nsity Mg/m³ sity Mg/m³ er mm strain % kPa strain %/min of failure ensity rubber latex membrane used. Specimen constrain second										Issue	e Date			7/201				Part o	f VINC	I Cons	structio	n UK Lir	nited

Project Name	Roger Tym and Partners Yorkshire Forward O O O O O O O O O O O O O								lies							riaxi						lole VC0!			
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Client	Vorks	hira F	orwa	ard																	San	003 ple			
Client	TOTAS	onne i	OIVV	iiu								В	S137	7: Pa	rt 7: 1	1990:	8				Juii	L	, y p c		
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Deviator stress kPa	Roger Tym and Partners Yorkshire Forward On Off white CHALK On Off white CHALK On Off white CHALK On Off white CHALK On On Off white CHALK O																							-	
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	off white CHALK The parameters c 91 kP. The																								1
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	th parameters c 91 kPa																								
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Test type									Undi	sturk	oed				S	ingle	sta	ge							
Test number											1														
Cell pressure											25														
Deviator stress Corrected devia		recc									182.9 182														
Membrane cor											0.52														
Membrane thic											0.45	9													
Moisture conte	ent										20														
Bulk density							-				2.09														
Dry density Diameter							_				1.74 85.3														
Length											ە.ە 195.9														
Failure strain											3.6														
Cu							k	Pa			91														
Rate of strain							%/n	nin			2.04														
Mode of failure		atov =	nom l-	ros	0 110	.04	Cna	nim.	on or		Britt		t avi-	inc		ical	orio	tatic	n						
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Approved by:			I	Leec	ds La	abor	atory																	_0	•
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					ion N			02				Doto		date	24	4/08/20:	τO								

2.03

Revision No.

27/07/2010

Issue Date

Part of VINCI Construction UK Limited

Project Name	South F		er Cha	nnel	Marir	ne Stu	dies			Comp	ress	ed Tri ion W	/itho	ut			V	le ID C11 le Dep	nth.	
Project No. Engineer	Roger T		nd Par	tners								nent (initiv)		0. ample	75m Num		
Client	Yorkshi	re For	ward							BS13	377: Pa	art 7: 1	990: 8					003 ole Typ L	ре	
Description	Brown	slightl	y grav	velly C	CLAY			'								-	0.	en De 75m n Nur 1		
400																				
300																_				
_																				
Deviator stress KPa																				
viator s																				
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0																				
0				ī	5					0 in %				1	5				20	0
Shear strength	paramet	ers	С		156	kPa		ф		0.0 °			rent c		156	kPa	a			
Test type Test number							Undi	sturbe	ed 1			Si	ngle s	stage		1				
Cell pressure						kPa			5											
Deviator stress						kPa			13.48											
Corrected devia Membrane cor		SS				kPa kPa			312 1.66											
Membrane thic						mm).467											
Moisture conte	ent					%			18											
Bulk density						lg/m³			2.20 1.87											
Dry density Diameter					IVI	lg/m³ mm			1.8 <i>1</i> 33.40											
Length						mm			95.83											
Failure strain						%			14.3											
Cu Rate of strain					0/2	kPa /min			156 1.02											
Mode of failure								В	rittle											
High density ru Remarks Sche						-			_							age.				
Approved by:			Lee	ds La	borate	ory												S O		<u> </u>
Stuart Kirk											rint date		08/2010		ENC					
			Revi	sion No) .	2.03			Issue D	ate	27/0	7/2010			Part o	f VINCI	Constru	ction UK	Limited	

Project Name			ber Ch	nanne	l Ma	rine S	tudie	es				ned 1 ssion						,	lole I VC15	5	
Project No. Engineer	F158 Roge	42 r Tym	and Pa	artner	'S				Pr	Me: essu		men efinit			od)			1	ple D L.30n le Nu	n	
Client	_	shire F								BS	1377:	Part 7	: 1990): 8				-	002 ple 1 L		
Description	Brow	n SAN	D															1	men L.30n Ien N	n	
100																					
80 -																					
ed 60 -																					
Deviator stress kPa																					
20 +																					
0 +				1				2	S	train	%	3				4					5
Shear strength Test type	h param	eters	(С	,	10 kF		φ ndistu		0.0	0		oaren Singl	it c e stag	je	10	kPa	а			
Test number Cell pressure Deviator stres Corrected dev		ress				kl	Pa Pa Pa		1 10 20.7 20	70											
Membrane co Membrane th Moisture cont Bulk density	rrectior ickness	1				kl m	Pa m %		0.4 0.46 31 1.9	0 67											
Dry density Diameter Length Failure strain						Mg/r m m	n³ m m		1.5 82.0 195. 2.6)8 93											
Cu Rate of strain Mode of failu	er mm mm strain % kPa strain %/min										avic i	n a vo	rtical	orien	tation	<u> </u>					
Remarks Sch																	age.				
Approved by: Stuart Kirk			Le	eds L	abor	atory										NG	3IN		2 2 3 1 1	DIL	•
Juan Kilk			Re	vision l	No.	2.0	3		Issu	e Date	Print da	ite 7/07/20	24/08/2 10	010	F	Part of	VINC	l Const	ruction	UK Lim	nited

Project Name	South	Hum	ber Ch	nanne	l Ma	rine St	udies	3			Indra								ŀ	Hole VC1		
Project No.	F1584	1 2									_				hout Pore					ple	Dept	h
Engineer	Roger	Tym	and Pa	artner	'S				Pr						/leth	od)		S			umb	er
Client	Yorks	hire F	orwar	d						Е	S137	7: Pa	rt 7: 1	1990): 8				Sar	004 nple L	і Туре	<u> </u>
Description	Brown	n slig	htly gr	avelly	CLA	Y														imen 0.71	Dep m Num	
200 —																						
_																						
150																						
																	_	_				
СРа										_												
Deviator stress kPa																						
stre —																						
ator																						
Devi																						
F0 -																						
50 —																						
	$/\!\!\!\!/$																					
\vdash																						
0 0				5				10	St	train	%	1.	5				2	0				25
Shear strength	paramo	eters		С		70 kP	a	φ			0 °		App	aren	t c		70) kF	Pa			
Test type	•						Un	distur	rbed				S	Singl	e staç	je						
Test number									1													
Cell pressure Deviator stress						kP kP			5 141.													
Corrected devia		ess				kP			139													
Membrane cor						kP			2.1													
Membrane thic						mr			0.46													
Moisture conte	ent						% З		15 2.2													
Bulk density Dry density						Mg/m Mg/m			1.9													
Diameter						mr			83.8													
Length						mr			196.													
Failure strain Cu						kP	%		20. 70													
Rate of strain						кР %/mi			2.0													
Mode of failure									ompo	ound		_]										
High density ru						-				_												
Remarks Sche	eduled a	as mı	ultistag	ge tes	t. No	obser	ved fa	ailure	of fir	st sta	age s	o rur	n unt	til te	rmina	ition	•					
Approved by:			Le	eds L	.abor	atory														S		_ 💠
Stuart Kirk									•		Print	date	24	4/08/20	010		N	112	1E	e :	iMi	

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Revision No.

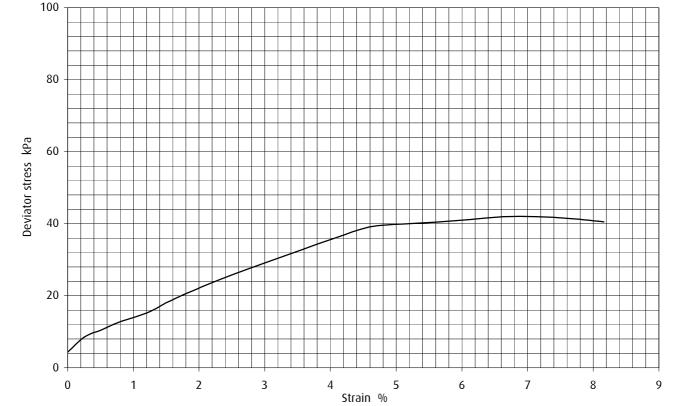
27/07/2010

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Project Name Project No.	South Humb F15842	er Channel I	Marine Stu	dies		omp	ressi	d Triax on Wit ent Of	hout				7 Depth	
Engineer	Roger Tym a	nd Partners			Pres	sure ((Defii	nitive	Method	I)	Sam	1.55ı ple N	m umber	•
Client	Yorkshire Fo					D040		. 7 400				004 mple	í	
						BS13	/ /: Par	rt 7: 199	0: 8			L		
Description	Brown grave	lly slightly s	andy CLAY								Spec	imen 1.55ı	Depth m	1
											Speci		Numbe	er
											<u> </u>	1		
200 —														
150											_			
_												+		
ę,												+		
A -												+		
Deviator stress kPa												+		
ਰ ਹੋ 100 ਹੋ						_								
viat														
De L												\perp		
_												_		
50												+		
												+		
												+		
7														
0 7														
0		5		10	Stra	in %	15	5		20				25
Shear strength	parameters	С	50 kPa	ф		0.0 °		Apparei	nt c	50	kPa			
Test type				Undistu	rbed			Sing	le stage					
Test number					1									
Cell pressure Deviator stress			kPa kPa		10 102.61									
Corrected devia			kPa		102.61									
Membrane cor			kPa		1.79									
Membrane thic			mm		0.436									
Moisture conte Bulk density	ent		% Mg/m³		15 2.20									
Dry density			Mg/m³		1.91									
Diameter			mm		84.77									
Length			mm		197.80									
Failure strain Cu			% kPa		17.7 50									
Cu Rate of strain			KFa %/min		2.02									
Mode of failure				С	ompour									
High density ru Remarks	ubber latex me	embrane use	d. Specim	nen cut w	ith long	est axi	is in a	vertica	l orienta	tion.				
Approved by:		Leeds Lal	ooratory											•
Sushil Sharda						р	nt data	27,000	2010	ENG	INE	ER	ING	ì
		Revision No	o. 2.03	1	Issue D		nt date 27/07.	24/08/2 /2010	.010	Part of \	VINCI Cor	structio	n UK Limit	ted

Project Name Project No. Engineer	South Humber Channel Marine Studies F15842 Roger Tym and Partners	Undrained Triaxial Compression Without Measurement Of Pore Pressure (Definitive Method)	Hole ID VC21 Sample Depth 1.75m Sample Number
Client	Yorkshire Forward	BS1377: Part 7: 1990: 8	002 Sample Type L
Description	Greyish brown slightly organic CLAY		Specimen Depth 1.75m Specimen Number 1
100			



Shear strength parameters	c 20 kPa	φ 0.0 °	Apparent c 20	kPa
Test type		Undisturbed	Single stage	
Test number		1		
Cell pressure	kPa	10		
Deviator stress	kPa	41.93		
Corrected deviator stress	kPa	41		
Membrane correction	kPa	0.96		
Membrane thickness	mm	0.459		
Moisture content	%	82		
Bulk density	Mg/m³	1.51		
Dry density	Mg/m³	0.83		
Diameter	mm	83.68		
Length	mm	196.03		
Failure strain	%	7.1		
Cu	kPa	20		
Rate of strain	%/min	2.04		
Mode of failure		Compound		

Remarks Scheduled as multistage test. Early brittle failure prevented determination of 2nd and 3rd stage.

Approved by:	Leeds Laboratory					
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 2.03	}	Issue Date	27/07/2	010	Part of VINCI Construction UK Limited

Project Name	South		nber	r Cha	nnel	Ма	rine	Stuc	lies			Co	mpr	essi		Nitl	hout					Hole VC2 iple l	2	h	
Project No. Engineer	Roger		n and	d Par	tner	s					Pre						Pore Vieti					1.00 ole N 002	m umb		
Client	Yorks	hire	Forw	vard								В	S137	'7: Pa	ırt 7:	1990): 8					nple L	Туре		
Description	Bron	sligh	tly s	andy	slig	htly	grav	elly	CLAY	' .												imen 1.00 nen l 1	m		
200																									
																_				_					
150																									
Deviator stress kPa									1																
100 —																									
eviato																									
ă _		/																							
50 —																									
$m{I}$,																								
0 0					5				1	0				1	5				20)				2	5
											St	rain													
Shear strength Test type	param	eters	S	С			84 k		Undi	φ sturk	oed	0.	0 °		App		it c e sta	ae	84	⊹ kP	°a				
Test number											1					9.		3-							
Cell pressure Deviator stress								κPa κPa			5 171.0	01													
Corrected devia	ator str						ŀ	кРа			169	9													
Membrane cor Membrane thic		1						κPa nm			2.10 0.46														
Moisture conte								%			15														
Bulk density							Mg/				2.22														
Dry density Diameter							Mg/	m nm			1.9 ⁴ 84.1														
Length								nm			196.7	73													
Failure strain Cu								% ‹Pa			19.8 84														
Cu Rate of strain							r %/r				2.03														
Mode of failure											Plast	ic													
High density ru Remarks	ıbber la	atex ı	mem	nbrar	ne us	sed.	Spe	cim	en cı	ıt wi	th loi	nges	t axi	s in a	a ver	tical	orie	ntatio	on.						
Approved by:				Lee	ds La	abor	atory	/														Æ		_4	—
Sushil Sharda											1		Prin	t date	2	4/08/2	010	5	ENC	31h	1E				
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Project Name	South	Hum	ıber Ch	annel	Ma	rine S	Stud	ies						ed T		ial hout				ŀ	Hole VC2			
Project No.	F1584	2										_				Pore					iple I 1.52		h	
Engineer	Roger	Tym	and Pa	rtner	S					Pro	essı	ıre (Defi	initi	ve I	Иeth	nod)		S		1.52 ole N 004	umb	er	
Client	Yorksl	hire F	orward	d							E	S137	77: Pa	art 7:	1990): 8				Sar	nple L		;	
Description	Browr	n sligi	htly gra	velly	CLA	Y															imen 1.52 nen l	m		
200 —																								
-																								
150 —																								
Deviator stress kPa																								
tor str																								
evia						_																		
50																								
		/																						
0 +				5				1	0		_		1	5				20)				25	
										St	train					_								
Shear strength Test type	parame	eters	C	:		50 k		Jndi	φ sturk	ned	Ü.	0 °		Арр		t c e sta	ne	50	kΡ	'a				
Test number								ariai	Stark	1					nigi	c sta	gc							
Cell pressure Deviator stress							Pa Pa		,	10 102.:														
Corrected devi		ess					Pa			102.														
Membrane cor							Pa			2.1														
Membrane this Moisture conte						n	ım %			0.43														
Bulk density	J11C					Mg/				2.1														
Dry density						Mg/				1.8														
Diameter							ım			83.6														
Length Failure strain						rr	ım %			182. 21.														
Cu						k	Pa			50)													
Rate of strain						%/n	nin		_	2.1														
Mode of failure High density ru		tev m	nembra	ine uc	ed.	Sner	rimo	יח כיי			ound		s in	a ver	tical	Orio	ntati	าท	<u> </u>					
Remarks Scho						-					-													
Approved by:			Le	eds La	abora	atorv																		
Stuart Kirk												Prin	nt date	,	4/08/2	010	6	ENC	31h	1E			-	
			Rev	ision N	lo.	2.0	03			Issu	e Date			7/201				Part o	f VINC	CI Cons	structio	n UK Li	mited	

Project Name	South	ո Hur	mber	Cha	anne	l Ma	rine	Stuc	lies				ndra				ial 1out				I	Hole VC2			
Project No.	F158	42											-				iout Pore					ıple l	Dept	h	
F	D	T		. n							Pre							10d)				1.42			
Engineer	Roge	r Iyn	n anc	d Par	tner	S							`					•		3	samp	ole N 004		er	
Client	Yorks	shire	Forw	vard								_	C4 0 7	7 D		4000					Sar	nple)	
												В	S137	/: Pa	rt /:	1990	: 8					L			
Description	Brow	n gra	avelly	/ CL/	ΑY															S		imen		th	
																				Sr		1.42 nen l		her	
																				۰,	,	1	· · ·	DC.	
200																			1						
200																									
150																									
Deviator stress kPa							/																		
ess																									
둘 100 —					_																				
iato				_																					
Dev																									
_																									
	+/																								
50 —																									
/																									
0 ↓																									
0					5				1	0				1.	5				2	0				2.	5
											St	rain	%												
Shear strength	param	eters	S	С			76 k	Pa		φ		0.	0 °		Арр	aren	t c		76	6 kF	Pa				
Test type	<u>. </u>							I	Undi		oed						e sta	ge							
Test number											1														
Cell pressure								кРа			10														
Deviator stress		×0						(Pa			154.4														
Corrected devia Membrane cor								κPa κPa			152 1.94														
Membrane thic								nm			0.45														
Moisture conte								%			17														
Bulk density							Mg/				2.14														
Dry density							Mg/				1.83														
Diameter								nm			84.4 196.1														
Length Failure strain							n	nm %			196 18.4														
Cu							k	кРа			76														
Rate of strain							%/n				2.04														
Mode of failure												ound		丄											
High density ru							-					_													
Remarks Sche	eduled	as m	nultis	tage	e test	t. No	obse	erve	d fail	ure o	ot firs	st sta	ige s	o rur	n un	til te	rmin	atior	1.						
Approved by:				Lee	ds L	abor	atory	,																. 4	
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Stuart Kirk													Print	date	24	4/08/20	010								

Revision No.

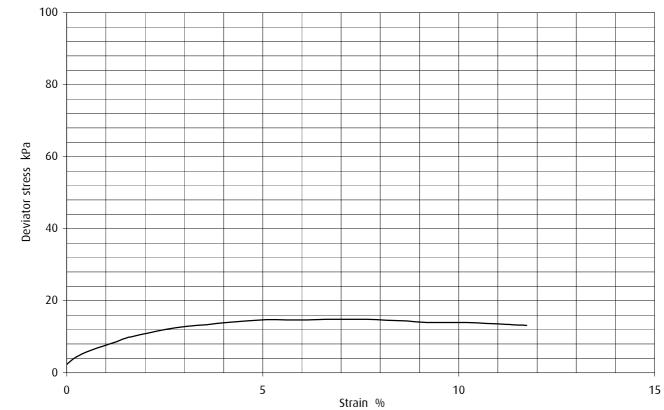
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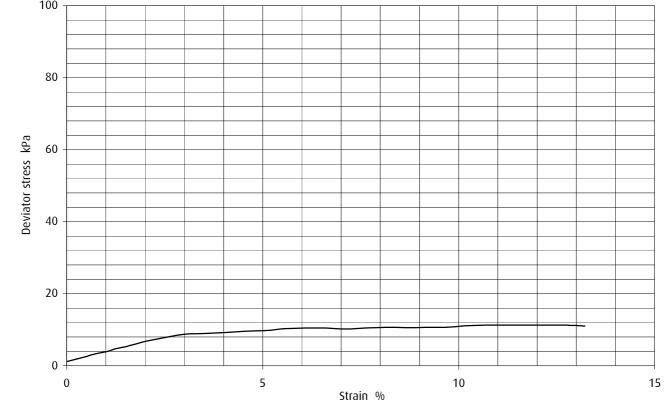
Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID
		Compression Without	VC04
Project No.	F15842	Measurement Of Pore	Sample Depth
		Pressure (Multistage	0.30m
Engineer	Roger Tym and Partners	,	Sample Number
		Method)	002
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type
		B31377. Part 7. 1990. 9	L
Description	Brown mottled dark grey sandy CLAY		Specimen Depth
			0.30m
			Specimen Number
			1



Shear strength parameters	c 5 kPa	φ 1.0 °	Apparent c	7 kPa
Test type		Undisturbed	Multi stage	
Test number		1	2	3
Cell pressure	kPa	5	10	20
Deviator stress	kPa	14.72	14.88	13.99
Corrected deviator stress	kPa	14	14	13
Membrane correction	kPa	0.73	0.91	1.19
Membrane thickness	mm	0.467		
Moisture content	%	65		
Bulk density	Mg/m³	1.64		
Dry density	Mg/m³	1.00		
Diameter	mm	84.05		
Length	mm	196.03		
Failure strain	%	5.1	6.6	9.2
Cu	kPa	7	7	6
Rate of strain	%/min	0.24		
Mode of failure	_		Compound	

Approved by:	Leeds Laboratory					soi∟ ♦
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	Revision No. 2.0)3	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

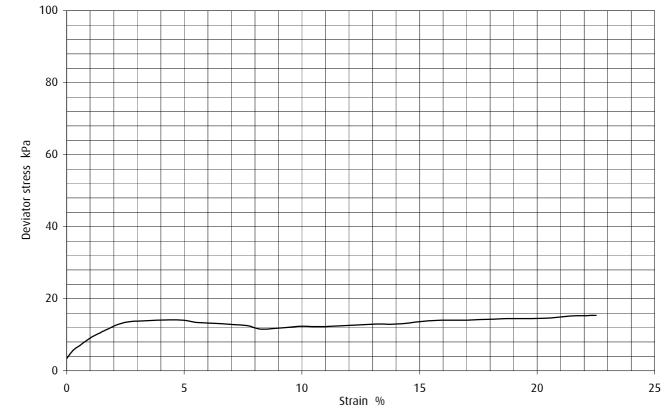
Project Name	South Hun	nber Ch	annel M	larine S	tudies				ed Tria	ixial ithout		Hole ID VC07)
Project No.	F15842						Mea	suren	nent O	f Pore	Sar	nple De 1.00m	•
Engineer	Roger Tym	and Pa	irtners				Pre		(Multi: thod)	stage	Sam	ple Nur	
Client	Yorkshire	Forward	i				BS	1377: Pa	art 7: 19	90: 9	Sa	mple Ty L	/ре
Description	Brown slig	htly gra	evelly CL	AY.		·						timen D 1.00m men Nu 1	-
100													
00						1	1						
80													



Shear strength parameters c	5 kPa	φ 0.0 °	Apparent c	5 kPa
Test type	Į	Undisturbed	Multi stage	
Test number		1	2	3
Cell pressure	kPa	10	20	40
Deviator stress	kPa	10.51	10.68	11.32
Corrected deviator stress	kPa	10	10	10
Membrane correction	kPa	0.83	1.15	1.34
Membrane thickness	mm	0.459		
Moisture content	%	55		
Bulk density	Mg/m³	1.64		
Dry density	Mg/m³	1.06		
Diameter	mm	84.95		
Length	mm	196.70		
Failure strain	%	6.1	9.2	11.2
Cu	kPa	5	5	5
Rate of strain	%/min	2.03		
Mode of failure			Plastic	•

Approved by:	Leeds Laboratory					
Sushil Sharda				Print date	24/08/2010	ENGINEERING
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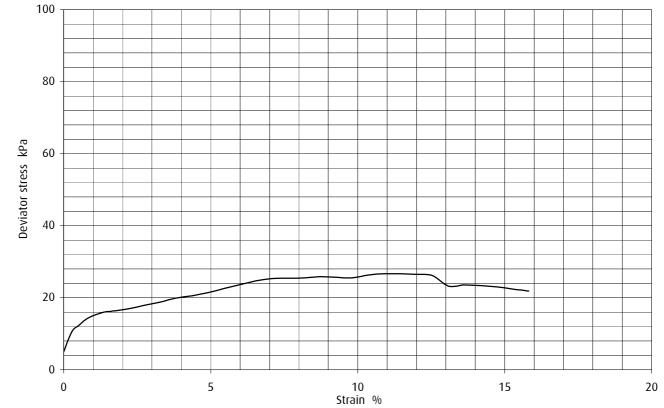
Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID
Project No.	F15842	Compression Without Measurement Of Pore	VC09 Sample Depth 1.65m
Engineer	Roger Tym and Partners	Pressure (Multistage Method)	Sample Number 002
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Brown sandy CLAY		Specimen Depth 1.65m Specimen Number 1
100			



Shear strength parameters	c 6 kPa	φ 0.5 °	Apparent c 7	kPa
Test type		Undisturbed	Multi stage	
Test number		1	2	3
Cell pressure	kPa	10	20	40
Deviator stress	kPa	14.13	13.45	15.38
Corrected deviator stress	kPa	14	13	13
Membrane correction	kPa	0.61	0.74	2.22
Membrane thickness	mm	0.459		
Moisture content	%	39		
Bulk density	Mg/m³	1.68		
Dry density	Mg/m³	1.21		
Diameter	mm	86.43		
Length	mm	182.17		
Failure strain	%	4.4	5.5	22.5
Cu	kPa	7	6	7
Rate of strain	%/min	2.19		
Mode of failure			Compound	

Approved by:	Leeds Laboratory					soi∟ ♦
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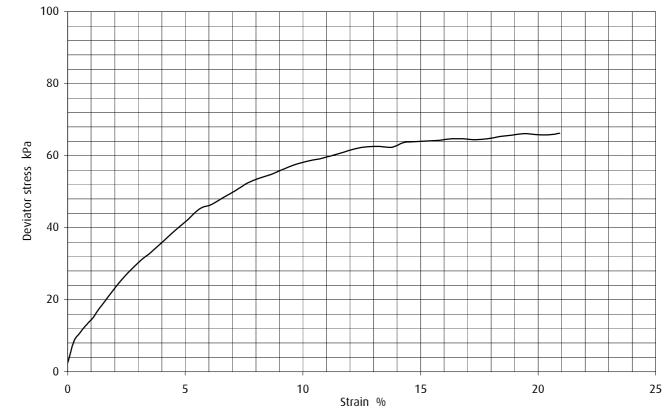
Project Name	South Humber Channel Marine Studies	Hole ID VC09	
Project No.	F15842	Compression Without Measurement Of Pore	Sample Depth
Engineer	Roger Tym and Partners	Pressure (Multistage Method)	2.05m Sample Number 003
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Brown SAND	_	Specimen Depth 2.05m Specimen Number
100			1



Shear strength parameters	С	10 kPa	ф	0.5 °	Apparent c	12 kPa	
Test type			Undisturbed		Multi stage		
Test number			1		2	3	
Cell pressure		kPa	15		30	60	
Deviator stress		kPa	25.8	4	26.69	23.54	
Corrected deviator stress		kPa	25		25	22	
Membrane correction		kPa	1.1	5	1.42	1.62	
Membrane thickness		mm	0.46	7			
Moisture content		%	28				
Bulk density		Mg/m³	1.8	ŝ			
Dry density		Mg/m³	1.4	5			
Diameter		mm	83.0	2			
Length		mm	183.	30			
Failure strain		%	8.7		11.5	13.6	
Cu		kPa	12		13	11	
Rate of strain		%/min	2.1	3			
Mode of failure					Compound	•	

Approved by:	Leeds Laboratory					soi∟ ♦
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 2.0)3	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

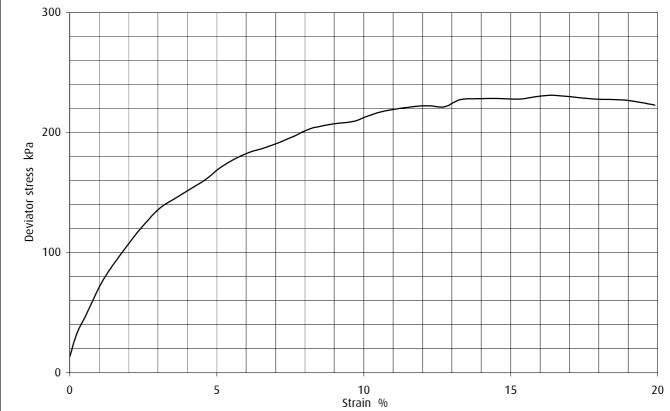
Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID
Project No.	F15842	Compression Without Measurement Of Pore	VC10 Sample Depth
Engineer	Roger Tym and Partners	Pressure (Multistage Method)	1.90m Sample Number 003
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Brown slightly gravelly slightly sandy CLAY		Specimen Depth 1.90m Specimen Number 1



Shear strength parameters	c 30 kPa	φ 1.6 °	Apparent c	31 kPa
Test type		Undisturbed	Multi stage	
Test number		1	2	3
Cell pressure	kPa	10	20	40
Deviator stress	kPa	62.54	64.73	66.19
Corrected deviator stress	kPa	61	63	64
Membrane correction	kPa	1.24	1.48	1.74
Membrane thickness	mm	0.459		
Moisture content	%	20		
Bulk density	Mg/m³	1.37		
Dry density	Mg/m³	1.14		
Diameter	mm	103.97		
Length	mm	196.03		
Failure strain	%	13.3	16.8	20.9
Cu	kPa	31	32	32
Rate of strain	%/min	2.04		
Mode of failure			Compound	•

Approved by:	Leeds Laboratory					soi∟ ♦
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 2.0)3	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

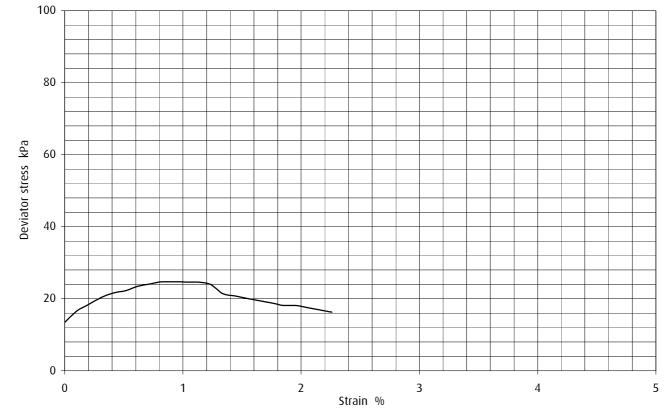
Project No. F15842		Compression Without	VC11
		Measurement Of Pore	Sample Depth 1.35m
Engineer Roger Tym	and Partners	Pressure (Multistage Method)	Sample Number 007
Client Yorkshire F	orward	BS1377: Part 7: 1990: 9	Sample Type L
Description Brown sligh	ntly gravelly CLAY		Specimen Depth 1.35m Specimen Number
300			1



Shear strength parameters	c 98 kPa	φ 6.3 °	Apparent c 113	3 kPa		
Test type		Undisturbed	Multi stage			
Test number		1	2	3		
Cell pressure	kPa	10	20	40		
Deviator stress	kPa	222.31	231.23	228.94		
Corrected deviator stress	kPa	221	230	227		
Membrane correction	kPa	1.38	1.70	1.77		
Membrane thickness	mm	0.436				
Moisture content	%	15				
Bulk density	Mg/m ³	2.20				
Dry density	Mg/m³	1.91				
Diameter	mm	84.15				
Length	mm	195.93				
Failure strain	%	12.2	16.3	17.4		
Cu	kPa	110	115	114		
Rate of strain	%/min	2.04				
Mode of failure		Compound				

Approved by:	Leeds Laboratory					soi ∟ ♦		
Stuart Kirk				Print date	24/08/2010	ENGINEERING		
	Revision No. 2.0)3	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited		

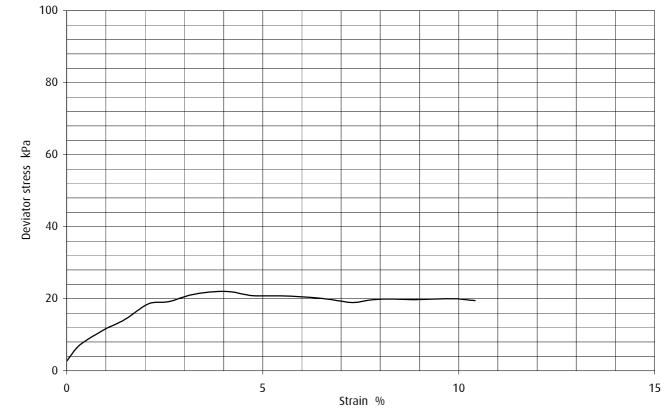
Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID VC12
Project No.	F15842	Compression Without Measurement Of Pore	Sample Depth 1.20m
Engineer	Roger Tym and Partners	Pressure (Multistage Method)	Sample Number 001
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Grey slightly gravelly slightly clayey SAND.		Specimen Depth 1.20m Specimen Number 1



Shear strength parameters	c 11 kPa	φ 0.0 °	Apparent c	11 kPa		
Test type		Undisturbed	Multi stage			
Test number		1	2	3		
Cell pressure	kPa	10	20	40		
Deviator stress	kPa	24.70	21.42	18.17		
Corrected deviator stress	kPa	25	21	18		
Membrane correction	kPa	0.13	0.20	0.27		
Membrane thickness	mm	0.436				
Moisture content	%	24				
Bulk density	Mg/m³	1.99				
Dry density	Mg/m³	1.60				
Diameter	mm	84.23				
Length	mm	194.67				
Failure strain	%	0.8	1.3	1.8		
Cu	kPa	12	11	9		
Rate of strain	%/min	2.05				
Mode of failure		Brittle				

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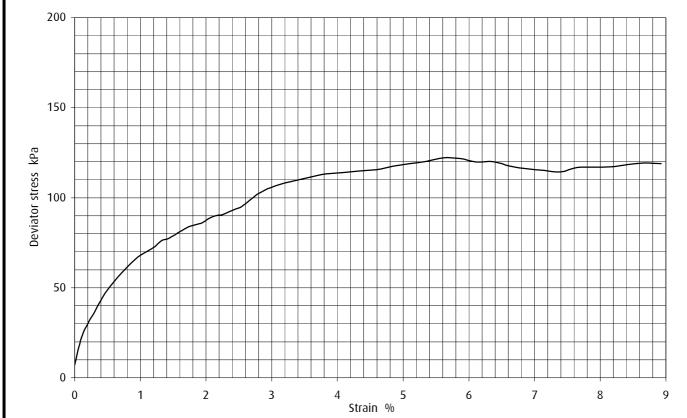
Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID
		Compression Without	VC13
Project No.	F15842	Measurement Of Pore	Sample Depth
		Pressure (Multistage	1.30m
Engineer	Roger Tym and Partners	,	Sample Number
		Method)	002
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type
		B31377. Part 7. 1990. 9	L
Description	Grey very sandy very gravelly CLAY.		Specimen Depth
			1.30m
			Specimen Number
			1



Shear strength parameters	С	10 kPa	φ	0.0 °	Apparent c	10 kPa	
Test type			Undisturbed		Multi stage		
Test number			1		2		3
Cell pressure		kPa	10		20		40
Deviator stress		kPa	21.96	j	20.79		19.98
Corrected deviator stress		kPa	21		20		19
Membrane correction		kPa	0.62		0.75		1.27
Membrane thickness		mm	0.482	<u>.</u>			
Moisture content		%	33				
Bulk density		Mg/m³	1.88				
Dry density		Mg/m³	1.41				
Diameter		mm	85.63	}			
Length		mm	192.0	0			
Failure strain		%	4.2		5.2		9.9
Cu		kPa	11		10		9
Rate of strain		%/min	2.08				
Mode of failure					Compound	•	

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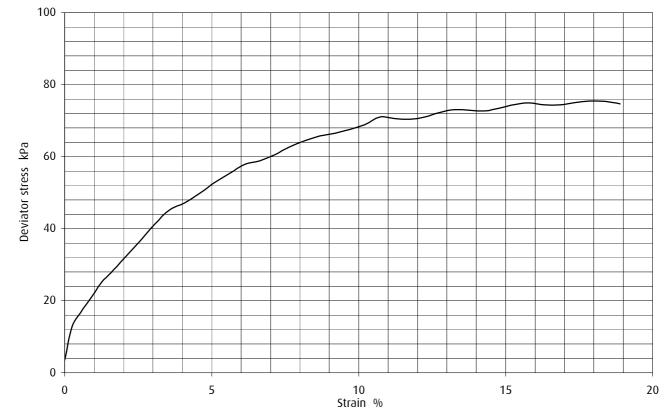
Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID VC13
Project No.	F15842	Compression Without Measurement Of Pore	Sample Depth 3.00m
Engineer	Roger Tym and Partners	Pressure (Multistage Method)	Sample Number 004
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Off white CHALK		Specimen Depth 3.01m
			Specimen Number 1



Shear strength parameters	С	56 kPa	ф	0.0 °	Apparent c	60 kPa	
Test type		1	Undisturbed		Multi stage		
Test number			1		2		3
Cell pressure		kPa	15		30		60
Deviator stress		kPa	122.1	.1	120.03		119.22
Corrected deviator stress		kPa	121		119		118
Membrane correction		kPa	0.78	}	0.87		1.12
Membrane thickness		mm	0.48	2			
Moisture content		%	22				
Bulk density		Mg/m³	1.91				
Dry density		Mg/m³	1.57	•			
Diameter		mm	87.9	7			
Length		mm	196.0	7			
Failure strain		%	5.6		6.4		8.7
Cu		kPa	61		60		59
Rate of strain		%/min	1.02				
Mode of failure					Compound	•	

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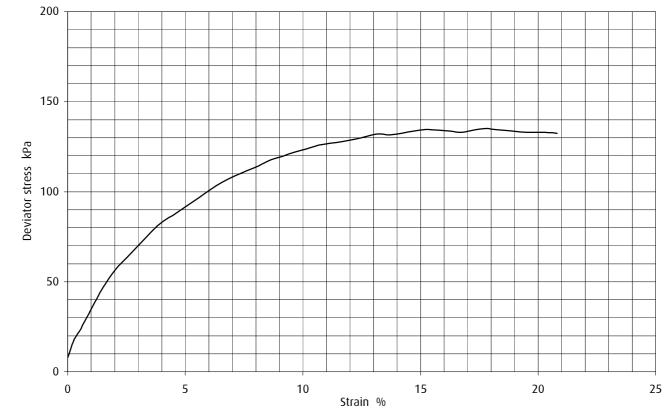
Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID VC14
Project No.	F15842	Compression Without Measurement Of Pore Pressure (Multistage	Sample Depth 0.25m
Engineer	Roger Tym and Partners	Method)	Sample Number 002
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Brown slightly gravelly CLAY		Specimen Depth 0.25m Specimen Number 1



Shear strength parameters	С	31 kPa	φ	6.5 °	Apparent c	36 kPa	
Test type			Undisturbed		Multi stage		
Test number			1		2		3
Cell pressure		kPa	5		10		20
Deviator stress		kPa	70.99)	73.08		75.43
Corrected deviator stress		kPa	70		72		74
Membrane correction		kPa	1.25		1.46		1.82
Membrane thickness		mm	0.436	;			
Moisture content		%	22				
Bulk density		Mg/m³	2.15				
Dry density		Mg/m³	1.76				
Diameter		mm	83.97				
Length		mm	195.93	3			
Failure strain		%	10.7		13.3		17.9
Cu		kPa	35		36		37
Rate of strain		%/min	2.04				
Mode of failure					Compound	•	

Approved by:	Leeds Laboratory					soi∟♦
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Project Name Project No.	South Humber Channel Marine Studies F15842	Undrained Triaxial Compression Without Measurement Of Pore	Hole ID VC16 Sample Depth
Engineer	Roger Tym and Partners	Pressure (Multistage Method)	0.25m Sample Number 002
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Brown gravelly slightly sandy CLAY.		Specimen Depth 0.25m Specimen Number 1
200 —			



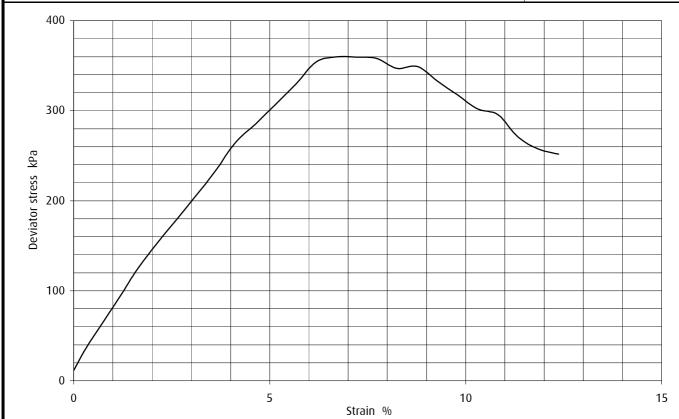
Shear strength parameters	c 58 kPa	φ 6.3 °	Apparent c	66 kPa
Test type		Undisturbed	Multi stage	
Test number		1	2	3
Cell pressure	kPa	5	10	20
Deviator stress	kPa	132.16	134.60	135.08
Corrected deviator stress	kPa	131	133	133
Membrane correction	kPa	1.44	1.60	1.79
Membrane thickness	mm	0.436		
Moisture content	%	16		
Bulk density	Mg/m³	2.16		
Dry density	Mg/m³	1.86		
Diameter	mm	85.02		
Length	mm	197.07		
Failure strain	%	13.2	15.2	17.8
Cu	kPa	65	67	67
Rate of strain	%/min	2.03		
Mode of failure			Compound	•

High density rubber latex membrane used. Specimen cut with longest axis in a vertical orientation.

Remarks Definitive (single stage) test not performed at clients request.

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Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID
Project No. Engineer	F15842 Roger Tym and Partners	Compression Without Measurement Of Pore Pressure (Multistage Method)	VC16 Sample Depth 2.10m Sample Number 007
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Light brownish grey very gravelly CLAY.	•	Specimen Depth 2.10m Specimen Number 1



Shear strength parameters	С	168 kPa	1 ф	0.0 °	Apparent c	168 kPa	
Test type			Undisturbed		Multi stage		
Test number			1		2		3
Cell pressure		kPa	15		30		60
Deviator stress		kPa	a 359.	83	349.03		301.70
Corrected deviator stress		kPa	359	9	348		300
Membrane correction		kPa	0.8	8	1.10		1.24
Membrane thickness		mn	0.45	4			
Moisture content		9/	6 17				
Bulk density		Mg/m	2.10	6			
Dry density		Mg/m	1.8	5			
Diameter		mn	n 85.2	.0			
Length		mn	194.	00			
Failure strain		9	6.7		8.8		10.3
Cu		kPa	a 179	9	174		150
Rate of strain		%/mir	2.00	6			
Mode of failure			_		Compound	l	

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Project Name	South Hu	ımber	Cha	nnel	Ma	rine	Stud	lies		Undrained Triaxial Compression Without									Hole ID VC17						
Project No.	F15842									Measurement Of Pore Pressure (Multistage								Sample Depth 3.00m							
Engineer	Roger Tyı	m and	l Par	tner	S					Method)									Sample Number 008						
Client	Yorkshire	Forw	<i>v</i> ard							BS1377: Part 7: 1990: 9										San	nple L	Туре			
Description	otion Brown gravelly CLAY																_			•	imen 3.00i nen f 1	m .			
200 —																									
450																									
150																									
КРа																									
Deviator stress								_	_	_	_	_													
0 lo					_																				
viat																									
De																									
50																									
30																									
	/																								
<u>/</u>																									
0 /																									
0			5	5				1	0	St	train	%	1	5				20)				25		
Shear strength	parameter	'S	С			46 k	кРа		ф		4.	1 °		Арр	aren	t c		53	kP	а					
est type								Undi	sturl	bed				N	Mult	i stag	е								
est number										1						2						3			
Cell pressure							кРа			20					_	40	_					80			
Deviator stress							κPa			102.						10.35)					1.71			
Corrected devia Membrane cor							κPa κPa			101 1.21						109 1.62						.03			
Membrane thic							nm			0.46						1.02					2	03			
Moisture conte							%			16															
Bulk density						Mg/				2.1															
Ory density						Mg/				1.8															
Diameter						n	nm			85.5															
ength						n	nm			196.															
ailure strain							%			9.7						14.3						9.4			
Cu Rate of strain							(Pa			50 2.0						54						55			
rate of Strain						%/r	ııırı			2.04	4				Car	mpou	nd		1						
							I								COL										
Mode of failure High density ru		mem	bran	ne iiis	ed	Sne	cim	en ci	ıt wi	th In	ทดคร	t avi	s in a	ver	tical	orien	itatio	n.							

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Project Name		umber Ch	nannel I	Marine S	itudies		C	Undr ompr			axial ithou	t	Hole ID VC18						
Project No.	F15842							/leasu				Sample Depth 1.75m							
Engineer	Roger Ty	m and Pa	artners				,	Pressi	viuiti hod)	,	Sample Number 004								
Client	Yorkshire	e Forward	d					BS137		-		Sample Type L							
Description	Brown gi	ravelly CL	AY.											Sp	ecime	en De	oth		
	· ·													_		'5m			
														Spe		n Nun 1	nber		
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200																			
150																			
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Deviator stress kPa																			
ă																			
50 —	+																		
	+/-																		
7			+																
0																			
0			5			10	Strai	n %	15	;			20				25		
Shear strength	paramete	rs (<u></u>	45 kl	Pa	φ		4.9 °	-	Appar	ent c		52	kPa					
Test type	•					listurbe	ed				ulti sta	qe							
est number							1				2					3			
Cell pressure					Pa		10				20					40			
Deviator stress Corrected devia					Pa Pa		01.77 100				106.2 105				-	107.2! 105	•		
Membrane cor		•			Pa		1.36				1.52					1.89			
Membrane thic					m).436												
Moisture conte	ent				%		15												
Bulk density			n³		2.13														
Ory density Diameter				Mg/r		1.85 86.98													
ength.					m		97.83												
ailure strain				mm %				12.6 14.7							19.7				
Cu					Pa		50 52									53			
	te of strain %/min					2.02 Compound													
Rate of strain Mode of failure																			

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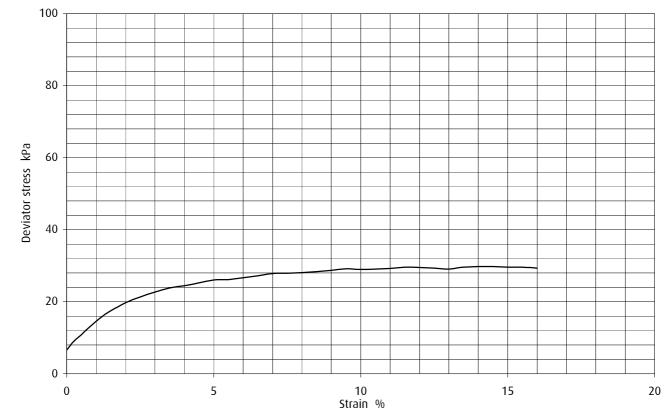
Sushil Sharda

Leeds Laboratory

Revision No.

2.03

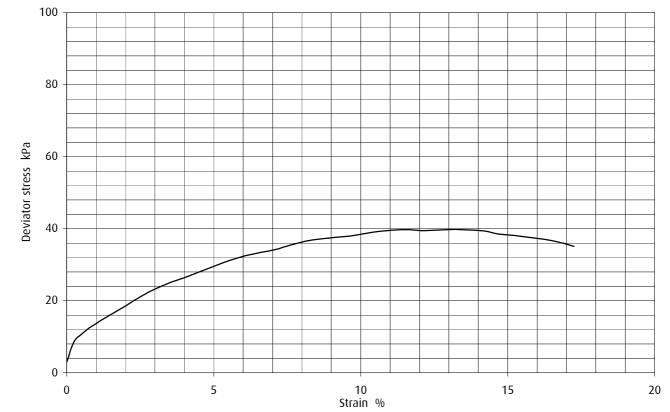
Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID
Project No.	F15842	Compression Without Measurement Of Pore Pressure (Multistage	VC19 Sample Depth 1.26m
Engineer	Roger Tym and Partners	Method)	Sample Number 004
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Brown gravelly slightly sandy CLAY.		Specimen Depth 1.26m Specimen Number 1



Shear strength parameters	c 14 kPa	φ 0.0 °	Apparent c	14 kPa
Test type		Undisturbed	Multi stage	
Test number		1	2	3
Cell pressure	kPa	10	20	40
Deviator stress	kPa	29.14	29.56	29.82
Corrected deviator stress	kPa	28	28	28
Membrane correction	kPa	1.15	1.33	1.58
Membrane thickness	mm	0.454		
Moisture content	%	25		
Bulk density	Mg/m³	1.95		
Dry density	Mg/m³	1.56		
Diameter	mm	86.18		
Length	mm	199.97		
Failure strain	%	9.5	11.5	14.5
Cu	kPa	14	14	14
Rate of strain	%/min	2.00		
Mode of failure			Compound	•

Approved by:	Leeds Laborato	ory				soi ∟ ♦
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Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID
Project No.	F15842	Compression Without Measurement Of Pore	VC19 Sample Depth 2.90m
Engineer	Roger Tym and Partners	Pressure (Multistage Method)	Sample Number 008
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Brown gravelly slightly sandy CLAY.		Specimen Depth 2.90m Specimen Number 1



Shear strength parameters	c 19 kPa	φ 0.0 °	Apparent c 19	kPa
Test type		Undisturbed	Multi stage	
Test number		1	2	3
Cell pressure	kPa	15	30	60
Deviator stress	kPa	39.71	39.84	38.11
Corrected deviator stress	kPa	39	39	37
Membrane correction	kPa	0.54	0.59	0.65
Membrane thickness	mm	0.459		
Moisture content	%	13		
Bulk density	Mg/m ³	0.33		
Dry density	Mg/m³	0.29		
Diameter	mm	219.48		
Length	mm	197.07		
Failure strain	%	11.7	13.2	15.2
Cu	kPa	20	20	19
Rate of strain	%/min	2.03		
Mode of failure			Brittle	•

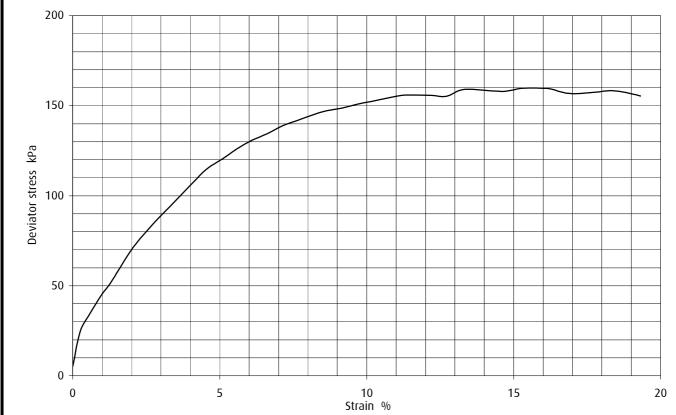
Approved by:	Leeds Laboratory				soi ∟ ♦	
Sushil Sharda			Print date	24/08/2010	ENGINEERING	
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Project Name	e South Humber Channel Marine Studies Undrained Triaxial					ined Triaxial			
	545070				Compre	ssion Without		VC20	
Project No.	F15842					ement Of Pore		Sample Depth 1.45m	
Engineer	Roger Tym and	Partners				re (Multistage		Sample Number	
_		_			N	/lethod)		003	
Client	Yorkshire Forwa	ard			BS1377	': Part 7: 1990: 9		Sample Type L	
Description	Brownish grey	slighlty gr	avelly CLA	Y.				Specimen Depth	
	0 ,	0 , 0	·					1.45m	
							5	Specimen Number 1	
100									
-									
80 —									
면 60 는									
Deviator stress kPa									
stre									
ator									
96 40 									
-									
20									
-									
						+			
0 +									
0			5		Strain %	10		-	
Shear strength	parameters	С	5 kPa	ф	0.0 °	Apparent c	5 k	<u></u> (Ра	
Test type				Undisturbe		Multi stag	e <u>.</u>		
Test number			kPa		10	20		3 40	
Cell pressure			kPa kDa		10 1 / Q	10.49		40 10 11	

Shear strength parameters c	5 kPa	φ 0.0 °	Apparent c	5 kPa
Test type	L	Indisturbed	Multi stage	
Test number		1	2	3
Cell pressure	kPa	10	20	40
Deviator stress	kPa	11.48	10.49	10.11
Corrected deviator stress	kPa	10	9	9
Membrane correction	kPa	1.08	1.19	1.43
Membrane thickness	mm	0.467		
Moisture content	%	165		
Bulk density	Mg/m³	1.60		
Dry density	Mg/m³	0.60		
Diameter	mm	83.73		
Length	mm	196.00		
Failure strain	%	8.2	9.2	11.7
Cu	kPa	5	5	4
Rate of strain	%/min	2.04		
Mode of failure			Compound	•

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Project Name	South Humber Channel Marine Studies	Undrained Triaxial Compression Without	Hole ID VC21
Project No.	F15842	Measurement Of Pore	Sample Depth 3.32m
Engineer	Roger Tym and Partners	Pressure (Multistage Method)	Sample Number 006
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Brown gravelly CLAY.		Specimen Depth 3.32m Specimen Number 1



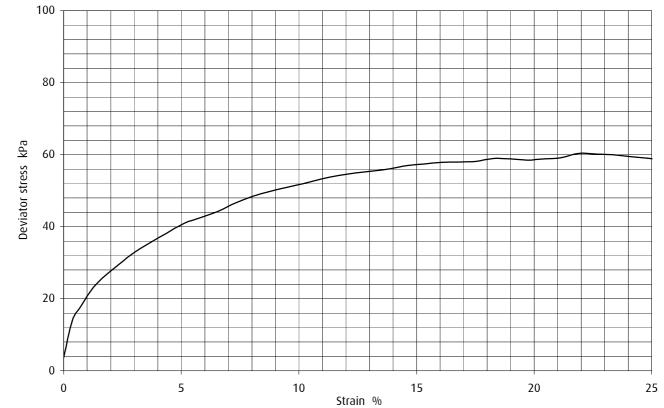
Shear strength parameters	С	77 kPa	φ 0.7 °	Apparent c	78 kPa
Test type			Undisturbed	Multi stage	
Test number			1	2	3
Cell pressure		kPa	20	40	80
Deviator stress		kPa	155.98	159.80	158.35
Corrected deviator stress		kPa	155	158	156
Membrane correction		kPa	1.34	1.67	1.86
Membrane thickness		mm	0.436		
Moisture content		%	18		
Bulk density		Mg/m³	2.12		
Dry density		Mg/m³	1.80		
Diameter		mm	83.47		
Length		mm	196.70		
Failure strain		%	11.7	15.8	18.3
Cu		kPa	77	79	78
Rate of strain		%/min	2.03		
Mode of failure		•		Compound	•

High density rubber latex membrane used. Specimen cut with longest axis in a vertical orientation.

Remarks Definitive (single stage) test not performed at clients request.

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Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID
Project No.	F15842	Compression Without Measurement Of Pore	VC23 Sample Depth 1.70m
Engineer	Roger Tym and Partners	Pressure (Multistage Method)	Sample Number 006
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Brown slightly sandy slightly gravelly CLAY.		Specimen Depth 1.70m Specimen Number 1



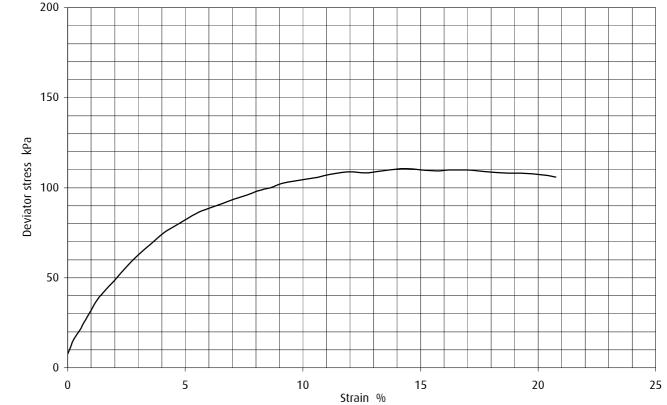
Shear strength parameters	c 2	9 kPa	ф	0.0 °	Apparent c	29 kPa	
Test type			Undisturbed		Multi stage		
Test number			1		2		3
Cell pressure		kPa	10)	20		40
Deviator stress		kPa	58.9	95	60.33		59.03
Corrected deviator stress		kPa	57	7	58		57
Membrane correction		kPa	1.9	95	2.24		2.49
Membrane thickness		mm	0.4	59			
Moisture content		%	17	7			
Bulk density	I	∕Ig/m³	2.9	8			
Dry density	I	∕Ig/m³	2.5	55			
Diameter		mm	83.	73			
Length		mm	137	.00			
Failure strain		%	18	.2	21.9		24.8
Cu		kPa	28	3	29		28
Rate of strain		%/min	0.3	34			
Mode of failure					Compound	d	

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Project Name	South F	lumbe	er Cha	nnel	Marin	ie Stu	dies			Und	lraiı	ned Ti	riaxia	I				le ID	
									(Comp	res	sion V	Vitho	ut				C23	
Project No.	F15842									-		ment				(le Dep	oth
												(Mul						00m	
Engineer	Roger T	ym ar	nd Par	tners					'			ethod		9		Sa		Num	nber
Client	Yorkshi	ro Eor	word									• • • • • • • • • • • • • • • • • • • •	• •					008 ole Ty _l	ne
Liletti	TUIKSIII	ie roi	waru							BS13	377:	Part 7: 1	1990: 9)			Janip	L L	pe
Description	Brown	slightl	y san	dy slig	htly o	gravel	ly CLA	λY.								Sp		en De	epth
																		00m	
																Spe	ecime	n Nu	mber
																		1	
200 —	1									I	1			I				ı	
150																			
130																			
Ра																			
Deviator stress kPa																			
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)ev																			
			_																
50 +																			
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0				ī	5				1	0				1	5				2
									Stra	in %									
hear strength	paramet	ers	С		53	kPa		ф		0.0 °		Appa	arent o	:	5	3 kPa	a		
est type								Ψ sturb	ed				/lulti s						
est number							anai	Starb	1			- 11		2		1		3	
ell pressure						kPa			15					0		+		60	
eviator stress						kPa		1	07.80)				3.82				108.8	
Corrected devia	ator stres	SS				kPa			106					07				107	
Летbrane cor						kPa			1.58					71				1.92	
Membrane thic	ckness					mm		(0.467										
/loisture conte	ent					%			15										
Bulk density						g/m³			2.24										
ry density					M	g/m³			1.95										
iameter						mm			32.93										
ength						mm			97.20)									
ailure strain						. %			13.2					4.7				17.2	2
Cu 						kPa			53				5	4				53	
ate of strain					%	/min			2.03										
Mode of failure					1 -								Comp						
ligh density ru	ihher late	x mei	mbrar	ne use	ed. S	pecim	en cu	ıt with	long	est a	cis ir	a vert	ical o	rienta	tion	_			

Approved by:	Leeds Laboratory				soi ∟ ♦
Sushil Sharda			Print date	24/08/2010	ENGINEERING
	Revision No. 2.03	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

Project Name	South H	lumbe	r Cha	anne	l Ma	rine	Stud	ies			Indr mpr								-	Hole VC2		
Project No.	F15842	<u>)</u>									asu									ıple [h
Engineer	Roger 1	Гут an	ıd Paı	rtner	S						essu		Mu	ltist				S		1.70 ole N 004	umb	er
Client	Yorkshi	ire For	ward							В	S137	7: Pa	rt 7:	1990	: 9				San	nple L	Туре)
Description	Brown	gravell	ly sliç	ghtly	sanc	dy CL	AY.													men 1.70 nen I 1	m .	
200																						
	++	_															J.					
150 —																						



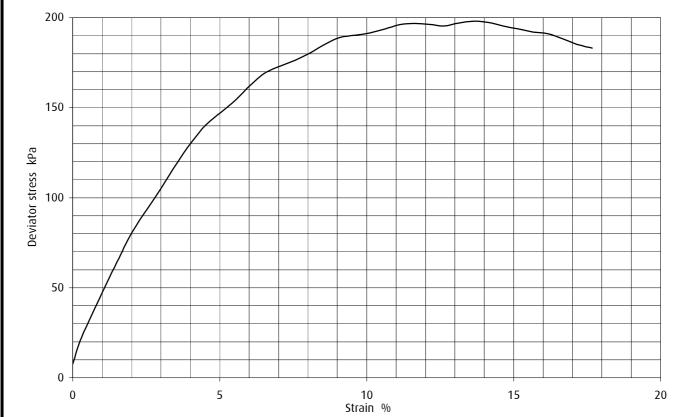
Shear strength parameters	С	54 kPa	ф	0.0 °	Apparent c	54 kPa	
Test type			Undisturbed		Multi stage		
Test number			1		2		3
Cell pressure		kPa	10		20		40
Deviator stress		kPa	108.72		110.62		109.93
Corrected deviator stress		kPa	107		109		108
Membrane correction		kPa	1.37		1.53		1.69
Membrane thickness		mm	0.436				
Moisture content		%	18				
Bulk density		Mg/m³	2.12				
Dry density		Mg/m³	1.79				
Diameter		mm	84.13				
Length		mm	197.57				
Failure strain		%	12.1		14.2		16.2
Cu		kPa	54		55		54
Rate of strain		%/min	2.02				
Mode of failure		Ī			Compound	•	

High density rubber latex membrane used. Specimen cut with longest axis in a vertical orientation.

Remarks Definitive (single stage) test not performed at clients request.

Approved by:	Leeds Laboratory				soi∟♦
Sushil Sharda			Print date	24/08/2010	ENGINEERING
	Revision No. 2.03	Issue Date	27/07/	2010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID VC25
Project No.	F15842	Compression Without Measurement Of Pore	Sample Depth 1.00m
Engineer	Roger Tym and Partners	Pressure (Multistage Method)	Sample Number 004
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Brown gravelly CLAY with sand pockets.		Specimen Depth 1.00m
			Specimen Number 1



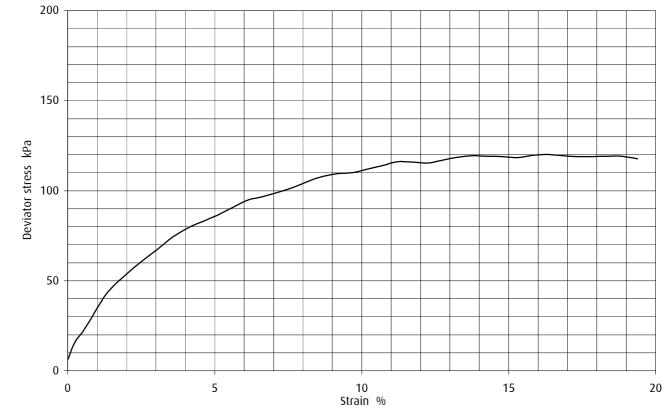
Shear strength parameters	С	97 kPa	φ	0.0 °	Apparent c	97 kPa	
Test type			Undisturbed		Multi stage		
Test number			1		2		3
Cell pressure		kPa	5		10		20
Deviator stress		kPa	196.	79	198.05		192.09
Corrected deviator stress		kPa	19	5	196		190
Membrane correction		kPa	1.4	1	1.59		1.76
Membrane thickness		mm	0.46	57			
Moisture content		%	18				
Bulk density		Mg/m ³	2.1	3			
Dry density		Mg/m³	1.8	1			
Diameter		mm	84.4	3			
Length		mm	198.	03			
Failure strain		%	11.	6	13.6		15.7
Cu		kPa	98		98		95
Rate of strain		%/min	0.2	0			
Mode of failure					Compound		

High density rubber latex membrane used. Specimen cut with longest axis in a vertical orientation.

Remarks Definitive (single stage) test not performed at clients request.

Approved by:	Leeds Laboratory				soi∟♦
Sushil Sharda			Print date	24/08/2010	ENGINEERING
	Revision No. 2.03	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

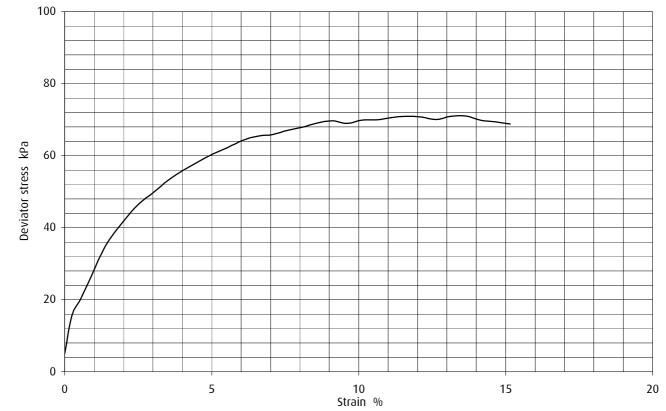
Project Name	South F	lumbe	er Cha	nnel	Marin	ie Stu	dies	C	Und omp	raine ressi						ole ID C27	
Project No.	F15842								/leas					(le De	oth
Engineer	Roger T	ym ar	nd Par	tners				F	Press	•	Mult	-	ge	Sá	ample	53m Nun 003	nber
Client	Yorkshi	re For	ward						BS13	77: Pa	rt 7: 1	990: 9			Samp	ole Ty L	ре
Description	Brown (gravel	ly CLA	ΑY											0.	nen Do 53m en Nu 1	epth mber
200																	



Shear strength parameters	С	51 kPa	φ 6.3 °	Apparent c	58 kPa
Test type		l	Undisturbed	Multi stage	
Test number			1	2	3
Cell pressure		kPa	5	10	20
Deviator stress		kPa	116.12	119.41	120.22
Corrected deviator stress		kPa	115	118	118
Membrane correction		kPa	1.38	1.61	1.82
Membrane thickness		mm	0.467		
Moisture content		%	15		
Bulk density		Mg/m³	2.23		
Dry density		Mg/m³	1.94		
Diameter		mm	84.10		
Length		mm	196.07		
Failure strain		%	11.2	13.8	16.3
Cu		kPa	57	59	59
Rate of strain		%/min	2.04		
Mode of failure		<u> </u>		Compound	•

Approved by:	Leeds Laboratory					soi∟♦
Stuart Kirk				Print date	24/08/2010	ENGINEERING
	Revision No. 2.0	3	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID
Project No.	F15842	Compression Without Measurement Of Pore	VC28 Sample Depth 0.50m
Engineer	Roger Tym and Partners	Pressure (Multistage Method)	Sample Number 003
Client	Yorkshire Forward	BS1377: Part 7: 1990: 9	Sample Type L
Description	Brown gravelly slightly sandy CLAY.		Specimen Depth 0.50m Specimen Number 1



Shear strength parameters	c 32 kPa	φ 3.2 °	Apparent c	35 kPa	
Test type		Undisturbed	Multi stage		
Test number		1	2	3	
Cell pressure	kPa	5	10	20	
Deviator stress	kPa	69.65	70.90	70.99	
Corrected deviator stress	kPa	68	70	69	
Membrane correction	kPa	1.15	1.39	1.56	
Membrane thickness	mm	0.459			
Moisture content	%	16			
Bulk density	Mg/m³	2.17			
Dry density	Mg/m³	1.87			
Diameter	mm	84.22			
Length	mm	198.03			
Failure strain	%	9.1	11.6	13.6	
Cu	kPa	34	35	35	
Rate of strain	%/min	2.02			
Mode of failure			0		

High density rubber latex membrane used. Specimen cut with longest axis in a vertical orientation.

Remarks Definitive (single stage) test not performed at clients request.

Approved by:	Leeds Laboratory				soi∟♦
Sushil Sharda			Print date	24/08/2010	ENGINEERING
	Revision No. 2.03	Issue Date	27/07/2	2010	Part of VINCI Construction UK Limited

Project Name	South I	South Humber Channel Marine Studies						Undrained Triaxial Compression Without							Hole ID VC28							
Project No.	F15842	<u> </u>							Measurement Of Pore Pressure (Multistage Method)						Sample Depth 4.08m							
Engineer	Roger 1	Tym and	d Partr	ners											Sample Number 007							
Client	Yorksh	orkshire Forward							В	S137	7: Pa	rt 7: :	1990	: 9			:		ple T L	уре		
Description	Brown	Frown gravelly CLAY															Sp		nen [Deptl	h	
																		Spe		.08m en N	ւ umb	er
																				1		
300 —																						
<u> </u>																						
200																		-				
											_											
- KPa																						
Less																						
or st																						
Deviator stress																						
Dev																						
100																						
	/	/																				
7	+																					
⊬																						
0 +																						
0			5				10)	Str	rain	%	1.	5				20					25
hear strength	paramet	ters	С		89 I	кРа		φ		4.	o °		Appa	aren	t c	,	100	kPa	l			
est type						Ti	Jndis		ed						stage	3						
est number									1						2					3	}	
Cell pressure						kPa			25						50					10		
eviator stress						kPa			96.4						03.69					207		
Corrected devia Membrane cor		SS				kPa kPa			195 1.66						202 1.83					20 2.2		
Membrane thic						nm			1.66 0.482						1.03					2.2	20	
Moisture conte					•	%		Ì	14	_												
Bulk density					Mg/				2.21													
ry density					Mg/				1.93													
Diameter						mm			84.02													
ength					r	nm			96.1						15.0					•		
ailure strain Cu						% kPa			13.8 97	5					15.8 101					20		
.u Rate of strain					ا %/r				2.04						101		103					
Node of failure	;				/U/ I	···''			۷.۵٦	•				Cor	npoui	nd						
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Issue Date

27/07/2010

24/08/2010

ENGINEERING

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Approved by:

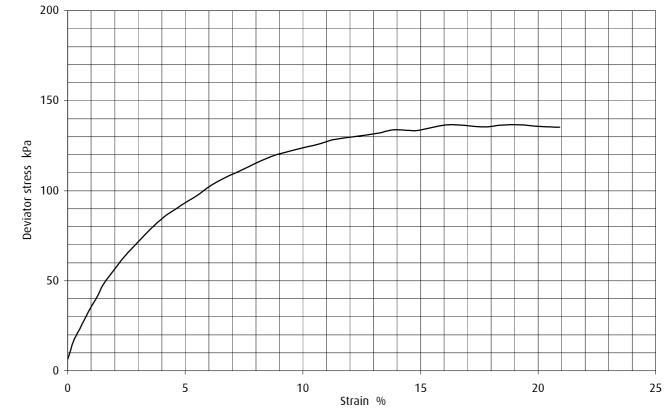
Stuart Kirk

Leeds Laboratory

2.03

Revision No.

Project Name	South Humber Channel Marine Studies	Undrained Triaxial	Hole ID		
		Compression Without	VC30		
Project No.	F15842	Measurement Of Pore	Sample Depth		
			1.83m		
Engineer	Roger Tym and Partners	Pressure (Multistage	Sample Number		
J	,	Method)	005		
Client	Yorkshire Forward	PC1277: Post 7: 1000: 0	Sample Type		
		BS1377: Part 7: 1990: 9	L		
Description	Brown gravelly CLAY		Specimen Depth		
	5		1.83m		
			Specimen Number		
			1		
200 —					



Shear strength parameters	c 65 kPa	φ 1.4 °	Apparent c	67 kPa
Test type		Undisturbed	Multi stage	
Test number		1	2	3
Cell pressure	kPa	10	20	40
Deviator stress	kPa	133.73	136.79	136.76
Corrected deviator stress	kPa	132	135	135
Membrane correction	kPa	1.54	1.70	1.89
Membrane thickness	mm	0.436		
Moisture content	%	16		
Bulk density	Mg/m³	2.19		
Dry density	Mg/m³	1.89		
Diameter	mm	84.13		
Length	mm	196.07		
Failure strain	%	14.3	16.3	18.9
Cu	kPa	66	68	67
Rate of strain	%/min	2.04		
Mode of failure			Compound	•

High density rubber latex membrane used. Specimen cut with longest axis in a vertical orientation.

Remarks Definitive (single stage) test not performed at clients request.

Approved by:	Leeds Laboratory				soi∟♦
Stuart Kirk		1	Print date	24/08/2010	ENGINEERING
	Revision No. 2.03	Issue Date	27/07/	2010	Part of VINCI Construction UK Limited



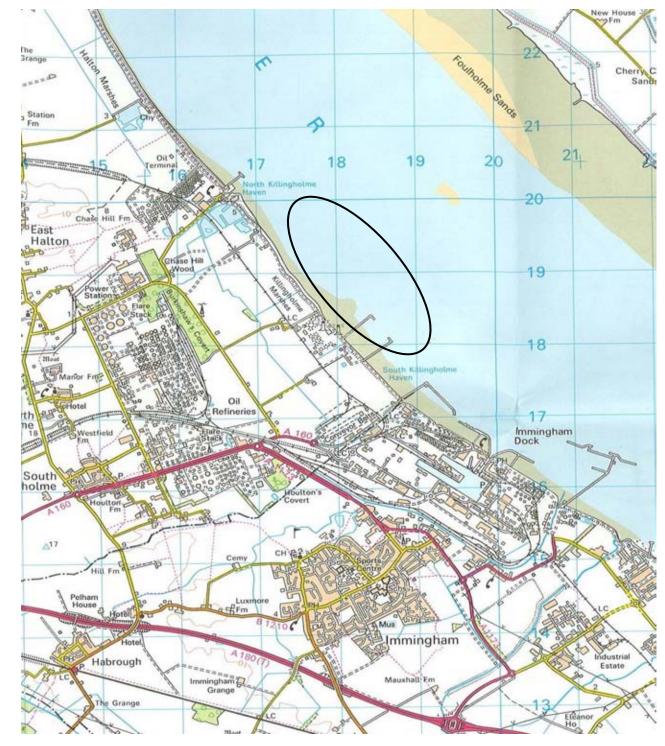
SUPPORTING FACTUAL DATA SECTION D Site Plans

SITE LOCATION PLAN





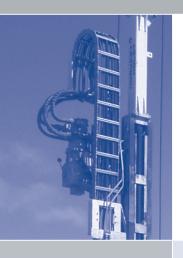
Project Name	South Humber Channel Marine Studies	Site Location Plan	Scale
Project No.	F15842		1:50,000
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		01





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Date						NORWEST
30/07/2010	0					HOLST
Form No.	SI SLP	Revision No.	2.01	Issue Date	16/03/2006	SOIL ENGINEERING



SUPPORTING FACTUAL DATA SECTION D Site Plans

EXPLORATORY HOLE LOCATION PLAN





Project Name South H	umber Channel Marine Studies	Exploratory Hole Location Plan	Scale
Project No. F15842			NTS
Engineer Roger Ty	ym & Partners		Fig no.
Client Yorkshir	re Forward		02
Date	+VC25 +VC25 +VC25 +VC25	+VC13 +VC13 +VC13 +VC13 +VC14 +VC19 +VC29	
			HOLST •

SI EHLPA3

Form No.

Revision No. 2.01

Issue Date 27/06/2006

SOIL ENGINEERING



SUPPORTING FACTUAL DATA SECTION E Photographs

SOIL SAMPLE / ROCK CORE / CONCRETE CORE PHOTOGRAPHS





Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC01
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		01



VC01 0.00m to 3.10m

Photograp	hed by	Date photographed				
EC		18/07/2010				
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007	



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		VC02
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		02



VC02 0.00M to 3.00m



Photographed by Date photographed

EC 19/07/2010

Form No. SI PMPA4 Revision No. 2.02 Issue Date 26/02/2007



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		VC03
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		03



VC03 0.00m to 2.60m

Photograp	hed by	Date photographed					
EC		19/07/2010					
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		VC04
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		04



VC04 0.00m to 3.00m



VC04 3.00m to 4.10m

Photograp	ohed by	Date photog	Date photographed				
EC		19/07/2010	19/07/2010				
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		VC05
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		05



VC05 0.00m to 3.00m



VC05 3.00m to 4.40m

Photograp	hed by	Date photographed			
EC		19/07/2010			
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		VC06
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		06



VC06 0.00m to 3.00m



VC06 3.00m to 5.30m

Photograp	hed by	Date photographed			
EC		19/07/2010			
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		VC07
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		07



VC07 0.00m to 2.60m

Photograp	hed by	Date photogr	aphed		
EC		20/07/2010			
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC08
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		08



VC08 0.00m to 3.00m



VC08 3.00m to 4.70m

Photograp	hed by	Date photographed					
EC		20/07/2010					
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC09
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		09



VC09 0.00m to 2.70m

Photograp	hed by	Date photographed			
EC		20/07/2010			
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC10
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		10



VC10 0.00m to 2.20m



VC10 2.20m to 3.20m

Photograp	hed by	Date photographed			
EC		20/07/2010			
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC11
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		11



VC11 0.00m to 2.20m

Photogra	phed by	Date photog	Date photographed				
EC		21/07/2010	21/07/2010				
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC12
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		12



VC12 0.00m to 3.00m



VC12 3.00m to 4.30m

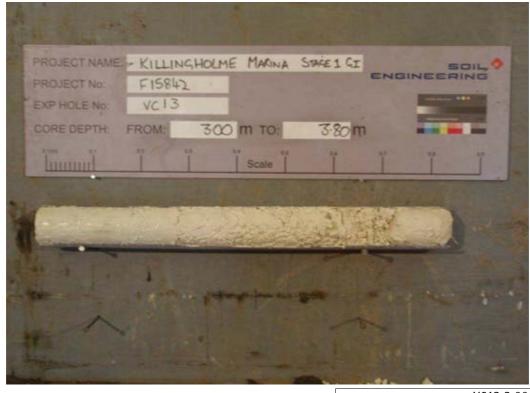
Photograp	hed by	Date photog	Date photographed				
EC		21/07/2010	21/07/2010				
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC13
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		13



VC13 0.00m to 3.00m



VC13 3.00m to 3.80m

Photograp	hed by	Date photog	Date photographed				
EC		21/07/2010	21/07/2010				
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		VC14
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		14



VC14 0.00m to 1.80m

Photograp	hed by	Date photog	Date photographed				
EC		21/07/2010	21/07/2010				
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		VC15
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		15



VC15 0.00m to 2.60m

Photograp	hed by	Date photographed			
EC		21/07/2010			
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		VC16
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		16



VC16 0.00m to 3.40m

Photograp	hed by	Date photogr	aphed		
EC		22/07/2010			
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		VC17
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		17



VC17 0.00m to 3.00m



VC17 3.00m to 4.10m

Photograp	hed by	Date photographed					
EC	22/07/2010						
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		VC18
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		18



VC18 0.00m to 3.00m



VC18 3.00m to 5.20m

Р	hotograp	hed by	Date photogr	aphed		
E	EC		22/07/2010			
Fo	orm No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Name South Humber Channel Marine Studies		Photographic Record	Hole ID
Project No.	F15842		V C19
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		19



VC19 0.00m to 3.20m

Photographed by		Date photographed			
EC		22/07/2010			
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC20
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		20



VC20 0.00m to 3.00m



VC20 3.00m to 3.80m

Photograp	hed by	Date photographed					
JT		26/07/2010					
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC21
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		21



VC21 0.00m to 3.00m



VC21 3.00m to 4.60m

Photograp	hed by	Date photographed			
JT	T 26/07/2010				
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC22
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		22



VC22 0.00m to 3.00m



VC22 3.00m to 3.60m

Photograp	hed by	Date photog	Date photographed				
JT		26/07/2010	26/07/2010				
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC23
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		23



VC23 0.00m to 3.00m



VC23 3.00m to 3.55m

Photograp	hed by	Date photographed			
JT	26/07/2010				
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC24
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		24



VC24 0.00m to 3.00m



VC24 3.00m to 3.60m

Photograp	hed by	Date photog	Date photographed				
JT		26/07/2010	26/07/2010				
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC25
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		25



VC25 0.00m to 3.17m

Photogra	phed by	Date photog	Date photographed				
JT 26/07/2010							
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



VC25

Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC26
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		26



VC26 0.00m to 3.00m



VC26 3.00m to 3.70m

Photograp	hed by	Date photog	raphed		
MB		27/07/2010)		
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC27
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		27



VC27 0.00m to 3.00m



VC27 3.00m to 4.90m

Photographed by Date photographed							
MB		27/07/2010					
Form No.	SI PMPA4	Revision No.	2.02		Issue Date	26/02/2007	



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC28
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		28



VC28 0.00m to 2.00m



VC28 2.00m to 4.30m

Photograp	hed by	Date photographed				
MB		27/07/2010)			-
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007	



Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC29
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		29



VC29 0.00m to 2.90m

Photograp	hed by	Date photographed			
МВ		27/07/2010			
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007



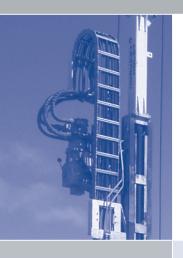
Project Nam	e South Humber Channel Marine Studies	Photographic Record	Hole ID
Project No.	F15842		VC30
Engineer	Roger Tym & Partners		Fig no.
Client	Yorkshire Forward		30



VC30 0.00m to 3.00m

Photograp	hed by	Date photographed			
MB		27/07/2010			
Form No.	SI PMPA4	Revision No.	2.02	Issue Date	26/02/2007





SUPPORTING FACTUAL DATA APPENDICES

Exploratory Hole Coordinates And River Bed Levels





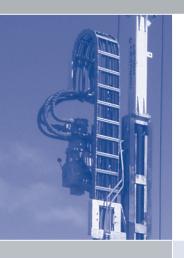
Exploratory Hole Co-ordinates and River Bed Levels

F15842 South Humber Channel Marine Studies

Hole	Eastings	Northings	River Be	d Levels
I.D.			m.CD	m.AOD
VC1	519385.1	418006.2	-9.93	-13.83
VC2	519255.0	417855.1	-10.28	-14.18
VC3	519091.0	418279.3	-10.07	-13.97
VC4	518961.8	418126.2	-10.79	-14.69
VC5	518797.9	418551.4	-10.01	-13.91
VC6	518667.7	418399.3	-10.25	-14.15
VC7	518384.5	418530.6	-9.81	-13.71
VC8	518764.0	419127.8	-8.91	-12.81
VC9	518554.7	418822.8	-9.51	-13.41
VC10	518374.6	418671.4	-8.86	-12.76
VC11	518233.1	418664.3	-4.64	-8.54
VC12	518617.9	419263.9	-8.58	-12.48
VC13	518487.8	419111.7	-8.67	-12.57
VC14	518097.4	418655.3	0.26	-3.64
VC15	518470.8	419399.9	-8.63	-12.53
VC16	518210.6	419095.6	-7.87	-11.77
VC17	518080.5	418943.5	-6.44	-10.34
VC18	517950.3	418791.3	0.60	-3.30
VC19	517893.1	418707.1	1.95	-1.95
VC20	517746.1	418845.2	2.15	-1.75
VC21	517804.3	418927.4	1.30	-2.60
VC22	517917.4	419367.7	-6.87	-10.77
VC23	517787.3	419215.6	-3.87	-7.77
VC24	517657.2	419063.4	1.14	-2.76
VC25	517510.1	419199.5	1.53	-2.37
VC26	517640.2	419351.6	-3.54	-7.44
VC27	517523.3	419638.2	-5.57	-9.47
VC28	517643.1	419485.6	-5.74	-9.64
VC29	517514.0	419333.4	-0.56	-4.46
VC30	517406.0	419761.9	-6.30	-10.20

NOTES

Co-ordinates to National Grid Chart Datum is 3.90m below Ordnance Datum



SUPPORTING FACTUAL DATA APPENDICES

Unexploded Ordnance "Sitesafe Desk Study " Report









site**safe**



site**safe**

Project No. P1998-10

Project Title SITESAFE UXO DESK STUDY

Project Location Humber Estuary

Client Vinci Construction UK Ltd

Report Ref. P1998-10-R1-A

Report Date 28th May 2010

Prepared by Anne Baker
Checked by Paul Jenkins

Authorised by Mike Sainsbury





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SITESAFE UXO DESK STUDY

Humber Estuary

Executive Summary

Zetica Ltd was commissioned by Vinci Construction UK Ltd to carry out a SiteSafe Unexploded Ordnance (UXO) Desk Study for a site of approximately 80 hectares (ha) located in the River Humber adjacent to Killingholme Marshes, North Lincolnshire (the 'Site').

The aim of this report is to gain a fair and representative view of the UXO hazard for the Site and its immediate surrounding area in accordance with the Construction Industry Research and Information Association (CIRIA) 'Unexploded Ordnance (UXO), a guide for the Construction Industry'. The main findings are summarised below.

- Zetica researched the military history for the Site and the surrounding areas. This research included both World War One (WWI) and World War Two (WWII).
- In WWI several key naval facilities were based in the vicinity of the Site, including a Royal Naval Air Service (RNAS) sea-plane base at Killingholme, adjacent to the Site. These were defended by coastal gun batteries.
- The region around the Site was bombed during WWI.
- There are no records to indicate the Site was bombed during WWI.
- During WWII towns and cities within 15km of the Site were heavily bombed.
- There were a number of strategic targets located in close proximity to the Site. These included naval installations, such as the Admiralty Fuel Depot at North Killingholme, adjacent to the Site and Naval and commercial dock facilities.
- Bombing densities for the North Lincolnshire coast adjacent to the Site were low.
- Records of bombs falling in the River Humber are not available.
- During WWII there were extensive mine laying operations in the River Humber by enemy aircraft.
- The River Humber was heavily defended by Anti-Aircraft (AA) guns, coastal gun batteries and barrage balloons.
- There were 7No. bombing decoys within 10km of the Site.



- Anti-Invasion defences were present on Killingholme Marshes, adjacent to the Site.
- Records indicate there was 1No. submarine minefield across the River Humber located approximately 5km southeast of the Site.
- There were 2No. operational Royal Air Force (RAF) airfields located within 10km of the Site.
- There were a number of aircraft crashes in the River Humber, some in close proximity to the Site. Some of these involved bomber aircraft.
- In 2007, 1No. Shell, 1No. Anti-Tank Mine and 1No. 19th century Naval Shell were found on beaches near Cleethorpes, approximately 15km southeast of the Site.

Based on the available information indicating the intensity of bombing, the density of known strikes on and immediately adjacent to the Site, the distance of the Site from strategic targets and the quality of the data, the risk of UXB being present on the Site is considered to be low.

Based on the available information on military activity in the vicinity of the Site, the risk of other UXO being present on the Site is considered to be moderate.

Tentative zoning of these risks is provided in the following figure, reproduced as Figure 8 in the main report.



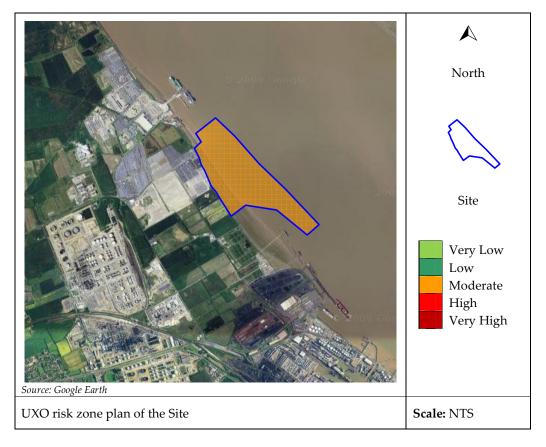


Table 8 provides recommended actions in relation to identified UXO risk and the anticipated Site activity. The actual mitigation will depend on the detail and nature of any planned works and the clients view of acceptable risk.

As with most locations, the potential presence of UXO as a result of enemy action, unauthorised disposal or unrecorded military activity cannot be totally discounted.

Further advice on mitigation strategy will be provided by Zetica on request.



1 INTRODUCTION

1.1 Project Outline

Zetica Ltd was commissioned by Vinci Construction UK Ltd to carry out a SiteSafe Unexploded Ordnance (UXO) Desk Study for a site of approximately 80 hectares (ha) located in the River Humber adjacent to Killingholme Marshes, North Lincolnshire (the 'Site').

The aim of this report is to gain a fair and representative view of the UXO hazard for the Site and its immediate surrounding area in accordance with the Construction Industry Research and Information Association (CIRIA) 'Unexploded Ordnance (UXO), a guide for the Construction Industry'. This hazard assessment includes:

- Likelihood of ordnance being present.
- Type of ordnance (size, filling, fuze mechanisms).
- Quantity of ordnance.
- Potential for live ordnance (UXO).
- Probable location.
- Ordnance condition.

It is essential to note that the effects of military activity will often extend beyond the source of the activity. For example, a base for armed forces may use surrounding areas of open land outside the official or recorded military boundaries for practice and military related activities.

In addition, World War Two (WWII) aerial bombardment was not discrete. 'Pinpoint' targeting did not exist in WWII. The effects of bombardment would be apparent in areas around the intended target.

It is for these reasons that it is important to address military activity both on the Site and in the relevant surrounding areas.

It should be noted that some military activity providing a source of UXO hazard may not be readily identifiable and therefore there cannot be any guarantee that all UXO hazards on the Site have been identified in this report.



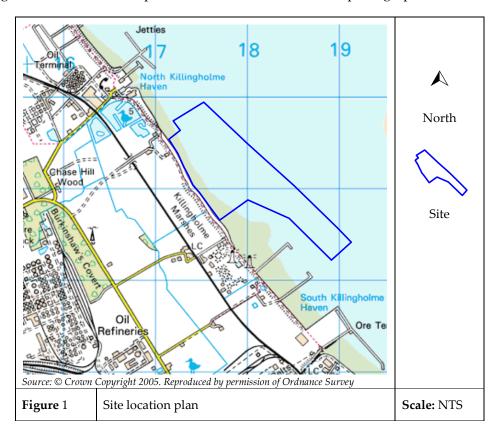
1.2 The Site

The Site is centred on Ordnance Survey Grid Reference (OSGR) TA 177192 adjacent to the south bank of the River Humber on the North Lincolnshire coast, approximately 4km northwest of Immingham, Lincolnshire.

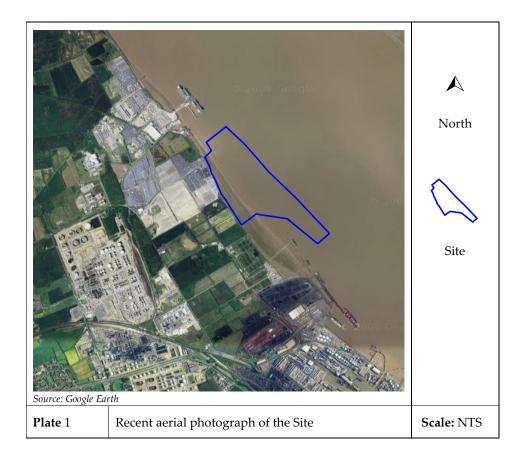
The Site comprises a section of the River Humber situated between North Killingholme Haven and South Killingholme Haven, immediately northeast of Killingholme Marshes. Much of the adjacent coastline is occupied by industrial sites linked to the petro-chemical industry.

The Site is located in the district of North Lincolnshire, but during World War Two (WWII), it was in the Rural District (RD) of Glanford Brigg.

Figure 1 is a Site location plan and Plate 1 is a recent aerial photograph of the Site.









2 SOURCES OF INFORMATION

Zetica Ltd researched the military history of the Site and its surrounding area utilising a range of information sources. The main sources of information are detailed in the following sections and referenced at the end of this report.

2.1 Zetica Ltd Defence Related Site Records

Zetica Ltd's in-house records were consulted, including reference books and archived materials from past work in the region. Relevant documents have been cited within the bibliography section of this report.

2.2 Zetica Ltd Bombing Density Records and Maps

Reference has been made to the Zetica Ltd bomb risk maps located on Zetica Ltd's website (www.zetica.com/uxb_downloads.htm).

2.3 Ministry of Defence Records

Various departments and units within the Ministry of Defence (MoD) were approached for information of past and present military activity in the area. These included the UK Hydrographic Office and the Explosive Ordnance Clearance (EOC) Group.

2.4 Other Historical Records, Maps and Drawings

Numerous reference documents including historical maps, aerial photographs and drawings have been consulted from sources such as English Heritage, the National Archives and the Defence of Britain Project.

2.5 Local Authority Records

Information was obtained from North Lincolnshire Council and Northeast Lincolnshire Council.

2.6 Local Record Offices and Libraries

Information was obtained from the Lincolnshire Archives.

2.7 Local Historical and Other Groups

Local history groups and archaeological societies were consulted and use was made of local history websites.



2.8 Historical Information

Detailed records of military activity are rarely released into the public domain. Even when military information is made public there may be gaps in the records because files have been lost or destroyed.

Records for periods such as WWII are only as detailed and accurate as the resources and working conditions would allow at the time. Densely populated areas tend to have a greater number of records than rural areas. Such records may be inaccurate due to the confusion surrounding continuous air raids.

Press records can supplement local information, although this source of information must be treated with caution, as inaccuracies do exist, either inadvertently or intentionally in order to confuse enemy intelligence. Classified official records can sometimes be considered inaccurate for the same reason

Recent research indicates that England alone had 17,434No. recorded defence sites of which 12,464No. were classified as defensive anti-invasion sites. The precise locations of many of these sites are still to be identified, illustrating the scale of the problem when establishing potential risks from limited historical data.



3 SITE HISTORY

3.1 General History

At the beginning of the 20th century land adjacent to the Site comprised a mixture of salt marsh and agricultural land alongside the tidal mudflats of the River Humber. The only development in the area was 3No. brickworks, located along the coast. There were also 3No. lighthouses situated along the shoreline.

Work on Immingham Docks began in 1907 and they opened in 1913. New rail links were constructed in 1906 and 1910 to link the new docks to Grimsby and the main London & North Eastern Railway (LNER) at Ulceby.

In 1911 a third rail link, the Barton and Immingham Light Railway (BILR) was opened to passengers. This linked Immingham Docks to Kingston-upon-Hull via the ferry from New Holland. The BILR was a single track railway which ran along the coast adjacent to the Site joining the main line at Goxhill, with halts at Killingholme and East Halton. In the 1920s a third halt was built to serve the Admiralty Fuel Depot based at North Killingholme Haven. This is illustrated in the 1926 historical map shown in Figure 2.

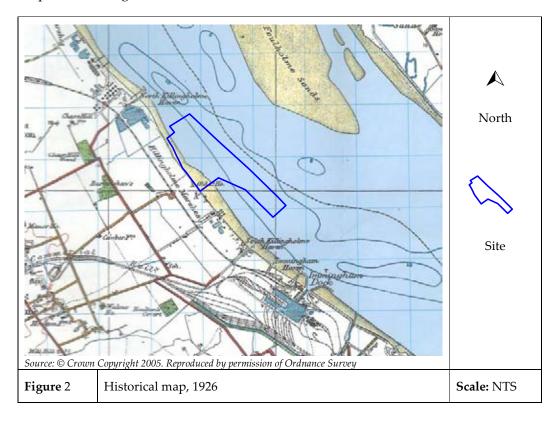
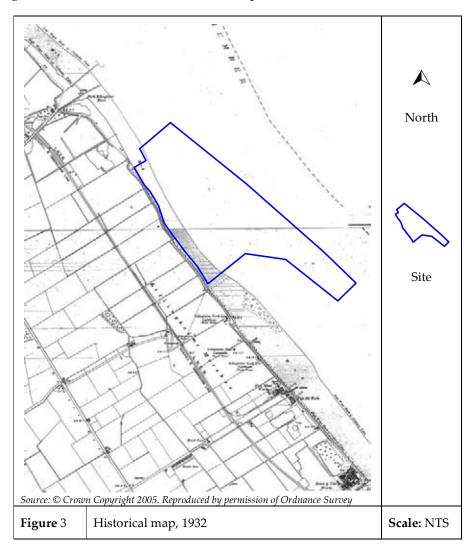




Figure 3 shows a historical map of the Site in 1932. The BILR is shown. A fish meal and fish oil works were present on Killingholme Marshes, just north of South Killingholme Haven. The brickworks at North Killingholme Haven had been closed. Due to security restrictions at the time, the Admiralty Fuel Depot at North Killingholme Haven is not shown on this map.



Significant industrial development took place in the south Humberside region after WWII. In the 1950s the petrochemical industry expanded in the area, with facilities constructed adjacent to the villages of North Killingholme and South Killingholme. By 1965 the extent of the fuel depot at North Killingholme Haven was depicted on the historical mapping. In addition, an extensive oil storage depot had been constructed adjacent to the Fish Meal Works, north of South Killingholme Station.



3.2 Pre-World War One (WWI) Military History

The Humber region has a long military history. Kingston-upon-Hull, approximately 12km northwest of the Site, became an important port in the 13th century, when the first fortifications were built. These were later expanded in the 16th century at the request of Henry VIII. An earthen battery was first erected at Paull Point, approximately 6km north of the Site, during the English Civil War.

The prospect of invasion by France during the Napoleonic Wars prompted the construction of several defences along the River Humber. The battery at Paull Point was reinstated and further batteries constructed at Stallingborough, approximately 6km southeast of the Site and Spurn Point, at the mouth of the River Humber. These defences were backed up by Volunteer artillery, infantry and yeomanry along the predicted invasion routes.

In the mid 19th century defences at Stallingborough and Paull Point were refurbished. New volunteer forces were raised to man the defences. A volunteer artillery unit was based in Grimsby and a volunteer cavalry unit, the Lincolnshire Light Horse, was established in 1867 and based at Brocklebury Park, approximately 9km southwest of the Site.

In 1886 the Humber Volunteer Division of the Submarine Mines, Royal Engineers (RE) was raised. The Division was tasked with laying a submerged minefield across the river or harbour mouth in the event of war. At the same time it was decided that the Royal Navy (RN) should take over responsibility for defending Grimsby and the adjacent RN anchorages.

In 1894 coast defence searchlights, known as Defence Electric Lights, were installed at Paull Point. In the early 20th century the RN decided to maintain a permanent presence in the region, and submarines began regularly using the port of Immingham, approximately 3km southeast of the Site. In 1907 an Admiralty Wireless Station was established at Waltham, Cleethorpes, approximately 17km southeast of the Site.

In 1907 HMS Pekin was also established at Grimsby as a shore base for the Auxiliary Patrol and 2No. 6" gun batteries were installed on either side of the River Humber at Stallingborough, approximately 6km southeast of the Site and Sunk Island, approximately 7.5km east of the Site. HMS Pekin was also used as the HQ of the Royal Navy's Eastern Command.

In 1912 an Admiralty Fuel Depot was constructed at North Killingholme, adjacent to the Site.



3.3 WWI Military History

In 1913 defence priorities for the region were identified and the resulting Defence Plan for the Humber region was finalised just before the outbreak of WWI. Grimsby and Immingham Docks, the Admiralty radio station at Waltham and the North Killingholme Fuel Depot were all identified as strategic sites. Several coastal gun sites were established to protect these facilities. The Humber Estuary was protected by gun batteries at Haile Sand Fort (TA 349061), Bull Sand Fort (TA 371092) and Spurn Head (TA 398106). Table 1 gives details of the WWI coastal gun batteries protecting the River Humber within 10km of the Site.

Table 1 WWI coastal gun batteries within 10km of the Site

Grid Reference	Location	Armament	Approximate Distance and Direction from the Site
TA 164202	Killingholme	2No. x 12-pounder	1.5km NW
TA 224147	Stallingborough	2No.x 6"	6.0km SE
TA 250176	Sunk Island	2No. x 6"	7.5km E

A defensive boom was constructed across the River Humber between Killingholme and Sunk Island, adjacent to the Site. This was guarded by HMS Albion, a former battleship.

Early in WWI, the Royal Naval Air Service (RNAS) was tasked with defending land and sea based targets against both submarine and air attacks. It established a base next to the Admiralty Fuel Depot at North Killingholme, adjacent to the Site. Further details are provided in Section 6.

In 1914 the 10th battalion of the Lincolnshire Regiment, known as the 'Grimsby Chums' was formed in Grimsby. A Head Quarters (HQ) was established in Artillery Barracks, Victoria Street, Grimsby and a hutted camp was constructed at Brocklesby Park, approximately 9km southwest of the Site, in December 1914. This was used for training until June 1915.

This camp was subsequently used by other units including the 19th Reserve Battalion of the Sherwood Foresters and the 12th Labour Battalion of the Lincolnshire Regiment. Garrisons were also present in Grimsby and Cleethorpes.

Brocklesbury Hall was also used as an auxiliary hospital, run by the Voluntary Aid Detachment (VAD).



During WWI an estimated 9,000No. German bombs were dropped over Britain. It was the first time that strategic aerial bombing had been used. Whilst most air raids were carried out on London and the southeast of England, targets all along the east coast were also attacked.

The closest bombing incidents to the Site are described below.

31st March 1916

Zeppelin L22 dropped HE bombs on Cleethorpes, approximately 15km southeast of the Site. The raid resulted in 32No. fatalities and 48No. casualties.

23rd September 1916

Zeppelin L22 dropped 14No. HE bombs on Scartho, approximately 15km southeast of the Site.

Many Grimsby shipyards were involved in wartime work, adapting trawlers for use as minesweepers and carrying out repairs to Naval vessels. After WWI the Naval facilities in the region were shut down and many of the coastal defences disarmed.

3.4 WWII Military History

From 1939 the south and east coasts of England were subject to reconnaissance flights by the Luftwaffe. From the onset of WWII mine-laying by the Luftwaffe along the east coast became increasingly frequent.

Bombing raids in the Humber region began in September 1939 and continued until the end of WWII. The region surrounding the Site was bombed in WWII. Details of air raid incidents are provided in Section 4.

Defensive and offensive military structures were built in the region during WWII. These included coastal artillery, anti-aircraft defences and decoy sites. Details of those relevant to the Site are provided in Section 5.

Lincolnshire became known as the 'bomber county' due to the large numbers of airfields constructed there during WWII. Operational airfields were deliberately targeted by the Luftwaffe. Royal Air Force (RAF) airfields in the region were raided. Details for those relevant to the Site are outlined in Section 6.

Military activity in the region included munitions storage and military training sites. Details of those relevant to the Site are given in Section 7.



During WWII, the Naval presence in the River Humber was re-instated and the docks at Immingham and Grimsby became important Naval bases once again, operating under the Nore Command. Details of these and other Naval establishments relevant to the Site are given in Section 8.

3.5 Post-WWII Military History

There has been continued military activity in the region since WWII.

A fuel depot at South Killingholme Haven TA 180177, adjacent to the Site, forms part of the Government Pipelines and Storage System (GPSS), a network of pipelines and Petroleum Storage Depots linking military airfields and key government establishments.

The Admiralty radio station at Cleethorpes, approximately 15km southeast of the Site, was renamed Waltham in 1948 and operated until 1980, when it was demolished.

RAF North Coates operated as a test site for the RAF's Surface-to-Air Missile (SAM) programme during the Cold War and there is an active bombing range at Donna Nook on the east Lincolnshire coast. Both are more than 25km southeast of the Site.

None of these sites is considered to provide a UXO hazard to the Site.



4 WWII BOMBING

4.1 General

Heavy Luftwaffe bombing began after the fall of France in June, 1940. Early targets were primarily coastal or industrial: the Orkney Islands, the Welsh coalfields, and industrial and shipping centres of Tyneside, Humberside, Teesside, and Glasgow.

The German bombing campaign saw the extensive use of both High Explosive (HE) bombs and Incendiary Bombs (IBs). The most common HE bombs were the 50kg and 250kg bombs, although 500kg were also used to a lesser extent. More rarely 1000kg, 1400kg and 1800kg bombs were dropped.

The HE bombs tended to contain about half of their weight in explosives and were fitted with one or sometimes two fuzes. Not all HE bombs were intended to explode on impact. Some contained timing mechanisms where detonation could occur more than 70 hours after impact.

Incendiary devices ranged from small 1kg thermite filled, magnesium bodied, bombs to a 250kg 'Oil Bomb' (OB) and a 500kg 'C300' IB. In some cases the IBs were fitted with a bursting charge. This exploded after the bomb had been alight for a few minutes causing burning debris to be scattered over a greater area. The C300 bombs were similar in appearance to 500kg HE bombs, although their design was sufficiently different to warrant a specially trained unit of the Royal Engineers to deal with their disposal.

Anti-Personnel Bombs (APBs) and Parachute Mines (PMs) were also deployed. 2No. types of anti-personnel bombs were in common use, the 2kg and the 12kg bomb. The 2kg bomb could inflict injury across an area up to 150m away from the impact, within 25m of this, death or fatal injury could occur.

PMs (which were up to 4m in length) could be detonated either magnetically or by noise/vibration. Anti-shipping parachute mines were commonly dropped over navigable rivers, dockland areas and coastlines. The Royal Navy was responsible for ensuring that the bombs were made safe. Removal and disposal was still the responsibility of the Bomb Disposal Unit of the Royal Engineers.

WWII bomb targeting was inaccurate, especially in the first year of the war. A typical bomb load of 50kg HE bombs mixed with IBs which was aimed at a specific location might not just miss the intended target but fall some considerable distance away.



It is understood that the local Civil Defence authorities in urban areas had a comprehensive system for reporting bomb incidents and dealing with any UXO. In more rural areas, fewer bombing raids occurred. It is known that Air Raid Precaution (ARP) records under-represent the number and frequency of bombs falling in rural and estuarine areas.

Bombs were either released over targets or as part of 'tip and run' raids where bomber crews would drop their bombs to avoid anti-aircraft fire or Allied fighter aircraft on the route to and from other strategic targets. Bombs dropped as a result of poor targeting or 'tip and run' raids on rural areas were often unrecorded or entered as 'fell in open country'.

4.2 WWII Strategic Targets

The presence of local strategic targets significantly increased the likelihood of bombing raids in a particular area. Military establishments, Government buildings, industrial targets important to the war effort, transport links and anti-invasion defences were all targeted by Luftwaffe bombers. The inherent bombing inaccuracies at the time meant that areas surrounding the targets were often subjected to aerial bombardment.

The following section outlines the main strategic targets in the vicinity of the Site.

4.2.1 Naval Stations

Grimsby and Immingham were key Naval bases during WWII, involved in protecting east coast convoys which transported goods, especially coal supplies, from the northeast of England to London. Many minesweepers were based in the docks. The Admiralty Fuel Depot at North Killingholme, adjacent to the Site, was a major strategic target. The Admiralty radio station at Waltham continued to be used during WWII.

4.2.2 Docks, Wharves and Warehouses

The docks at Grimsby and Immingham both had handling facilities and shipbuilding and repair works. Companies carried out servicing of Naval vessels and converting merchant shipping for use by the Navy. Kingston-upon-Hull, approximately 12km northwest of the Site, also contained strategically important docks and the city was heavily bombed by the Luftwaffe.

The River Humber was a major navigational aid for German bombers attacking Kingston-upon-Hull, and the area around the Site would have been subjected to 'tip and run' bombing raids.



4.2.3 Transport infrastructure

Important rail links servicing the docks at Immingham and Grimsby were located adjacent to the Site. These would have been targeted by the Luftwaffe.

4.3 Bombing Density and Incidents

Some areas of the Humber region were heavily bombed in WWII. Kingston-upon-Hull, approximately 12km northwest of the Site, was raided on more than 70No. occasions and was heavily bombed. There were also more than 40No. raids recorded on the Grimsby and Cleethorpes area, approximately 15km southeast of the Site. In addition, extensive mine laying operations were carried out in the River Humber from 1939.

Table 2 gives details of the overall bombing statistics recorded for the Local Authority Districts of the Site and surrounding districts. These were categorised as County Boroughs (CB), Municipal Boroughs (MB), Urban Districts (UD) and Rural Districts (RD). The Site was located within Glanford Brigg RD and figures for the neighbouring districts are also given.

The figures for the London Borough (LB) of West Ham, generally considered to be high risk, are included for comparison.

Table 2 Bombing statistics

8	Bombs reported				
Area	High Explosive	Parachute Mines	Other	Total	Bombs per 405ha (1,000 acres)
Glanford Brigg RD	663	12	1	676	4.9
Grimsby RD	204	6	0	210	5.3
Holderness RD	1691	78	6	1775	13.7
Grimsby CB	131	0	0	131	24.0
Kingston-upon-Hull CB	1213	101	4	1318	93.5
LB of West Ham	1498	45	47	1590	334.0

Note that Table 2 excludes the figures for AA Shells, IBs, Pilotless Aircraft, also known as Flying Bombs or 'Doodlebugs' (V1s) and Long Range Rockets (V2s).

Bombing density in Glanford Brigg RD was low compared to Kingston-upon-Hull CB and Grimsby CB. No official records of bombs falling within the River Humber have been found.

Details of some of the bombing and mine laying raids within the vicinity of the Site are provided below.



21st November 1939

Magnetic mines fell in the River Humber.

18th June 1940

The oil tanks at the Admiralty Fuel Depot at North Killingholme, adjacent to the Site, were raided.

1st July 1940

HE bombs fell on oil and petrol storage tanks at Salt End, approximately 8km north of the Site. The majority of the bombs missed the target, but shrapnel pierced some of the tanks setting them on fire.

29th July 1940

1No. bomber aircraft jettisoned its bombs in the River Humber near Cleethorpes, approximately 15km southeast of the Site.

6th November 1940

3No. enemy aircraft were recorded mine laying in the River Humber.

16th November 1940

Mine laying was reported in the River Humber.

23rd November 1940

Mine laying was reported in the mouth of the River Humber.

5th December 1940

Mine laying was reported in the mouth of the River Humber.

21st December 1940

Mine laying was reported in the mouth of the River Humber.



January 1941

Approximately 20No. German aircraft carried out mine laying in the Humber estuary. Over the next 3No. weeks, 36No. mines were removed.

4th February 1941

A large mine laying force raided the River Humber. 1No. mine fell on a convoy ship at anchor in the River Humber, approximately 13km east of the Site.

9th February 1941

Mine laying took place in the River Humber.

By the end of February 1941, 171No. mines had been removed from the River Humber. Another 40No. had been accounted for. This contrasts with the Harwich Sub-Command which swept 100No. mines in a year.

13th March 1941

PMs fell on Goxhill, approximately 8km northwest of the Site.

18th March 1941

There was a major raid on Kingston-upon-Hull, approximately 12km northwest of the Site.

22nd March 1941

HE bombs fell on waste ground between Immingham Docks and the locomotive sheds, approximately 3km southeast of the Site.

31st March 1941

1No. auxiliary patrol trawler was sunk by a mine in the River Humber.

11th April 1941

1No. contraband control vessel was sunk by a mine in the River Humber.



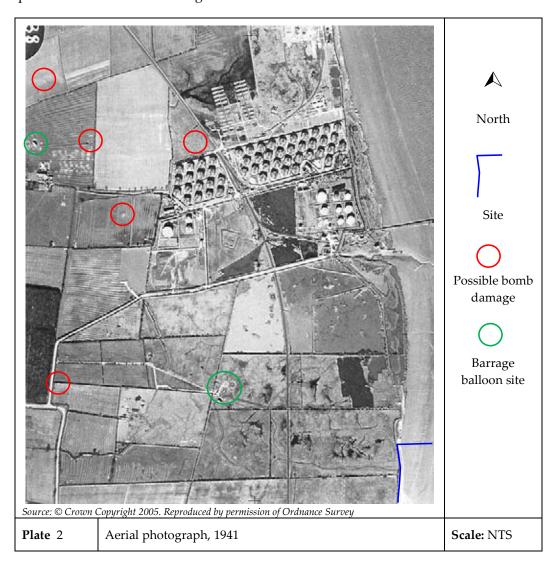
10th June 1941

2No. vessels were sunk by mines in the River Humber.

3rd November 1941

1No. steam ship was bombed and sunk in the River Humber.

Plate 2 is an aerial photograph of North Killingholme dated 1941 on which some possible areas of bomb damage can be seen.





13th April 1942

Grimsby was bombed. 35No. houses were totally destroyed and 22No. were deemed unsafe and were demolished.

19th May 1942

There was a major raid on the eastern part of Kingston-upon-Hull, approximately 12km northwest of the Site.

4No. 500kg HE bombs fell in fields to the east of Paull, approximately 6km north of the Site.

30th May 1942

There was widespread bombing in the Humber region.

IBs fell in Immingham, approximately 5km south of the Site.

3No. HE bombs fell close to the decoy site at Paull, approximately 6km north of the Site.

4No. HE bombs fell in the mud of the Humber foreshore, close to the Immingham decoy, approximately 7km southeast of the Site.

31st July 1942

1No. 1000kg HE bomb fell in the marshes at Salt End, approximately 8km northwest of the Site.

1No. UXB was discovered on marshes north of Paull, approximately 8km north of the Site.

August 1942

1No. HE bomb fell at the intersection of the runways at RAF Goxhill, approximately 7km northwest of the Site. It was recorded as UXB and remained beneath the runway. It was finally retrieved in 1947 from a depth of more than 10m.



14th June 1943

There was a major raid on Grimsby and Cleethorpes, approximately 15km southeast of the Site.

HE bombs and approximately 3,000No. Anti-Personnel ('butterfly bombs') fell throughout the towns. In Grimsby, the raids resulted in 211No. houses being destroyed and 66No. casualties.

13th July 1943

The eastern part of Kingston-upon-Hull was heavily bombed.

There was further heavy bombing on Grimsby, approximately 15km southeast of the Site.

19th March 1944

In a raid intended for Hull, 92 tonnes of bombs were dropped, mainly falling in Lincolnshire and Norfolk.

23rd December 1944

1No. V1 fell in the mud just off Reads Island in the River Humber, approximately 15km northwest of the Site.

Given the generally low density of bombing on the North Lincolnshire coast adjacent to the Site, it is considered that WWII bombing in the vicinity of the Site does not provide a significant UXB hazard to the Site.

It is considered that WWII mine laying operations in the River Humber do provide a source of UXO hazard to the Site.



5 WWII DEFENCES

5.1 WWII Decoys

In order to draw enemy aircraft away from towns and other strategically important targets, a series of decoys were developed between 1940 and 1941. They were estimated to have drawn at least 5% of the total weight of bombs away from their intended targets. Approximately 792No. static decoy sites were built at 593No. locations in England and many more were constructed in Wales and Scotland. In addition, numerous temporary and mobile decoys were deployed. Several different types of decoy were devised:

- Night time dummy airfields (Q sites).
- Daytime dummy airfields (K sites).
- Diversionary fires to simulate successful bombing raids on airfields (QF sites), petroleum depots (P sites) and major towns and cities (Starfish sites).
- Simulated urban lighting (QL sites).
- Dummy Heavy Anti-Aircraft (HAA) batteries, factories and buildings (C series).
- Mobile decoys representing 'hards' for troop embarkation (MQLs), tanks and other vehicles.

Machine gun emplacements and Light Anti-Aircraft (LAA) guns were used to prevent possible enemy landings at decoy airfields. By their nature, decoy sites provide a potential risk from UXB, both within the decoy site boundary and in the surrounding areas.

Table 3 gives details of the decoy sites within 10km of the Site.

Table 3 Decoy sites within 10km of the Site

Grid Reference	Serial No	Location	Туре	Approximate Distance and Direction from the Site
TA 210227	HU5	Thorney Crofts	Naval SF/QL	4.5km NE
TA 188240	1	Paull	Civil SF	5.0km NE
TA 188240	HU3	Paull	Naval SF/QL	5.0km NE
TA 197237	HU4	Little Humber	Naval SF/QL	5.0km NE
TA 138231	KI1	East Halton	Naval QF	5.5km NW
TA 137229	1	East Halton	Oil QF	5.5km NW
TA 235136	IM1	Immingham Range	Naval SF/QL	8.0km SE



There are records indicating that the decoy sites at Immingham Range and Paull were both bombed.

It is considered that none of these decoy sites provide a direct UXO hazard to the Site.

5.2 Anti-Aircraft Defences: Gun Batteries

Anti-Aircraft (AA) gun batteries were targeted by the Luftwaffe. They were also a source of Unexploded AA (UXAA) Shells which could land up to 27km from the firing point during WWII, although more typically fell within 15km. These could be distributed over a wide area.

AA batteries present a potential source of UXO hazard as a result of the storage, use and disposal of ordnance associated with the armaments used. They may have a risk from small caches of ammunition buried locally to them.

3No. types of AA batteries existed:

- Heavy Anti-Aircraft (HAA) batteries of large guns designed to engage high flying bomber aircraft. These tended to be relatively permanent gun emplacements.
- Light Anti-Aircraft (LAA) weaponry, designed to counter low flying aircraft. These were often mobile and were moved periodically to new locations around strategic targets such as airfields.
- Rocket batteries (ZAA) firing 3" or 3.7" AA rockets with a maximum altitude of 5,800m and a ground range of 9km were also relatively permanent emplacements.

Many AA batteries were associated with searchlights and therefore 'visible' at night, providing clear targets to the Luftwaffe bombers and a potential for UXB.

Table 4 is a list of known HAA gun batteries within 10km of the Site.



Table 4 HAA batteries within 10km of the Site

Grid			Approximate Distance
Reference	Serial	Location	and Direction from
Reference			Site
TA 155190	-	-	2.3km SW
TA 153173	H23	-	3.0km SE
TA 180155	-	Immingham	3.5km S
TA 137190	H24	East Halton	4.0km W
TA 192156	H22	-	4.0km SE
TA 199234	H8	Little Humber	4.5km NE
TA 210155	H21	Long Strip	5.0km SE
TA 199238	-	-	5.0km NE
TA 169131	H37	-	5.5km S
TA 238188	H9	Stone Creek	6.0km E
TA 187120	-	Stallingborough	7.0km SE
TA 185120	H20	-	7.0km SE
TA 173266	-	Paull	7.0km N
TA 171265	H7	1	7.0km N
TA 124248	H25	Goxhill	7.5km NW
TA 135122	H36	1	8.0km SW
TA 094238	H26	-	9.0km NW
TA 096231	-	Barrow Haven	9.0km NW
TA 196292	-	Hedon, Hull	10km N
TA 196291	H5	Hedon, Hull	10kmN

This list is not definitive as mobile units were frequently deployed and could spend a considerable time at any one location.

LAA batteries were frequently mobile and moved around according to operational requirements. Initially, LAA defences were concentrated around airfields but as the war progressed, industrial and commercial targets and cities were also given LAA defences. Records of their precise positions are rarely available.

Due to the location of the Site in relation to the AA gun sites, it is considered that the possibility of unrecorded UXAA shells falling in the River Humber does provide a potential source of UXO hazard to the Site.

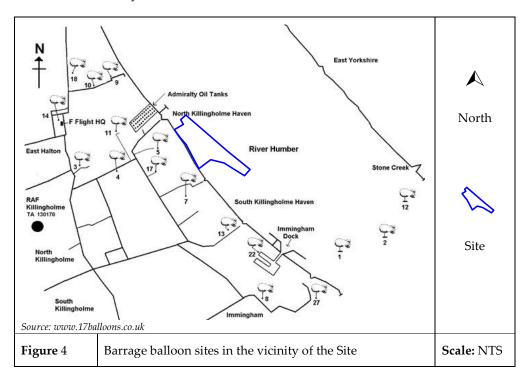
5.3 Anti-Aircraft Defences: Barrage Balloons

Balloon barrages were flown in many British cities to protect against air raids. Their presence deterred low flying aircraft, making it more difficult for bombs to reach their intended targets.



Barrage balloon sites can be a source of UXO as they were targeted by the Luftwaffe. They also often had a small explosive charge attached approximately 50m from each end of the balloon cables, designed to detonate if hit by an aircraft.

Barrage balloons were flown on the Killingholme Marshes, adjacent to the Site, and from barges on the River Humber. Figure 4 shows the locations of barrage balloon stations in the vicinity of the Site.



None of the barrage balloon sites are considered to provide a direct source of UXO hazard to the Site.

5.4 Anti-Invasion Defences: River Humber

The defences of the River Humber were largely scaled down after WWI. In the late 1930s in the build up to WWII, the defences of the River Humber, were reviewed. The Humber area was designated as a Gun Defended Area (GDA) and in 1938 emergency mobilisation of the 8No. remaining defences was initiated, manned by East Riding Heavy Regiment, Royal Artillery, Territorial Army (TA).

A defensive boom was laid across the mouth of the River Humber between Bull Sand Fort and Haile Sand Fort, at the mouth of the River Humber. By the start of WWII a programme of re-armament of the Humber defences was underway.



There were a number of coastal gun batteries protecting the Naval facilities, some of which were located close to the Site. Table 5 gives details of the WWII coastal gun batteries within 10km of the Site.

Table 5 WWII coastal gun batteries within 10km of the Site

Grid Reference	Location	Armament	Approximate Distance and Direction from Site
TA 164202	Killingholme	2No. x12pdrs	1.5km NW
TA 168166	Immingham	1No. x 6 pdr	2.5km SW
TA 182165	Immingham	1No. x 6 pdr	2.5km S
TA 194169	Immingham	1No. x 6 pdr	2.5km SE
TA 193165	Immingham	1No. x 6 pdr	3.0km SE
TA 207161	Immingham	1No. x 6 pdr	4.0km SE
TA 201157	Immingham	1No. x 6 pdr	4.0km SE
TA 196148	Immingham	1No. x 6 pdr	4.5km SE
TA 224147	Stallingborough	1No. x 4"	6.0km SE
TA 224147	Stallingborough	2No. x 4.7"	6.0km SE
TA 169255	Paull Point	2No. x 4"	7.0km N
TA 250176	Sunk Island	2No. x 4.7"	7.0km E
TA 184117	Stallingborough	4No. x 3.7"; 4No. x 5.25"; 1No. x 12"	7.5km SE

Once the threat of invasion had passed at the end of 1943 several of the coastal gun batteries in the Humber were placed on care and maintenance or relegated to part-time and manned by local Home Guard units.

By the end of WWII batteries at Stallingborough, Paull Point, Sunk Island and Grimsby had all been abandoned.

It is considered that coastal gun batteries do provide a potential source of UXO hazard to the Site.

5.5 Anti-Invasion Defences: In-Land

The rapid advance of German Troops into France, Holland and Belgium after the start of WWII prompted the War Office to review the vulnerability of the UK to invasion and a decision was taken to begin work on a national plan of anti-invasion defences.



Defence structures are a potential source of UXB as they were targeted by enemy aircraft. Some, such as pillboxes, are also potential sources of UXO in their own right due to the associated use and storage of ordnance.

The Lincolnshire coastline was considered as a potential invasion point and was heavily defended (the 'Coastal Crust'). Static defences were built to delay an invading force from landing and confine them to the beach-heads for as long as possible. Fortifications included pillboxes, barbed wire, minefields and anti-landing obstacles. Plate 3 is an example of concrete obstacles at Spurn Head, at the mouth of the River Humber.



Further inland, similar lines of defence structures were constructed along 'Stop Lines' in order to impede enemy progress for long enough to allow mobile defending forces to counterattack.

Stop Lines were further integrated into a network of fortified nodal points and 'Anti-Tank (AT) Islands'. These fortifications included road blocks, ditches, anti-tank blocks, pimples, mined bridges, demolition charges, spigot mortar and machine gun emplacements.

Stop Lines and other defence installations were to be defended by the Home Guard. The Home Guard was active in the Humber region. The Admiralty Wireless Transmitter site at Waltham was guarded by a platoon of the Grimsby Home Guard, all former WWI 'Grimsby Chums' and known as the 'Pyloniers'. Although training



was common in coastal, rural and urban areas, no records of any Home Guard activity adjacent to the Site has been found.

Important elements of the ordnance supply for the use of the Home Guard included substantial supplies of Mills bombs (fragmentation grenades) and Self Igniting Phosphorus (SIP) grenades as well as machine gun and small arms ammunition. It is considered that all sites used or occupied by the Home Guard present a moderate UXO risk.

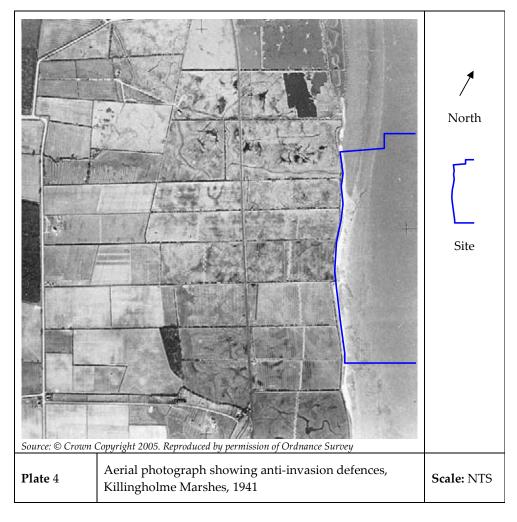
In addition to the regular Home Guard, Auxiliary Units were made up of guerrilla troops trained in sabotage and assassination in case of invasion. Sites used by these Units were Top Secret and many locations are still unknown. Brocklesby Park, approximately 9km southwest of the Site, was used by Auxiliary Units.

It is considered that all locations occupied or used by the Auxiliary Units offer a high risk of UXO being present.

Measures were also taken to prevent enemy aircraft landing in the event of invasion. Obstructions were constructed around airfields and on sites deemed fit for use as landing grounds. Solid obstructions (such as concrete blocks), posts or stakes, felled trees, haystacks, scaffolding with wire and trenching were the main measures used.

There is evidence of anti-landing defences on Killingholme Marshes, adjacent to the Site. This is shown in Plate 4, a 1941 aerial photograph of the area.





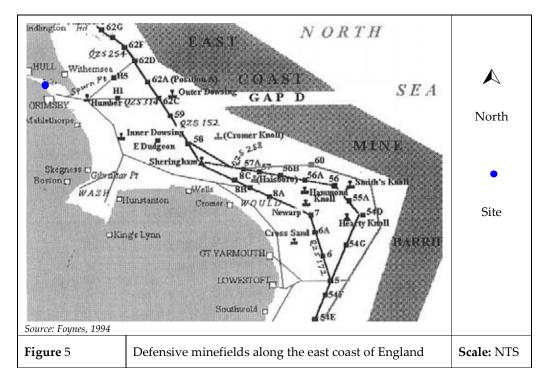
None of the land defences identified are considered to provide a direct UXO hazard to the Site.

5.6 Minefields and Mined Locations

Minefields were laid along the coast and in estuaries to deter invasion. Strategic points such as bridges were mined to impede enemy advance. Most of the mined beaches in the UK were cleared after WWII.

Extensive minefields were laid in the North Sea by the RN to protect the east coast of England from attacks by German shipping. These had cleared areas to allow east coast convoys to enter the River Humber. Figure 5 shows the approximate location of these minefields.





Records also indicate that a submarine minefield was laid in the River Humber between the coastal batteries at Stallingborough and Sunk Island, approximately 5km southeast of the Site.

It is understood that known marine and land-based minefields were cleared at the end of WWII using the original layout plans. However, it is known that many mines were moved from their original positions by tidal currents and as a result, there is a possibility that some remain in the marine environment.

It is considered that the submarine minefield between Stallingborough and Sunk Island does provide a potential source of UXO hazard to the Site.



6 MILITARY AIRFIELDS

Military airfields offer the potential for significant UXO hazards due to the use, storage and disposal of ordnance and as a result of enemy bombing during WWI and WWII.

Airfields active during WWII were targeted by the Luftwaffe, providing a potential source of UXB on the airfield. As bombing accuracy was so poor during WWII, it is likely to find UXB in the surrounding areas. Aircraft crashes are also associated with operational airfields.

Details of the closest operational airfield to the Site are described in the following Sections.

6.1 RNAS Killingholme

RNAS Killingholme TA 166203, adjacent to the Site, was opened in 1914 as a sea plane base, tasked with protecting the Admiralty Fuel Depot at North Killingholme Haven. The airfield included approximately 600m of landing runs, with slipways going into the sea. The base predominantly operated sea planes but some land planes were also deployed as part of the Home Defence task which involved the RNAS until spring 1916.

In July 1918, the United States Naval Air Service (USNAS) officially took over RNAS Killingholme, until January 1919, when it was handed over to the RAF. For the next year it was mainly occupied by non-flying units awaiting disbandment, and the airfield was closed in 1920.

RNAS Killingholme is not considered to provide a direct source of UXO hazard to the Site.

6.2 RAF North Killingholme

RAF North Killingholme TA 130170, approximately 5km southwest of the Site, opened as a bomber station in November 1943. It was occupied by No. 550 Squadron from January 1944 until November 1945, flying Lancaster aircraft. From January 1946 to September 1950 the airfield was used as a sub-site by No. 35 Maintenance Unit (MU), Heywood. No. 93 MU from Newton also used the site in 1948 and 1950.

The majority of the airfield has since returned to agricultural use, with some industrial units occupying part of the eastern boundary.



RAF North Killingholme is not considered to provide a source of UXO hazard to the Site.

6.3 RAF Goxhill

RAF Goxhill TA 115210, approximately 7km northwest of the Site, was first used as a relief landing ground (RLG) during WWI. It was effectively abandoned at the end of the WWI.

The Site was selected in 1941, intended to be used as a bomber airfield. This proved to be unsuitable due to the airfield's location within the barrage balloon area. RAF Goxhill opened in 1941 and was used for target training using Lysander aircraft as tugs. Fighter aircraft were also stationed there to defend the approaches to the Humber.

In May 1942 it was transferred to the USAAF as Station 345 from which fighter aircraft were operated. It was bombed on 1No. occasion. In January 1945 it was transferred back to the RAF until all flying ceased in May 1945. It was then transferred to Maintenance Command and used as a bomb store.

The airfield was finally closed on the 14th December 1953, decommissioned and eventually sold off in 1962. It has since reverted to agriculture.

RAF Goxhill is not considered to provide a source of UXO hazard to the Site.

6.4 Aircraft Crashes

Aircraft crash sites associated with airfields are a known UXO hazard. The MoD advises that if crashed aircraft are found, the safest policy is to leave them alone where possible. Unless disturbed there is no statutory requirement for the MoD to clear such sites. There were more than 1000No. aircraft crashes recorded in Lincolnshire during WWII, with many recorded in the Humber region. Those relevant to the Site are described in the following Section.

September 1940

1No. Heinkel HE111 crashed in the River Humber opposite Stone Creek, approximately 4km southeast of the Site.

November 1940

1No. Whitley aircraft crashed near Stallingborough Roads, approximately 7km southeast of the Site.



22nd March 1941

1No. Heinkel HE111 was hit by AA fire and crashed into the River Humber (position unknown).

9th May 1941

1No. Dornier Do217 crashed in the mud 3km from Immingham Docks, approximately 4km northeast of the Site.

19th December 1941

1No. Stirling aircraft crashed near Killingholme Lighthouse, on or in close proximity to the Site.

November 1943

1No. Stirling aircraft crashed at Killingholme near the lighthouse, on or in close proximity to the Site following a collision with another aircraft. It had jettisoned its bombs at sea and the wreckage was recovered.

28th August 1944

1No. Lancaster aircraft crashed in the River Humber at low tide, approximately 1.5km from Killingholme Haven (precise location not known), approximately 2km northwest of the Site.

1944 (precise date not known)

1No. Halifax MK III aircraft crashed at Immingham Dock, approximately 3km southeast of the Site.

1st March 1945

1No. Lancaster aircraft crashed in the River Humber approximately 1km off the west jetty, Immingham, approximately 2.5km southeast of the Site.

The precise locations of most of these crash sites have not been determined. There is also a lack of information as to whether the bomber aircraft were still armed. As a result, it is considered that some of these aircraft crash sites do provide a potential source of UXO hazard to the Site.



7 EXPLOSIVES AND MUNITIONS ESTABLISHMENTS & DEPOTS

Explosives and munitions manufacturing or storage sites offer a particularly high risk from both explosive substances and UXO. Standard procedures of explosive/ordnance disposal through burial or burning means that explosive and UXO hazards will be present in some areas of such establishments.

In addition, UXB hazards may be present as a result of enemy bombing during WWI and WWII.

7.1 Explosives and Munitions Factories and Stores

No explosives or munitions factories or stores have been identified on or within close proximity of the Site.

7.2 Ammunitions Stores

Land at RAF Goxhill was used as a bomb store after WWII (see section 6.3).

This is not considered to provide a source of UXO hazard to the Site.

7.3 Informal Munitions Depots

Informal munitions depots, often made by requisitioning roadside lay-bys, may have been present within the vicinity of the Site during WWII. Other informal munitions depots were commonly located in areas of woodland or on train wagons along sidings in marshalling yards.

There is anecdotal evidence that North Killingholme was used as a mine storage depot but no further details have been found.

This is not considered to provide a source of UXO hazard to the Site.

7.4 Munitions Disposal Areas and Bomb Cemeteries

Munitions disposal areas were often made by requisitioning open areas of land, usually away from habitation. Marshland, beaches and sand dunes were frequently used for this purpose. Disposal of munitions was carried out in many different ways ranging from destruction to burial. Full records were not necessarily maintained for these locations, and so they can potentially be a source of UXO.

No records of any official munitions disposal areas in close proximity of the Site have been found.



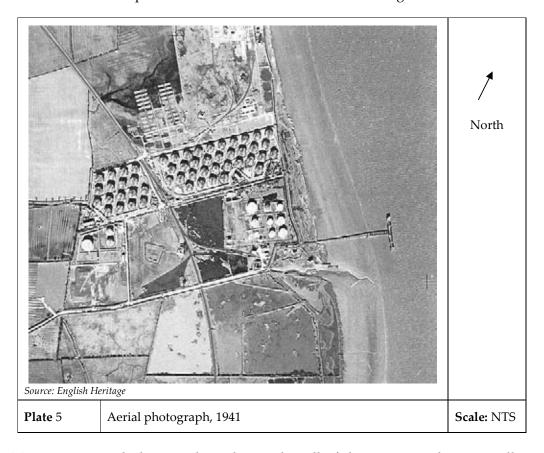
8 OTHER ESTABLISHMENTS, MILITARY BASES & BARRACKS

Military establishments, including barracks, camps and military installations directly linked to the armed forces exist or have existed in the vicinity of the Site. These can provide a source of UXO hazard, although the level of risk from such hazards will depend on the nature of operations carried out.

8.1 Admiralty Fuel Depot

The Admiralty Fuel Depot TA 162201, approximately 1.5km northwest of the Site, was established before WWI and continued to be used through WWII.

Plate 5 shows the depot in 1941. The tanks have been camouflaged.



More recent aerial photography indicates that all of the storage tanks were still in place in 2003. By early 2007 the western part of the Site had been cleared and turned into a car park and the remaining tanks were in the process of being removed.



The former Admiralty Fuel Depot is not considered to provide a direct source of UXO hazard to the Site.

8.2 Immingham Dock

Immingham Dock, approximately 3.5km southeast of the Site, was opened in 1912 and the Admiralty made it the HQ for the newly established Eastern Command. Operational forces based there during WWI included the 7th Destroyer Flotilla and 'C' Class submarines.

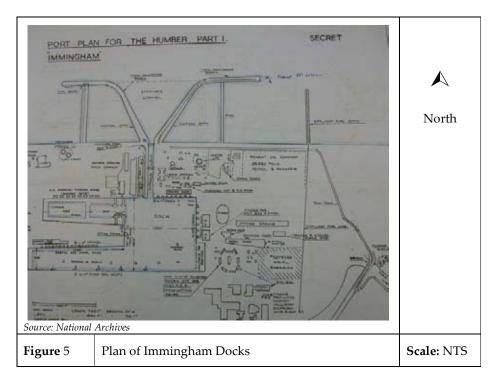
During WWI a submarine fleet was based there. 2No. trawlers were hired as depot ships and boom defence vessels, an old gunboat became the submarine depot ship and an obsolete cruiser was used for overflow accommodation. A Port Convoy Office was set up to co-ordinate the use of escort ships to protect merchant convoys.

Towards the end of WWI, all of these facilities were combined under the command of HMS Pembroke VII and VIII.

During WWII, Immingham was the base for the Naval element of the Humber Defences. The HQ was initially based in Kingston-upon-Hull, but after heavy bombing of the city in November 1940, it was moved to Immingham. The docks were used as a base for minesweepers. At Immingham foundations were laid for shore-based torpedo tubes.

Figure 6 is a WWII plan of Immingham Docks, showing the location of Naval units and facilities.





The Docks were decommissioned as a Naval facility at the end of WWII and Immingham continued to expand as a commercial port. During the Vietnam War, HE bombs were shipped out to the USA from Immingham.

Immingham Docks are not considered to provide a direct source of UXO hazard to the Site.

8.3 RNAS Immingham

RNAS Immingham, approximately 4km southeast of the Site, was established before WWI as a Balloon Station. Tethered kite balloons were trailed from convoy escort ships. Observers were lifted in a wicker basket to a height of approximately 3,000 feet to watch for torpedo tracks, sea mines and submarines.

Some aircraft were also based at the station and a few airship operations were conducted from Immingham during WWI.

The RAF took over the station in April 1918 when it became known as No. 8 Balloon Station. It was closed at the end of WWI.

RNAS Immingham is not considered to provide a source of UXO hazard to the Site.



8.4 Fort Paull

Fort Paull, approximately 6km north of the Site, was constructed in 1861 and used for training by local Volunteer Artillery units. A permanent garrison had been established there by 1881. The Fort was used by a force of Submarine Miners who had set up a training base nearby in 1886.

During WWI it was used as the HQ for the Humber Force.

During WWII Fort Paull was used as a degaussing (or demagnetising) station to combat the threat from magnetic mines which were laid in the Humber from the winter of 1939. Ships were degaussed using electrical cables laid in the river bed, thereby preventing them from detonating magnetic mines.

During WWII, the associated battery remained unarmed and was instead used as a storage depot for ammunition by the Humber AA defences. 2No. practice batteries were located on the foreshore at TA 178254 and TA 179253. A searchlight was located at TA 171251.

The site was abandoned after WWII and was sold in 1961. It is now houses a museum.

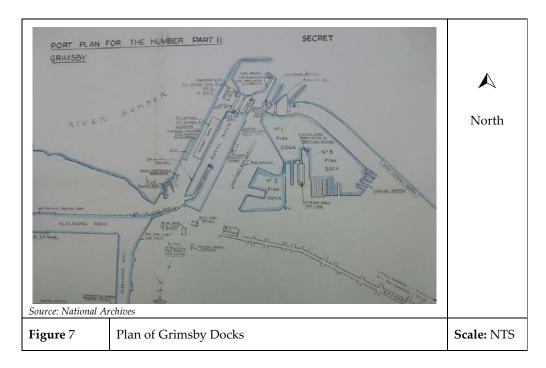
Fort Paull is not considered to provide a source of UXO hazard to the Site.

8.5 Grimsby Dock

The formal association of Grimsby, approximately 13km southeast of the Site, with the RN commenced in 1907 when HMS Pekin was established in the dock as the shore base of the Auxiliary Patrol Service. Grimsby was the base for all War Department civilian vessels operating in northeast England.

During WWII escort ships for east coast convoys once again operated from Grimsby. The town was also the base for air-sea rescue units. Figure 7 is a WWII plan of Grimsby Docks showing its proposed use by the Navy.





As at Immingham, the Naval units based in Grimsby were quickly stood down at the end of WWII.

Grimsby Docks are not considered to provide a direct source of UXO hazard to the Site.

8.6 Sunk Island Battery

The battery at Sunk Island TA 250176, approximately 7km southeast of the Site, was constructed at the start of WWI. It was used as the HQ of the Inner Humber Defences. It was placed in reserve in 1918 and later abandoned in the inter-war years.

At the start of WWII, a concrete observation platform was constructed from which a submarine minefield was laid across the river. In April 1941 the battery was rearmed. The guns were removed in 1943 and the battery closed down and abandoned at the end of WWII.

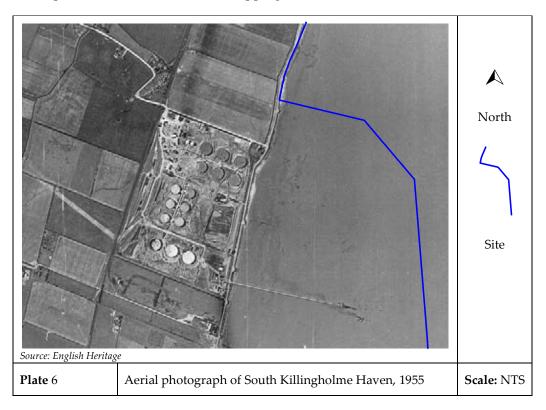
The coastal guns at Sunk Island battery are considered to provide a potential source of UXO hazard to the Site.



8.7 Government Pipelines & Storage System (GPSS)

In 1985 the Oil and Pipelines Agency was established to manage the GPSS, which comprises a national network of underground, high pressure pipes linking Petroleum Storage Depots (PSD). These are used to maintain fuel supplies to major RAF and United States Air Force (USAF) bases and key Government installations such as research establishments.

There is 1No. PSD located at South Killingholme TA 177182, adjacent to the Site. Plate 6 is an aerial photograph dated 1955 on which the depot is under construction. The depot is not shown on historic mapping until 1968.



GPSS Killingholme is not considered to provide a source of UXO hazard to the Site.



9 MILITARY TRAINING AREAS, FIRING & BOMBING RANGES

By their nature, firing ranges, bombing ranges and military training areas represent a potential source of UXO due to associated training activities. The training will involve both practice and live munitions and will offer a significant risk from a very wide range of potential UXO.

9.1 Small Arms Ranges

Small arms ranges (such as rifle ranges) and close combat ranges (such as mortar and grenade ranges) are likely to provide a significant source of UXO. It should be noted that even on small arms ranges, larger munitions such as mortars or grenades cannot be discounted.

1No. firing range was located Stallingborough Haven, approximately 8km southeast of the Site and was probably used during WWI.

This is not considered to provide a UXO hazard to the Site.

9.2 Artillery Ranges

Artillery ranges will have utilised a wide range of munitions, predominantly shells, although close combat munitions such as mortars, or larger munitions such as bombs, cannot be discounted.

No artillery ranges have been identified on or in close proximity to the Site.

9.3 Bombing ranges

Bombing ranges will have primarily used bombs, although other munitions such as shells and close combat munitions such as mortars cannot be totally discounted.

No bombing ranges have been identified on or in close proximity to the Site.



10 EXPLOSIVE ORDNANCE CLEARANCE (EOC) ACTIVITIES

Official UK bombing statistics have been compiled from both British and German sources. There were differences in the way the figures were originally reported and collated which has led to discrepancies in the summary data.

Based on data from 1939 to 1945, War Office statistics indicate that 200,195No. HE bombs exploded within Great Britain. Additionally, 25,195No. HE bombs (representing 11%) were recorded as UXBs. However, records from the Royal Engineers who were responsible for bomb disposal at the time indicate that as of 27th February 1946 upwards of 45,000No. UXBs were disposed of.

On average 8.5% UXBs later self-exploded. In some cases the bombs had delayed action fuzes or were never intended to explode, their purpose being to cause inconvenience and fear.

Given the discrepancy in records and the fact that UXBs are still being found unexpectedly, it is clear that the original figures are understated and provide only an approximation of the number of potential UXBs in the UK.

War Office statistics also show that between October 1940 and May 1941 most of the UXBs (93%) were either 50kg or 250kg. It should be noted that neither recovery nor size of the UXB were always accurately reported.

10.1 Abandoned Bombs

Information from the MoD on any officially registered abandoned bombs which may affect the Site was unavailable at the time of issuing this report. Where significant, this information will be forwarded as an addendum to this report.

10.2 EOC Tasks

Information from the MoD on official EOC tasks on the Site was unavailable at the time of issuing this report. Where significant, this information will be forwarded as an addendum to this report.

Other sources held by Zetica indicate that the following post-WWII EOC tasks have been carried out.

13th September 2007

1No. Army Shell was found on the beach at Cleethorpes, approximately 15km southeast of the Site.



17th September 2007

1No. Anti-Tank mine and 1No. 19th century Naval Shell were found on the beach at Cleethorpes, approximately 15km southeast of the Site.

10.3 Wrecks Information

Information obtained from the UK Hydrographic Office indicates that there are 4No. known wrecks on or in close proximity to the Site. 3No. of these have been salvaged and 1No. remains live. Their positions are indicated in Table 6.

Table 6 Marine wrecks in close proximity to the Site

The state of the s			
Grid Reference	Latitude & Longitude	Type	Status
TA 187186	53° 39.01′N, 00° 12.36′W	Barge	Live
TA 179200	53° 39.77′N, 00° 13.10′W	Trawler	Lift (salvaged)
TA 179186	53° 39.00′N, 00° 12.34′W	Steamship	Lift (salvaged)
TA 185184	53° 38.90′N, 00° 12.54′W	Pile frame	Lift (salvaged)

None are considered to provide a source of UXO hazard to the Site.



11 UXO HAZARD

11.1 Anticipated Ordnance Types

When assessing the risk from UXO including UXB, it is important to be aware of ordnance type and function. The following Section briefly describes the main ordnance types that could potentially affect the Site.

11.1.1 Small Arms Ammunition

Small Arms Ammunition (SAA) is one of the more recognisable categories of ordnance which is primarily designed for anti-personnel use. SAA include items such as bullets, generally up to a calibre (diameter) of 20mm. Larger calibre small arms munitions can contain fuze mechanisms and high explosives or pyrotechnic fillings and may have been used for anti-aircraft or anti-vehicle purposes.

Generally small arms ordnance has a relatively low risk as UXO, although the larger calibre categories may have the same detonation risk as larger high explosive ordnance. SAA is often associated with discarded ammunition boxes around firing practice ranges. Plate 7 illustrates some common SAA.





11.1.2 Hand Grenades

Hand grenades can be filled with explosives or chemicals and have 3No. main parts, a body, a fuze with a pull ring and a safety-clip assembly. Fragmentation grenades are the most common and have a metal or plastic body filled with an explosive. Most use a burning delay fuze that functions for 3 to 5 seconds after the safety lever is released.

Some, such as smoke grenades, are activated instantly when the lever is released.

11.1.3 Projected Grenades

Projected grenades are among the most commonly found UXO items, particularly the 40mm type. These contain high explosives and use a variety of fuzes, including some of the most sensitive internal impact-fuzing systems. They are extremely dangerous and can explode if moved or handled.

11.1.4 Mortars

A mortar is a short tube designed to fire a projectile at a steep angle. Mortars can range from approximately 25mm to 280mm in diameter and can be filled with explosives, toxic chemicals, white phosphorous or illumination flares. They generally have a thinner metal casing than projectiles, but use the same types of fuzing and stabilisation.

11.1.5 Shells

Shells are a projectile containing an explosive charge designed to burst the casing that can contain High Explosives, pyrotechnic compounds or other chemicals.

Shells can be found in a range of sizes, from <20mm to several times this size. The most likely shells to be found on the Site are Small Arms Ammunition (SAA) or UXAA shells that have fallen back to the ground unexploded. Most commonly used anti-aircraft shells were 2" and 3.7" HE shells.

If fired and found as UXO, shells can offer a particular hazard from accidental detonation as they can have sensitive fuze mechanisms. A fuze is a device which incorporates mechanical, electrical, chemical or hydrostatic components to initiate a train of fire or detonation.

11.1.6 Bombs

Probably the most common and certainly most publicised UXOs to be found in the UK are bombs. Air dropped bombs, as a result of WWII enemy action, are found on



a relatively frequent basis as UXO. They tend to be highly publicised (at least on a local basis) due to the common disruption where an evacuation of the potentially affected area is put in place.

The amount of High Explosive and the potential for a fuze to still be activated means that these devices have the prospect of causing some of the most widespread damage. WWII bombs were particularly sophisticated for their time, with antitamper fuzes.

Many German bombs were designed to not explode on impact and instead to cause disruption as a UXB. Some fuzes were set with a delay time of over 70 hours. During this time, an anti-tamper fuze could also be activated to detonate should it be disturbed.

The most commonly used bombs during WWII were the 50kg and 250kg sized general purpose bombs. Less frequently, the 500kg bomb was also used. Larger bombs were used, but so infrequently that any assessment of hazard is more typically based on bombs ranging up to 500kg only.

It should be noted that the June 2008 find of a 1000kg bomb in London, does demonstrate that larger bombs can be found and any risk mitigation measures should consider this. Plate 8 shows the variety of UXBs recovered by the Civil Defence during WWII.



Plate 8

Photograph of a variety of UXBs recovered by the Civil Defence during WWII



11.1.7 Magnetic Mines

Magnetic mines are designed to lie at the bottom of relatively shallow water and explode when the earth's magnetic field become distorted by any large metal object such as a ship coming within range. Luftwaffe aircraft laying mines on tidal rivers are known to have accidentally dropped magnetic mines on to land. It is unlikely that magnetic mines would remain in the ground as unexploded ordnance as they were approximately 2m long, normally dropped by parachute and were unlikely to penetrate the ground because of this.

The Hydrographic Office advises that there are very large quantities of historic ordnance lying around the UK and tidal streams may cause them to migrate from their original positions.

11.2 Geology and Bomb Penetration Depths

It is important to consider the soil type present at the time that a bomb was dropped in order to establish its maximum penetration depth. British Geological Survey (BGS) 1:50,000 Sheet 81 Patrington (Solid and Drift) was consulted.

The geology of the Site is understood to comprise approximately 30m marine and estuarine alluvium over chalk.

Table 7 provides an estimate of average maximum bomb penetration depths for the Site from ground level assuming 5m soft clay over 5m sand over 20m stiff clay.

Table 7 Estimated average maximum bomb penetration depths for the Site

Estimated average bomb penetration depths for anticipated geology			
Bomb Weight	50kg	5.7m	
	500kg	9.3m	
	1000kg	10.9m	

The estimated bomb penetration depths given in Table 7 are from the WWII ground level and are based on the following assumptions:

- a) High level release of the bomb resulting in an impact velocity of 260m/s (>5,000m altitude).
- b) A strike angle of 10 to 15 degrees to the vertical.
- c) That the bomb is stable, both in flight and on penetration.
- d) That no retarding units are fitted to the bomb.



e) That the soil type is homogenous.

A high altitude release of a bomb will result in ground entry at between 10° and 15° to the vertical with the bomb travelling on this trajectory until momentum is nearly lost. The bomb will then turn abruptly to the horizontal before coming to rest. The distance between the centre of the entry hole and the centre of the bomb at rest is known as the 'offset'. A marked lateral movement from the original line of entry is common.

Low-level attacks may have an impact angle of 45° or more, which will frequently lead to a much greater amount of offset movement during soil penetration.

The average offset is one third of the penetration depth, i.e. an offset of 2m may be expected for a 50kg bomb in dry silts and clays.

If hard standings or Made Ground were present during WWII, bomb penetration depths would have been significantly reduced but offset distances may have been up to four times greater.

11.3 Effects and Consequences

There have been a limited number of recorded incidents in the UK since WWII where bombs have detonated during engineering works, though a significant number of bombs have been discovered. Incidents involving smaller ordnance are, however, relatively common in the UK.

In the UK, there are no recorded incidents since the decade after WWII, of a UXB accidentally detonating. In recent years, bombs have been found that have fuze mechanisms that have started to operate indicating that given the right conditions a UXB may still function. In 2002 during construction work in Sunderland, a UXB was uncovered and the fuze mechanism started to operate.

In June 2008 the UXB uncovered in the Lea Valley caused difficulty to No.33 Regiment (Explosive Ordnance Disposal) Royal Engineers because the fuze mechanism started to operate. The 1000kg 'Hermann' bomb, the first of this size to be found in over 30 years, took 5 days to deactivate. This demonstrates that larger bombs can be found and any risk mitigation measures should provide the option to deal with this size of device. Since WWII, UXBs have been found on a regular basis in London.

In May 2009 1No. 50kg WWII bomb was found on a building site in Bexhill-on-Sea, Sussex, and on the 16th August 2009, 1No. 250kg WWII bomb was found near



Ebberston, North Yorkshire. Both of these were destroyed in controlled explosions by Bomb Disposal Units.

On the 8th March 2010 1No. 500kg WWII bomb was found at Bowers Marsh in Essex by Zetica EOC operatives following a Zetica desk study concluding a high risk of UXB on the site. This led to a detailed geophysical survey being carried out by Zetica to detect targets which could be UXB and thus mitigate the risk to future ground works. Plate 9 is a photograph of the bomb as it was discovered in the ground.



The bomb was dealt with by members of the Army Royal Logistics Corps (RLC). Plate 10 is a photograph taken from the edge of the 1.5km exclusion zone around the UXB as the bomb was destroyed in situ.





There is a long list of incidents during construction work in Germany that in some cases have led to the deaths of workers. In September 2008, 17No. people were injured and considerable damage occurred to adjacent buildings when a bomb exploded on a construction site in Hattingen, Germany.

In October 2006 during road works on a motorway near Aschaffenburg in Bavaria, southern Germany, a bomb was struck by a machine and detonated. The plant driver was killed and 5No. others injured, including passing motorists. In a similar incident in October 2004 in Linz, Austria a bomb exploded injuring 3No. workers and causing considerable damage to plant.

In September 2008, a WWII bomb under a back garden in Vienna, Austria, was detonated by a minor earth tremor, after remaining undiscovered for over 60 years.

Further details of similar finds can be found at www.zetica.com/uxb_downloads.htm

The effects of a partial or full detonation of ordnance are usually shock, blast, heat and shrapnel damage. A 50kg buried bomb can damage brick / concrete structures up to a distance of approximately 16m away. Unprotected personnel on the surface up to 70m away from the blast could also be seriously injured. Larger ordnance would obviously be more destructive.

Explosives rarely lose effectiveness with age, although over time mechanisms such as fuzes and gaines can become more sensitive and therefore more prone to detonation, regardless of whether the device has been submersed in water or embedded in silt, clay or similar materials. The effects of a detonation of explosive ordnance are usually extremely fast, often catastrophic and invariably traumatic to any personnel involved.



12 RISK ASSESSMENT

12.1 UXB Risk

During both WWI and WWII, the Site was in a region of important strategic targets, predominantly Naval installations and dock facilities.

The region was bombed during WWI, but there are no records to indicate that the Site was directly bombed during WWI.

During WWII the Humber region was bombed, especially Kingston-upon-Hull, approximately 12km northwest of the Site. Bombing densities in Glanford Brigg RD, in which the Site was located, were much lower.

There are no records of the Site being directly bombed during WWII. However, it should be noted that it is unlikely that bombs falling within the River Humber were accurately recorded.

Taking into consideration the available information indicating the intensity of bombing, the density of known strikes on and immediately adjacent to the Site, the distance of the Site from strategic targets, the ground conditions during WWII and the quality of the data, it is considered that the Site has a low risk of UXB being present.

12.2 UXO Risk

Records indicate there was a significant level of military activity in the vicinity of the Site during both WWI and WWII. The River Humber was heavily defended with a number of coastal and AA guns in range of the Site.

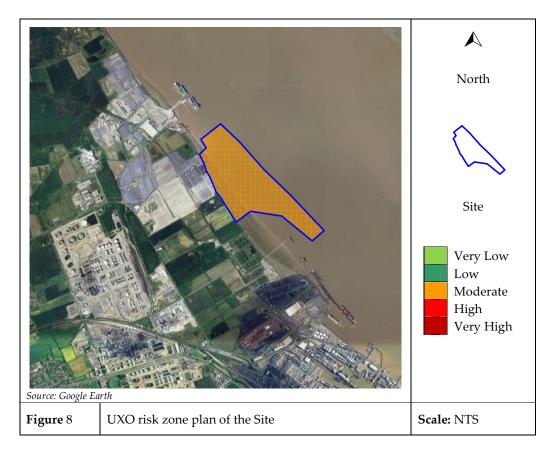
Records indicate there was 1No. submarine minefield and several aircraft crashes in the River Humber in close proximity to the Site. These can all provide a source of UXO.

There were also extensive mine laying operations in the River Humber during WWII. These were distributed on a random basis and so their precise positions cannot be determined.

Taking into consideration the available information indicating the level of military activity in the vicinity of the Site and the potential for ordnance to migrate due to tidal currents, it is considered that the Site has a moderate risk of other UXO being present.

A tentative risk zone plan is provided in Figure 8.





As with all sites, the potential presence of UXO as a result of unauthorised disposal or unrecorded military activity cannot be totally discounted.

12.3 Risk Management Recommendations

Table 8 gives recommended actions in relation to potential UXO risk and the anticipated Site activity. The actual mitigation will depend on the detail and nature of any planned works.

It is recognised that the act of drilling or piling on or very near a UXB increases the risk of detonation. This risk is moderated by the fact that a UXB, if one exists, has lain in the ground for over 60 years and may not function in any event. However, the potentially severe consequences of a UXB exploding, requires appropriate risk mitigation measures to be taken.

Accidental detonation of a UXB during shallow excavation works is considered to be a lower risk than when drilling or piling as any item should be identified by a qualified EOC banksman before repeated disturbance initiates it's functioning. Deeper excavations and dredging may need a more considered approach.



Where a zero tolerance of risk is adopted, then intrusive site works such as drilling or piling can be effectively managed by clearing borehole or pile locations by using MagCone or MagDrill techniques or by implementing a probability of detonation threshold to determine the course of action required, using a statistical model of risk.

The MagCone or MagDrill UXB detection techniques advance a magnetometer by probing or drilling, depending on geology, into the ground in advance of a borehole or pile. The magnetometer is capable of detecting large ferrous metal objects such as UXB. If no objects comparable to a UXB are detected, then the borehole or pile position is considered clear of UXB.

It should be noted that MagCone or MagDrill UXB detection techniques may be ineffectual in areas containing closely spaced ferrous metal driven or reinforced cast in-situ piles due to magnetic anomalies. The same is true for use in fill material and Made Ground with a high ferrous metal content.

Further advice on the mitigation methods can be provided by Zetica on request.



Table 8 Risk mitigation for assumed Site activities

Table	ole 8 Risk mitigation for assumed Site activities					
el of sk	Typical Future Activity on the Site					
Level of Risk	None	Shallow Excavations (<1.0m)	Deep Excavations (>1.0m)	Boreholes or Pile Construction		
	Ensure suitable records and procedures are in place to highlight the risk should future development	Ensure site staff, are informed as part of the site safety induction that the potential presence of UXO cannot be discounted.	Ensure site staff, are informed as part of the site safety induction that the potential presence of UXO cannot be discounted.	Ensure site staff, are informed as part of the site safety induction that the potential presence of UXO cannot be discounted.		
Low	be planned.	Appropriate action is required to be detailed within site procedures.	Appropriate action is required to be detailed within site procedures.	Appropriate action is required to be detailed within site procedures.		
				Clearance certification for borehole or pile locations would be considered prudent, but not essential.		
Moderate	As low risk.	Ensure site staff, are informed as part of the site safety induction that there is a potential for UXO to be discovered during site works. EOC Operative supervision is considered prudent.	Ensure site staff, are informed as part of the site safety induction that there is a potential for UXO to be discovered during site works. Non-intrusive investigation method prior to excavation should be considered. EOC Operative supervision is considered prudent.	Ensure site staff, are informed as part of the site safety induction that there is a potential for UXO to be discovered during site works. Clearance certification for borehole or pile locations would be considered essential.		
High	As low risk.	Ensure site staff, are informed as part of the site safety induction that there is a high potential for UXO to be discovered during site works. EOC operative supervision is considered essential where ground has not been developed post war.	Ensure site staff, are informed as part of the site safety induction that there is a high potential for UXO to be discovered during site works. Nonintrusive investigation methods considered prudent with excavation of any targets identified. EOC operative supervision is also considered essential.	Ensure site staff, are informed as part of the site safety induction that there is a high potential for UXO to be discovered during site works. Clearance certification for borehole or pile locations would be considered essential.		

The above table is for guidance only.



Appendices

Appendix 1 Abbreviations & Glossary

Abbreviations

AA Anti-Aircraft

AFU Advanced Flying Unit
AI Airborne Interception

ANS Air Navigation School

ARP Air Raid Precaution

ASACS Air Surveillance and Control System

ASV Air to Surface
BD Bomb Disposal

BDO Bomb Disposal Officer

BDU Bomb Disposal Unit

BEF British Expeditionary Force

CB County Borough

CFS Central Flying School

DSDA Defence Storage and Distribution Agency

ECFS Empire Central Flying School

EFS Empire Flying School

EFTS Elementary Flying Training School

EOC Explosive Ordnance Clearance

FIDO Fog Intensive Dispersal Operation

FITS Flying Instructors Training School

FTS Flying Training School

GCHQ Government Communications Headquarters

GCI Ground Control Intercept

HAA Heavy Anti-Aircraft

HCU Heavy Conversion Unit

HE High Explosive





HMEF His/Her Majesty's Explosives Factory

HMFF His/Her Majesty's Filling Factory

HQ Head Quarters

HSE Health and Safety Executive

IB Incendiary Bomb

ICBM Inter-Continental Ballistic Missile
IRBM Intermediate Range Ballistic Missile

LAA Light Anti-Aircraft

LB London Borough

MAP Ministry of Aircraft Production

MB Municipal Borough

MC Maintenance Command

MCA Maritime Coastguard Agency

MoD Ministry of Defence

MMU Mobile Meteorological Unit

MU Maintenance Unit

NATO North Atlantic Treaty Organisation

NSF National Shell Factory

NTS Not to Scale

OCU Operational Conversion Unit

OTU Operational Training Unit

POW Prisoner of War

PTC Personnel and Training Command

RAF Royal Air Force

RASC Royal Army Service Corps

RD Rural District

RDX Research Development Explosive

RE Royal Engineers

REME Royal Electrical and Mechanical Engineers

RFC Royal Flying Corps





RLG Relief Landing Ground

ROC Royal Observer Corps

ROF Royal Ordnance Factory

RRE Royal Radar Establishment

SAS Special Air Service

SI Secret Installation

SIP Special Incendiary Phosphorous

SLG Satellite Landing Ground

SOE Special Operations Executive

SOS Services of Supply

STC Strike Command

TA Territorial Army

TFU Telecommunications Flying Unit

TRE Telecommunications Research Establishment

UD Urban District

UKHO United Kingdom Hydrographic Office

UKWMO United Kingdom Warning and Monitoring Organisation

USAF United States Air Force

USAAF United States Army Air Force

UXB Unexploded Bomb

UXO Unexploded Ordnance

WWI World War One

WWII World War Two





Glossary

Operative

Camouflet The type of cavity produced when a charge explodes underground

without breaking the surface of the earth to form a crater.

Conflagration A very large self sustaining destructive fire.

Dannert Wire Barbed wire in the form of a coil which could be extended concertina-like

to form a barrier to impede the movement of hostile troops.

Deflagration The fast and violent burning of an energetic material (as opposed to

detonation).

Demil Derived from the term 'Demilitarisation', it refers to the break down and

the recycling or disposal of ordnance components.

Detonation The high-speed chemical breakdown of an energetic material producing

heat, pressure, flame and a shock wave.

Device This term is used for any component, sub-assembly or completed

ordnance, which may or may not have an explosive risk. It can apply to

detonators, primers, gaines, fuzes, shells or bombs.

EOC is an abbreviation for Explosive Ordnance Clearance. This term is

more commonly used today instead of the more traditional term EOD (Explosive Ordnance Disposal) that specifically refers to the disposal of ordnance. An EOC Operative is a trained person (usually military trained with formal qualifications) capable of conducting ordnance

recognition and remediation tasks.

Explosive The term explosive refers to compounds forming energetic materials that

under certain conditions chemically react, rapidly producing gas, heat and pressure. Obviously, these are extremely dangerous and should only

be handled by qualified professionals.

Firing The 'template' is the area of a firing range (sea or land) that ordnance is **Template** fired into. This is an area usually monitored by the MoD Police and/or

fired into. This is an area usually monitored by the MoD Police and/or Coast Guard to prevent non-authorised persons or vessels straying into

the area.

Fuze A fuze is the part of an explosive device that initiates the main explosive

charge to function. In common usage, the word fuze is used indiscriminately, but when being specific (and in particular in a military context), fuze is used to mean a more complicated device, such as a

device within military ordnance.





Gaine Small explosive charge that is sometimes placed between the detonator

and the main charge to ensure ignition.

Geophysical survey

A geophysical survey is essentially a range of methods that can be used to detect objects or identify ground conditions without the need for intrusive methods (such as excavation or drilling). This is particularly suited to ordnance as disturbance of ordnance items is to be avoided where ever receible.

where ever possible.

Gold line This is the estimated limit of blast damage from an explosive storage

magazine. It usually means that development within this zone is

restricted.

High Explosive Secondary explosives (commonly known as High Explosives (HE)) make up the main charge or filling of an ordnance device. They are usually less sensitive than primary explosives. Examples of secondary explosives are: Nitro glycerine (NG), Trinitrotoluene (TNT), AMATOL (Ammonia nitrate + TNT), Gunpowder (GP), and Cyclotrimethylenetrinitramine (RDX).

Inter-Continental Ballistic Missile An intercontinental ballistic missile, or ICBM, is a very long-range (greater than 5,500km or 3,500 miles) ballistic missile typically designed for nuclear weapons delivery, that is, delivering one or more nuclear warheads.

Luftflotte German military air force squadron.

MagCone MagCone is a method by which ordnance (or other similar metallic items)

can be detected at significant depths. This is conducted by the use of a specialised probe. The probe contains a sensitive magnetometer that is pushed into the ground. The magnetometer is able to detect items such as buried ordnance and thus advise on clear routes for drilling, piles,

deep excavation or alike.

MagDrill Similar technique to MagCone, but utilises a drilling (rather than

probing) technique to advance the magnetometer into the soil.

Primary Explosive Primary explosives are usually extremely sensitive to friction, heat, and pressure. These are used to initiate less sensitive explosives. Examples of primary explosives are: Lead Azide, Lead Styphnate, and Mercury Fulminate. Primary explosive are commonly found in detonators.





Propellants

Propellants provide ordnance with the ability to travel in a controlled manner and deliver the ordnance to a predetermined target. Propellants burn rapidly producing gas, pressure and flame. Although usually in solid form they can be produced in liquid form. Examples of propellants are: Ballistite often found in a flake form and Cordite used in small arm ammunition.

Pyrotechnics

Pyrotechnic compositions are used to produce effects such as smoke, flares (illumination) and occasionally propulsion (as you would see in fireworks).

Unexploded Ordnance (UXO) UXO is explosive ordnance that has been either primed, fuzed, armed or prepared for use and has been subsequently fired, dropped, launched, projected or placed in such a manner as to present a hazard to operations, persons or objects and remains unexploded either by malfunction or design.

V1 Rocket

The Vergeltungswaffe-1, V-1, also designated Fieseler Fi 103/FZG-76, known colloquially in English as the Flying Bomb, Buzz Bomb or Doodlebug, was the first guided missile used in WWII and the forerunner of today's cruise missile.

V2 Rocket

The Vergeltungswaffe 2 (V-2) ("Reprisal Weapon 2") was the first ballistic missile. It was used by the German Army primarily against Belgian and British targets during the later stages of WWII. The V-2 was the first manmade object launched into space, during test flights that reached an altitude of 189km (117 miles) in 1944.



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Appendix 3 General Notes

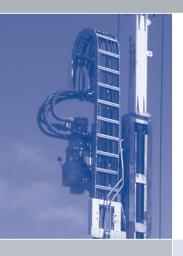
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SUPPORTING FACTUAL DATA APPENDICES

Geophysical Survey Report







South Humber Channel Marine Studies

Geophysical & Geotechnical Report

for





Report No.: 10/J/1/25/1695 2nd revision

Issue Date: December 2010

Emu Contact: Rob Ferris

Emu Job No.: J/1/25/1695



Title: South Humber Channel Marine Studies

Report No. : 10/J/1/25/1695 Emu Job No. : J/1/25/1695

Client Name : Vinci Construction

Client Contact : Rob Rogers
Project Manager : Robert Ferris

		Signature	Date
Report written by	Rob Ferris	AL	06/12/2010
Report checked by Ben Rainbow		& Rich	06/12/2010
Report authorised by	Huw Powell	the fa-	06/12/2010
Report Status	ISSUED	15-15	
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J/1/25/1695 j Emu Limited



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EXECUTIVE SUMMARY

Emu Limited completed the geophysical data acquisition component of the South Humber Channel Marine Studies. This consists of a single beam echo sounder survey recording the water depth across the site. A magnetometer survey to identify any potential ferrous objects including unexploded ordnance (UXO), and a boomer survey to depict the shallow geology of the site in particular the distance from the seabed to the first detected acoustic interface thought to be the rock head.

The data was acquired using the Humber estuary harbour master's survey vessels. The acquisition period occurred from the 16th to 20th June 2010. The timing of the survey and lines run maximised the use of the high tide in order to survey as close to the shore as was practical and safe to do so.

There were however two areas that were not accessible to the survey. The first of this was the near/on shore areas due to restrictions in water depth. The other area that we were unable to reach was in between the power station water supply pipes as this area is not safe to enter towing equipment within the water column.

The magnetometer survey highlighted a number of potential ferrous targets which are illustrated in the magnetometer chart. The shallow geology dataset shows a thickening of the over lying sediments away from the shore and into the south eastern extremity of the site.

Vibrocores were then collected at the thirty determined sites and were handed to the client for logging and assessment.

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1 INTRODUCTION

1.1 Scope of Work

- 28 vibrocores at locations specified by client
- Unexploded ordnance (UXO) survey around the geotechnical vibrocore sites to search for possible items of UXO prior to any intrusive survey techniques.
- Geophysical survey to determine the depths of soils above the rock head.
- Bathymetric map showing the site underwater topography

1.2 Location

The surveyed site lies on the southern shore line of the Humber estuary offshore from the village of Killingholme.

Restrictions in the survey area were due to a number of factors. In the north western end of the site a power station water outlet/inlet restricted the survey area due to the practicality of surveying over such structures. The inner bound was limited by the water depth, the skipper of the survey vessel manoeuvred as close to the shore as safe and practical to do so, following the approximate four meter contour.

2 SUMMARY OF EVENTS

Table 1 outlines the key events for the survey operations. Daily Progress Reports (DPRs) were completed throughout the duration of the surveys.

D	ate	No. of days	Event
15 th Jւ	ine 2010	1	Boomer survey
16 ^{th,} 19 ^{th,} 20	D th June 2010	3	Bathymetry and magnetometer survey
13th - 15t	h July 2010	3	Vibrocore survey
Table 1		Summary	of Survey Events

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3 METHODOLOGY

Sub Bottom Survey Methodology

SUB BOTTOM SURVEY					
Requirement	Implementation				
Determine distance to rock head from seabed	Sub bottom boomer survey along lines at 50 m line spacing to provide profiles				

Data Collection

Equipment: Applied Acoustics Boomer

20-element single-channel hydrophone

Coda Octopus DA2000 digital acquisition and processing system

Methodology:

Before the survey commenced, the boomer system was tested near the survey area to establish optimum, site-specific settings. The boomer catamaran and hydrophone were maintained at 25m astern throughout the survey. This layback was applied during post-processing. The recorded digital seismic data sweep time was 120 ms but a display range of 80ms was maintained for online data QA. Fixes were generated at 50m intervals and recorded within digital records. All settings and offsets were recorded in online logs. All data were logged digitally (.cod format) in the Coda Octopus DA2000 acquisition and processing system.

Post-processing and interpretation were carried out using Coda Octopus GeoSurvey. A combination of band-pass filters were used to remove noise and aid the interpretation.

Data were analysed for any reflective interfaces below the river bed. Only one interface is visible with any significant extent and this is a marked one. It has consequently been taken as rockhead (or a significant increase of competence within the bedrock). The depth of this interface is significantly below the depth of penetration of the vast majority of the vibrocores and no correlation is hence possible.

Rock head was interpreted and exported to a database. These were imported into ESRI ArcGIS where the data were contoured and quality checked. All interpreted points were converted from two-way travel time (TWT) to metres below seabed using a velocity of 1600 ms⁻¹.

Data Outputs

J.1.25.1695.03 Isopachyte map depicting distance from seabed to interpreted rock head J.1.25.1695.04 Contour map depicting distance from chart datum to interpreted rock head

Table 2	Sub Bottom Survey Methodology	

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3.1 Magnetometer Survey Methodology

MAGNETOMETER SURVEY				
Requirement	Implementation			
Magnetometer survey to identify ferrous objects, possibly unexploded ordnance (UXO).	Marine magnetometer survey with survey lines spaced at 10m			

Data Collection

Equipment: Geometrics G-882/G-881 caesium-vapour magnetometer

MagLog acquisition software

Geosoft Oasis Montaj GIS and processing software

Methodology:

Table 3

A pair of Geometrics caesium vapour marine magnetometers were utilised for this aspect of the survey. The towfish unit housed a total magnetic field sensor and provided absolute readings of total magnetic field in nanoteslas (nT).

The magnetometer towfish was towed a minimum of 60m behind the vessel. The altitude was maintained between 2 and 4 m above the seabed.

Following the survey, post-processing was carried out using Geosoft Oasis Montaj software. The magnetic field intensity was calculated by applying a polynomial filter to the raw data to calculate a trend. This curve was subtracted from the raw data to give the residual magnetic field intensity. An analytical signal grid was calculated for this residual which represented the square root of the sum of the derivatives in x, y and z directions (magnetic gradient). This was used to identify the edges of magnetic source bodies. Magnetic targets, or anomalies, were calculated from this grid.

Magnetometer Survey Methodology

J.1.25.1695.02 Magnetometer analytical signal grid

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3.2 Single Beam Echo Sounder Survey

Single Beam Echosounder SURVEY				
Requirement	Implementation			
Measure the water depth over the site	A Knudson echo sounder was implemented to record the water depth			

Data Collection

Equipment:

Knudsen 320M single beam echosounder

Methodology:

A Knudsen 320M single beam echo sounder was used to collect water depths over the site, run simultaneously with the magnetometer.

The raw data collected was then corrected for tidal variations using tidal data supplied from Associated British Ports (ABP) tide gauge from Immingham.

Data Outputs	
J.1.25.1695.01	Bathymetric chart
Table 4	Echo sounder methodology

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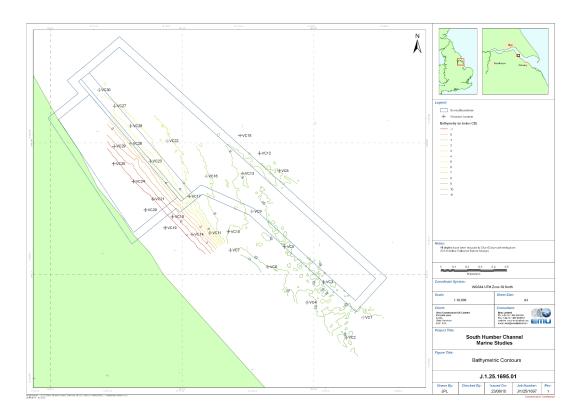
4 RESULTS

Charts have been provided with this report presenting the magnetometer analytical signal grid (chart number J.1.25.1695.02), bathymetric chart (chart number J.1.25.1695.01), sediment isopachyte (chart number J.1.25.1695.03) chart and sediment contour chart to chart datum (chart number J.1.25.1695.04).

4.1 Bathymetry

All depths are referenced to Chart Datum (CD) unless otherwise stated. Bathymetry data has been reduced using tidal data supplied from Associated British Ports (ABP) tide gauge from Immingham.

The water depth across the site varies from 4m (the minimum depth that was safe to survey to around 18m on the north eastern extremity of the site.



4.2 Magnetometer

All magnetometer data was collected at 10m line spacing using the G882/G881 magnetometers.

Seven significant magnetic anomalies and two smaller targets have been identified. Target two on image one overleaf corresponds to a wreck which is recorded on the admiralty chart for the area.

The other 8 anomalies are identified as unknown ferrous objects, this means they could potentially be UXO or discarded ferrous objects from passing shipping. The relative target sizes shown below are a unitless peak value to give a relative relationship between the various targets and can't be quantified to a physical dimension.

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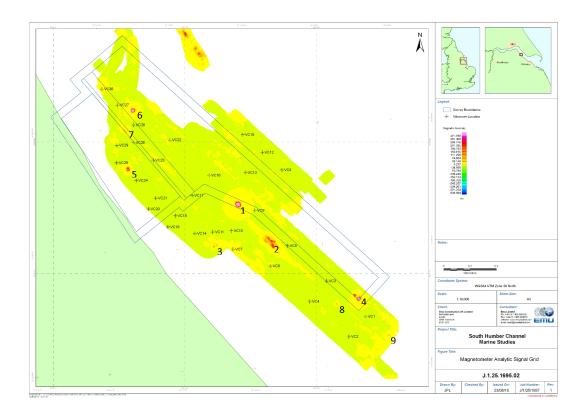


Anomaly No	E OSGB	N OSGB	Relative target size	Comment
1	518428	418872	8.83	Apparent large single object
2	518677	418586	12.62	Wreck as shown on admiralty chart
3	518238	418552	9.47	Multiple objects
4	519305	418166	8.63	Appears to be two objects close together or joined
5	517593	419147	12.58	Strong single signature
6	517638	419596	11.55	Strong single signature
7	517571	419446	11.41	Multiple objects
8	519165	418103	6.65	Weak single signature
9	519556	417859	10.4	Strong single signature

Coordinates in OSGB36

There are two methods to further identify the targets. The first is by far the quickest and simplest, this would be to use side scan sonar to record a high resolution acoustic image of the site. This would then give the ability to visually recognise any surface lying or partially buried objects.

If further analysis was required and remote methods had been exhausted, divers could be sent down to visually identify the objects. This is not an easy process however within the Humber river due to the poor visibility and hazardous tidal streams.



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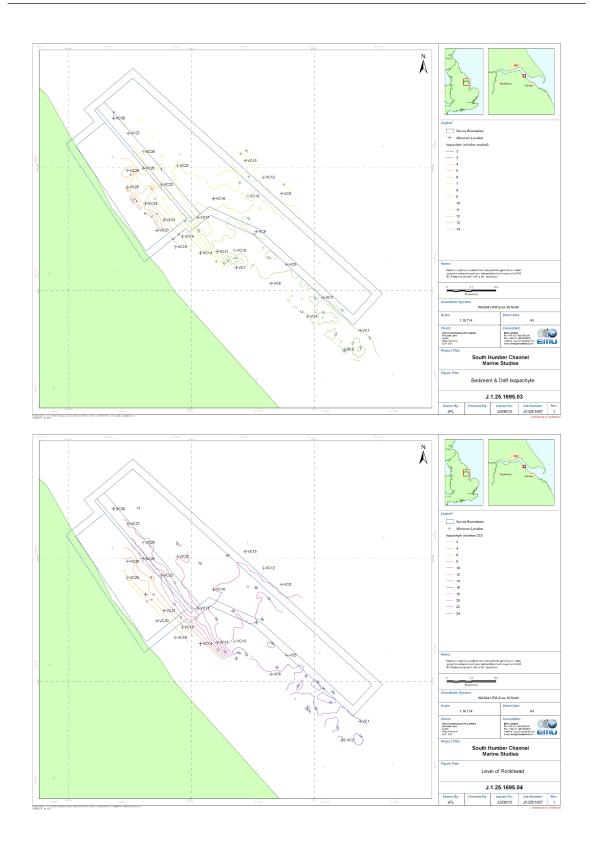


4.3 Boomer

All depth results reported within this section have been converted from two-way travel time (TWT) to depth below seabed using an estimated seismic velocity of 1600 ms⁻¹. Two charts were produced an Isopachyte (seabed to interface) and depth chart (chart datum to interface) The interpreted primary sub bottom interface probably depicting rock head was calculated from the data set collected and varies from 3m at the shore end to 8m at the north eastern boundary of the site deepening in the centre of the site to around 14m from seabed. These values are based on a seismic velocity of 1600m/s which is characteristic of these sediment types. Without specific velocity analysis it is not possible to be more accurate than this so there could be a variation in the translation of up to ±15%.

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4.4 Vibrocore Locations

The table below shows the positions that were actually used for the vibrocoring (in OSBG36 and latitude longitude) after consultation with the client and careful analysis of the geophysical dataset.

Vibrocore	Comments	Lat	Lon	E_OSGB	N_OSGB
VC1	Location unchanged	53° 38.697'	-0° 11.729'	519385	418006
VC2	Location unchanged	53° 38.617'	-0° 11.850'	519255	417855
VC3	Location unchanged	53° 38.848'	-0° 11.989'	519091	418279
VC4	Location unchanged	53° 38.768'	-0° 12.110'	518962	418126
VC5	Location unchanged	53° 38.999'	-0° 12.249'	518798	418551
VC6	Location unchanged	53° 38.919'	-0° 12.370'	518668	418399
VC7	Moved 100m East	53° 38.993'	-0° 12.624'	518384	418531
VC8	Location unchanged	53° 39.310'	-0° 12.266'	518764	419128
VC9	Moved 50m East	53° 39.149'	-0° 12.463'	518555	418823
VC10	Location unchanged	53° 39.069'	-0° 12.630'	518375	418671
VC11	Moved 150m East	53° 39.067'	-0° 12.759'	518233	418664
VC12	Location unchanged	53° 39.385'	-0° 12.396'	518618	419264
VC13	Location unchanged	53° 39.305'	-0° 12.517'	518488	419112
VC14	Location unchanged	53° 39.064'	-0° 12.882'	518097	418655
VC15	Location unchanged	53° 39.461'	-0° 12.526'	518471	419400
VC16	Location unchanged	53° 39.300'	-0° 12.769'	518211	419096
VC17	Location unchanged	53° 39.220'	-0° 12.891'	518080	418943
VC18	Location unchanged	53° 39.140'	-0° 13.012'	517950	418791
	Moved 100m North				
VC19	East	53° 39.095'	-0° 13.066'	517893	418707
	Moved 100m North				
VC20	East	53° 39.172'	-0° 13.196'	517746	418845
VC21	Location unchanged	53° 39.215'	-0° 13.142'	517804	418927
VC22	Location unchanged	53° 39.451'	-0° 13.029'	517917	419368
VC23	Location unchanged	53° 39.371'	-0° 13.151'	517787	419216
VC24	Location unchanged	53° 39.290'	-0° 13.272'	517657	419063
VC25	Location unchanged	53° 39.366'	-0° 13.402'	517510	419199
VC26	Location unchanged	53° 39.446'	-0° 13.281'	517640	419352
VC27	Moved 100m West	53° 39.602'	-0° 13.381'	517523	419638
VC28	Moved 150m East	53° 39.518'	-0° 13.275'	517643	419486
VC29	Moved 150m East	53° 39.438'	-0° 13.396'	517514	419333
	Moved 150m North				
VC30	North East	53° 39.670'	-0° 13.484'	517406	419762

Coordinates in OSGB36

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4.5 Vibrocore depths relative to chart datum.

Vibrocore	E_OSGB	N_OSGB	Top of core relative to chart datum
VC1	519385	418006	-9.93
VC2	519255	417855	-10.28
VC3	519091	418279	-10.07
VC4	518962	418126	-10.79
VC5	518798	418551	-10.01
VC6	518668	418399	-10.25
VC7	518384	418531	-9.81
VC8	518764	419128	-8.91
VC9	518555	418823	-9.51
VC10	518375	418671	-8.86
VC11	518233	418664	-4.64
VC12	518618	419264	-8.58
VC13	518488	419112	-8.67
VC14	518097	418655	0.26
VC15	518471	419400	-8.63
VC16	518211	419096	-7.87
VC17	518080	418943	-6.44
VC18	517950	418791	0.6
VC19	517893	418707	1.95
VC20	517746	418845	2.15
VC21	517804	418927	1.3
VC22	517917	419368	-6.87
VC23	517787	419216	-3.87
VC24	517657	419063	1.14
VC25	517510	419199	1.53
VC26	517640	419352	-3.54
VC27	517523	419638	-5.57
VC28	517643	419486	-5.74
VC29	517514	419333	-0.56
VC30	517406	419762	-6.3

Coordinates in OSGB36



5 HEALTH AND SAFETY

On the commencement of the geophysical survey a vessel safety briefing was attended by all survey personnel and crew. Emergency procedures were explained and the use of emergency equipment was demonstrated. Fire and man overboard drills were carried out. Following changes in vessel, additional safety briefings were carried out for the new vessel.

A safety plan and risk assessment was completed prior to commencement of the survey. All survey and crew members were required to read the safety plan. This is available on request.

No reportable incidents occurred over the duration of the geophysical survey.

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