CAPITA

Crane Cross Civic Amenity Site and Recycling Centre, Saundersfoot

Geotechnical Interpretative Report | May 2014

We | Listen Create Deliver

CAPITA

Project No: CS/71529 Doc Ref: CS/71529/GT01 Rev:

Client: Pembrokeshire County Council

Issue Date: May 2014

Crane Cross Civic Amenity Site and Recycling Centre, Saundersfoot Geotechnical Interpretative Report

	Name	Signature	Date
Author	Ian leek Senior Geotechnical Engineer Bsc(Hons) MSc CGeol CSci EurGeol FGS		21/05/2014
Checker	Alan Rosier Geotechnical Engineer BSc (Hons) MSc FGS		21/05/2014
Approver	Andrew Hale Technical Director BEng (Hons) CEng MICE		21/05/2014

Issue Record

Rev	Date	Description/Comments	Author/Prepared by:	Approved for Issue by:

Contents

Appendices

1. Introduction

1.1 Background

In order to construct a new Civic Amenity site, Pembrokeshire County Council (PCC) has purchased a parcel of land off Devonshire Drive, Saundersfoot. Currently the land is utilised for grazing.

Capita Property & Infrastructure (CPI) has been commissioned to design and manage a ground investigation to aid the design of the proposed development.

This report provides an interpretation of the findings of the ground investigation, design parameters and geotechnical advice for the proposed scheme.

1.2 Proposal

The proposed Civic Amenity site is part of the South West Wales Materials Efficiency Project which is part funded through the convergence element of the European Regional Development Fund through the Welsh Government.

Planning Application No: NP/13/0093 describes the proposed development as follows:

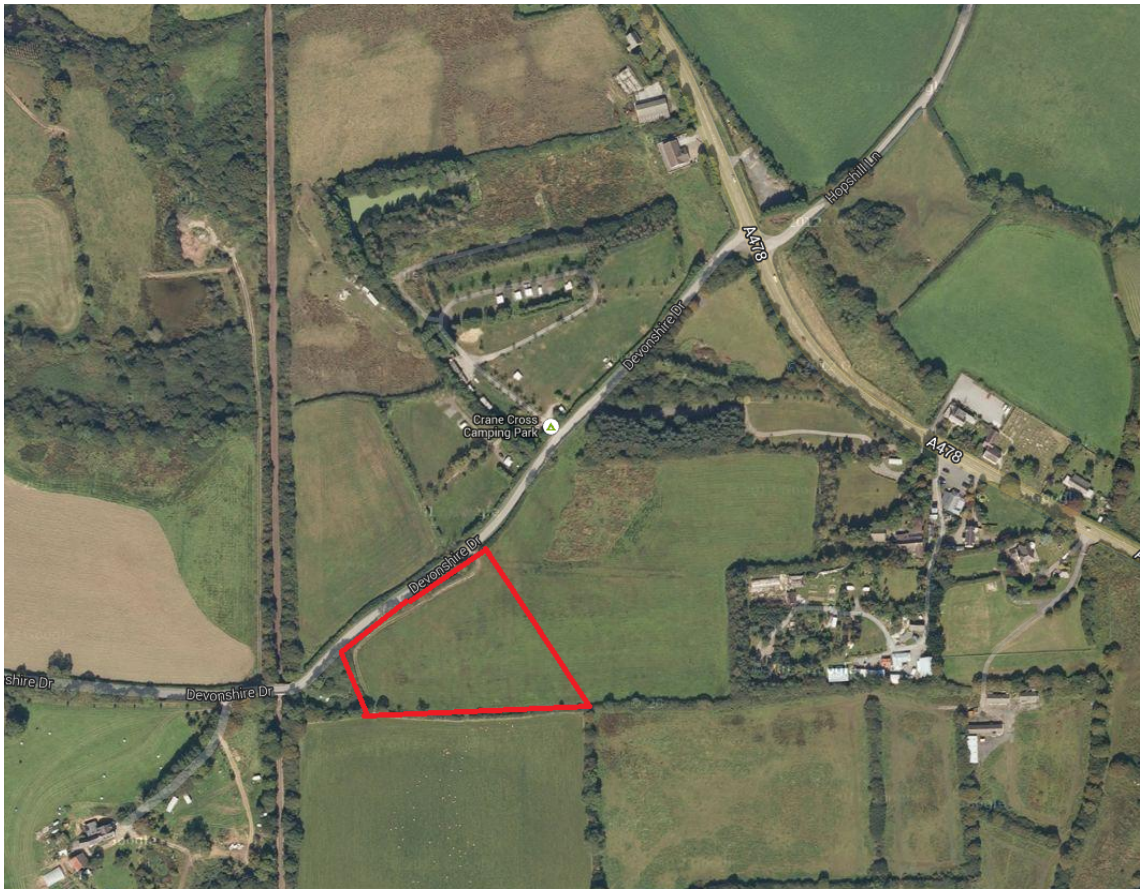
Construction of Civic Amenity & Recycling Centre (CA&RC), incorporating an internal access road, site access improvements, erection of a compactor shed, canopy shed & welfare office, provision of containers, skips & igloos, staff & visitor parking, weighbridge area and quarantine area, lighting & site signage, fencing & landscaping works. The proposed site layout is shown on Drg. No. CS/071529/P/105: General Arrangement of Amenity Site, presented in Appendix A.

Additionally, it is understood that new storm water drainage will be constructed and Devonshire Drive is to be upgraded.

1.3 Site Description

The site lies to the west of Saundersfoot town, between the A478 and railway line, off Devonshire Drive. The approximate centre of the subject site is located at Ordnance Survey National Grid reference SN (2)11723 (2)03872. An aerial photograph extract showing the site boundary is shown on Plate 1.1 overleaf.

Plate 1.1 - Site Boundary Overlaid on Aerial Photograph Extract



The site is a roughly triangular shaped parcel of grazing land. Its eastern boundary is approximately 130 m long and its southern boundary is approximately 150 m long.

Ground levels within the site fall gently from the southeast to the northwest by a maximum of 3 m across the site.

An open drain is present between the outside of the northern field boundary and Devonshire Drive.

1.4 Exclusions

This report is for the private and confidential use of PCC for whom the report is undertaken and should not be reproduced in whole or in part or relied upon by third parties for use what so ever without the express authority of Capita.

Any recommendations made, or opinions presented are based upon a professional review of available information. However, there may be special conditions pertinent to the site which may not have been revealed by these works and have not, therefore, been taken into account in this report.

2. Investigation Rationale

2.1 Background Study

A study of Client supplied information, geological maps, coal mining reports, historic maps and the Environment Agency website revealed the following pertinent information regarding the site and its surrounds:

- No superficial deposits are shown on geological maps
- The site lies upon strata of the Lower Coal Measures of Carboniferous age
- No coal mining is recorded within the site
- The bedrock is classified as a Secondary A aquifer
- There are no groundwater abstraction licenses in the vicinity of the site
- There are no groundwater protection zones in the vicinity of the site
- No relevant British Geological Survey borehole records were available
- The site is historically Greenfield agricultural land
- The site is not at risk of flooding
- No Landfills are present in the vicinity of the site.

2.2 Investigation Design

The ground investigation (GI) was designed to confirm the ground conditions underlying the site, to provide geotechnical design parameters for the proposed structures and to identify any contamination of the site.

A series of machine excavated trial pits were scheduled to visually inspect the ground and groundwater conditions and to enable samples to be collected for geotechnical and geo-environmental testing. An additional deep pit was scheduled to assess the excavatability of the ground where a deep drainage run is envisaged.

Dynamic probes were scheduled across the site to determine the grounds strength with depth at various locations across the site, to aid in design of the retaining structures, hardstanding and internal access roads.

Hand excavated trial pits with dynamic cone penetrometer tests (TRL probes) were scheduled within the pavement of Devonshire Drive to aid in design of the carriageway upgrading works.

As there are to be no permanent occupied structures at the site, gas and groundwater monitoring was not deemed necessary.

3. Site Investigation

3.1 Field Works

The GI was designed by CPI, undertaken by Apex Drilling Services Limited (Apex) and supervised by CPI.

The trial pitting and dynamic probing element of the investigation was carried out on the 20 March 2014. The hand excavated pavement inspection pits and TRL probes were undertaken within Devonshire Drive on 04 April 2014.

Full details of the GI can be found within the Apex Factual Report (Ref. 1).

The locations of the trial pits (TP) and Dynamic Probe (DP) tests undertaken during the investigation are presented as Figure 1 within Appendix A.

3.2 Summary of Trial Pits

Six trial pits (TP) were excavated using a 14 tonne tracked excavator to a maximum depth of 4.20 mbgl, and backfilled with arisings on completion.

TP 1 and TP 5 were located to the west of the entrance to the proposed Civic Amenity and Recycling Centre (CA&RC), offset from the northern boundary, and were positioned to provide information to design the proposed access road and attenuation tanks.

TP 2 and TP 6 were located along the eastern boundary and southwest corner of the site respectively and were positioned to provide information for access road design. TP 6 was also used to determine the excavatability of rock at the anticipated maximum depth of the proposed storm water drain.

TP 3 and TP 4 were located offset from the southern boundary of the site and were positioned to provide information for retaining wall and access road design.

Trial Pit logsheets are presented in Appendix B.

3.3 Dynamic Probe Testing

Dynamic probe testing was carried out at seven locations using track mounted super heavy test apparatus.

The tests were undertaken to depths of between 3.2 and 5.0 mbgl.

Dynamic Probe test reports are presented in Appendix B.

3.4 Hand Excavated Pavement Inspection Pits

Three hand excavated pavement inspection pits (DCP 1 to DCP 3) were undertaken within Devonshire Drive with a TRL probe undertaken at the base of each.

DCP 1 was undertaken in the northeast, DCP 3 was undertaken in the southwest, near the site entrance, and DCP 2 was located roughly half way between them.

The pits were all extended to 0.4 mbgl to expose the pavement sub-base.

DCP logsheets and test reports are presented in Appendix B.

3.5 Sampling

Representative bulk, disturbed and environmental samples were taken from the materials encountered in the trial pits and pavement inspection pits.

3.6 Geotechnical & Geo-environmental Laboratory Testing

Geotechnical and Geo-environmental testing was scheduled by CPI.

Environmental analysis consisted of the following tests:

- Total Petroleum Hydrocarbons (TPH) (CWG-with aliphatic/aromatic split)
- Toxic Metals Suite
- Cyanide
- Soil Organic Matter (SOM%)

Geotechnical analysis consisted of:

- Moisture Content
- Atterberg limits Testing
- Particle Size Distribution (PSD)
- BRE SD 1: Greenfield Suite
- Loss on Ignition (LOI%)
- California Bearing ratio
- Proctor Compaction Tests
- Bituminous analysis

Laboratory results are presented in Appendix C and discussed in the following sections.

4. Ground Conditions & Material Properties

4.1 Strata Encountered

Table 4.1 below summarises the typical strata encountered in the exploratory holes at the CA&RC.

Table 4.1 – Summary of Strata Encountered

Strata Encountered	Location	Comments
TOPSOIL: Soft to firm dark brown slightly sandy slightly gravelly CLAY.	All	Clayey topsoil 100 to 400 mm thick.
SUPERFICIAL SOILS: Firm / stiff to very stiff Low/medium strength slightly sandy slightly gravelly CLAY. Occasional thin sand horizons.	All	Beneath topsoil extending to depths between 1.5 and 2.0 mbgl. Shear Vane results 36 to 50 KPa
SUPERFICIAL/RESIDUAL SOILS: Clayey, sandy, GRAVEL of sandstone/siltstone with low to medium cobble content.	All	Beneath superficial clay soils and extending to depths of between 2.4 to 2.7 mbgl.
LOWER COAL MEASURES: Very weak fine grained sandstone. Recovered as clayey angular fine to coarse gravel and angular cobbles.	TP1, TP2, TP3, TP5, TP6	Encountered at depths of 2.4 mbgl and greater.

4.1.1 Topsoil

Soft brown clayey topsoil was encountered across the CS&RC site to depths of between 100 and 400 mmbgl.

The topsoil was in a saturated condition during the investigation and rutted heavily.

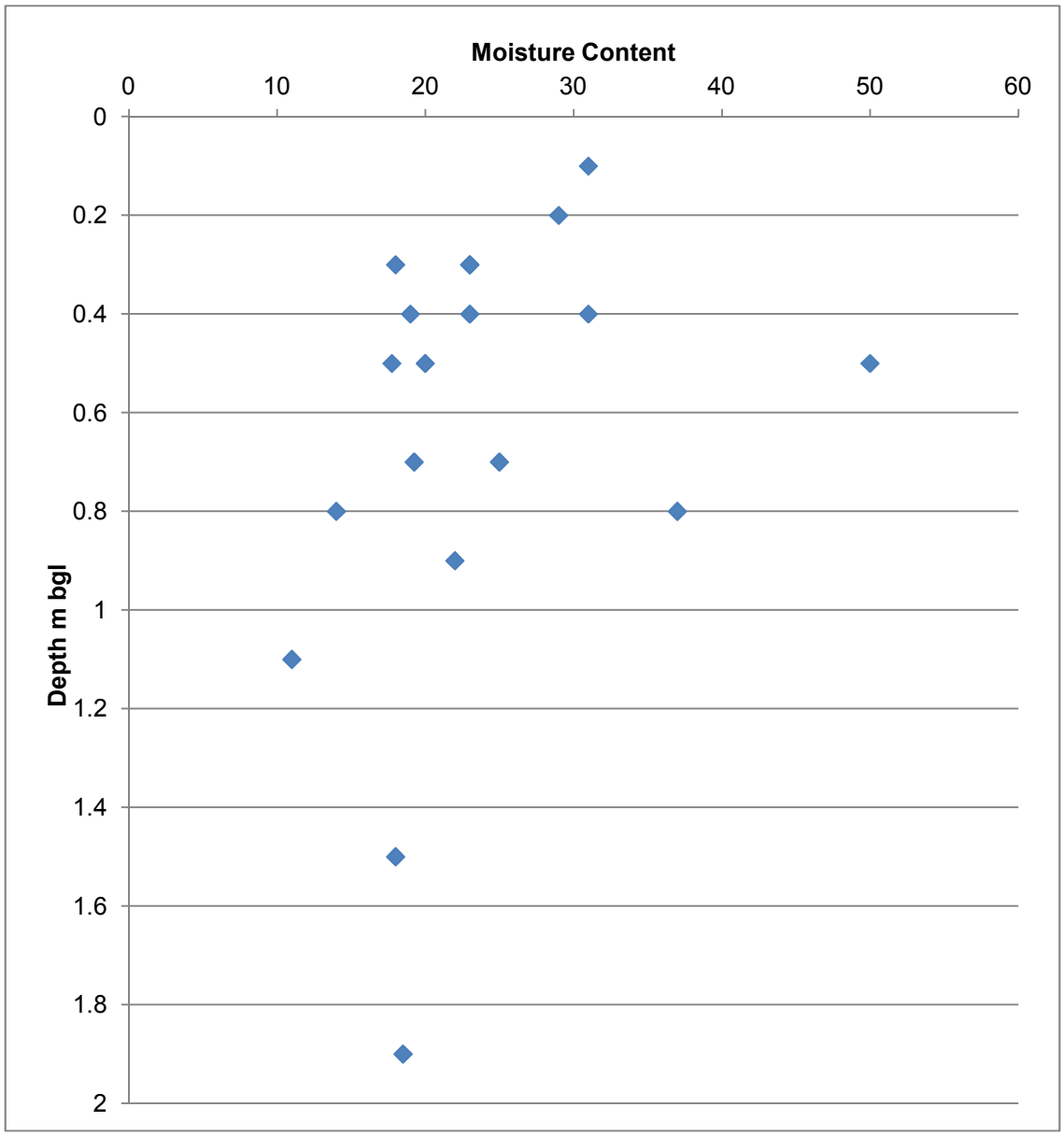
4.1.2 Clay Soils

Sandy clay with occasional gravel was encountered in all trial pits and extended to depths of between 1.5 and 2.0 mbgl.

A grading envelope composed of nine samples of clay soil is presented in Figure 2 in Appendix A.

A wide range of moisture contents were recorded, between 11 and 50%. Graph 4.1 below illustrates the moisture content distribution with depth.

Graph 4.1 – Moisture Content with Depth



Plasticity index between 12 and 23 % were recorded. Liquid limits between 31 and 59 % were recorded; referring to the Casagrande plasticity chart the samples were classified as Low to High plasticity, see Figure 3 in Appendix A.

Compaction testing undertaken on three samples gave a wide range of maximum dry density, ranging between 1.35 and 1.8 Mg/m^3. Optimum moisture contents were between 9.3 and 34 %. These results indicate a significant variation within the clay strata.

Hand shear vane tests were undertaken at depths between 0.3 and 1.2 mbgl. Test results ranged between 36 and 50 kPa, but were concentrated between 40 and 44 KPa.

The results of dynamic probe tests undertaken in the clay soils are presented as Figure 4 in Appendix A. To a depth of 0.7mbgl the clay was of a markedly lower strength than that of the deeper soils. Below 0.7 mbgl the soil strength increased approximately linearly with depth.

The material properties of the clay strata, summarised in Table 4.2 below, are based on published typical values, laboratory analysis and/or obtained by empirical methods based on the field test data.

Table 4.2 – Material Properties of Clay

Material Properties of Clay	Min	Average	Max
Equivalent SPT N Value			
0.2 - 0.7mbgl	0	2	9
0.8 – 1.1 mbgl	3	8	15
1.1 – 1.5 mbgl	3	12	32
Undrained Shear Strength – kN/m^2			
0.2 - 0.7mbgl	20 - 30		
0.8 – 1.1 mbgl	40 - 50		
1.1 – 1.5 mbgl	50 - 60		
Φ' phi°	25		
Cohesion C'	2 – 3		
Bulk Density Mg/m^3	1.85		
Moisture Content %	18	28	50
Liquid Limit %	31	45	59
Plastic Limit %	19	23	30
Plasticity Index %	12	22	32
Passing 425 sieve %	82	94	99
Silt / Clay Fraction %	41	74	94
Maximum Dry Density Mg/m^3	1.35	1.56	1.80
Design CBR %	2		

4.1.3 Gravel

Beneath the clay soils, trial pits recorded a pervasive layer of gravel composed of clayey sandy angular to subangular sandstone/siltstone with increasing cobble content with depth. Particle size distribution testing on two samples, see Figure 2, confirms the trial pit log description.

The unit is interpreted as weathered insitu bedrock and as such the lower boundary of the unit is fairly subjective. However, the trial pit logs indicate a change from soil to rock at around 2.4 to 2.7 mbgl.

Equivalent SPT N values obtained in the gravel and cobbles averaged around 15 indicating a medium dense soil.

4.1.4 Lower Coal Measures

The transition from residual soils to very weak siltstone/fine grained sandstone was recorded at around 2.4 to 2.7 mbg; this is corroborated by a sharp increase in equivalent SPT N values at, and beyond, the anticipated transition boundary, see Figure 4.

Excavation of this weak fractured rock resulted in an angular gravel being recovered, with the cobble sized fraction increasing with depth. As anticipated, the joint spacing became increasingly wide and the aperture increasingly tight with depth so that by 4.3 mbgl in TP6 the excavator was unable to make progress.

4.2 Groundwater

Groundwater was encountered in all trial pits between depths of 1.8 and 2.1 mbgl. The water was recorded as a fast inflow from the residual soil/gravel immediately beneath the clay layer.

In TP4, the water strike was encountered at 1.80 mbgl as a fast inflow. On completion of the pit the standing water level was monitored rising from 2.60 back to 1.80 mbgl in 90 min.

Thin impersistent sand layers were observed in the clay strata in the western part of the site. The layers contained some groundwater and consequently bled as 'running sand'. If encountered during the site works, the excavation sides will require close boarding.

4.3 Visual & Olfactory Evidence of Contamination

No visual or olfactory evidence of contamination was found within the exploratory holes.

4.4 Pavement Construction

Table 4.3 below provides a summary of the logs and testing undertaken within the pavement at Devonshire Drive.

Table 4.3 - Summary of Pavement Trial Holes and Laboratory Testing

Trial Hole		DCP3		DCP2		DCP1	
Approximate Location		Nr. CA&RC entrance		Nr. Campsite entrance		Nr. A478 Junction	
Surface Layer thickness (mm)		12		11		12	
Surface & Base Layer thickness (mm)		100		120		200	
Binder content % (mixed sample)		5.3		5.4		6.1	
Sub-base thickness (mm)		300		260		200	
Does sub-base comply with Type 1 grading		Yes		No		Yes	
Formation level (mm bgl)		400		380		400	
Description of formation soils		Firm slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse					
CBR (%)	Depth range (mm bgl)	33.7	400 - to 615	20.1	380 to 1000	7.1	200 to 920

Bitumen bound surfacing was subject to sieve analysis which revealed 100% of the sample passed the 40 mm sieve.

The sub-base was also subject to particle size distribution analysis which revealed that the materials in DCP1 and DCP 3 conformed to the Specification to Highway Works – Series 800 - Type 1 grading requirements. However, Sub-base at DCP 2 did not conform as it exceeded the fines (0.063 mm sieve) by 1%.

No groundwater was encountered in DCP3, whereas groundwater was encountered on completion of the DCP test in DCP2 and directly beneath the base layer (within the sub-base) in DCP1.

5. Geotechnical Appraisal

Based upon information obtained during this exploratory investigation, the following section provides a geotechnical appraisal and recommendations for the construction of the proposed CA&RC.

5.1 Foundations

The significant structures requiring design at the proposed CA&RC are a concrete slab and retaining wall, up to 1.8m high, along the southern and western side of the operational area. An access road will ramp up behind the southern retaining wall so that site users can unload and deposit waste into the skips/containers below. A compactor building is to be situated on the slab to the west. Details are shown on Drg. No. CS/071529/P/105: General Arrangement of Amenity Site, presented in Appendix A.

The ground investigation has shown that the site is underlain by clay to a depth of 1.5 to 2.0 mbgl. It is anticipated that the retaining walls and slabs will be founded in this material due to its depth and because groundwater is likely to enter excavations if the underlying residual soil/gravel is encountered.

The highest load of 80kN/m^2 is anticipated at the location of the retaining wall where structural loads and soil weight combine.

The foundations must be placed at a minimum 0.7 m below existing ground level, below the level where soils which have been affected by seasonal volume change. An allowable bearing capacity of 80 kN/m^2 is anticipated at this depth. Additional bearing capacity can be achieved by increasing the depth of formation level, however this should be offset against the risk of encountering groundwater.

Settlement in the clay layer is not anticipated to be greater than 25 mm and will comprise an element of long-term consolidation settlement.

Formation level must be inspected by a qualified Geotechnical Engineer so that weaker layers or soft spots can be identified and dug out and replaced with concrete.

5.2 Pavements

Trial holes undertaken within Devonshire Drive revealed the pavement construction to vary along its length; a surface layer of between 11 and 12 mm was underlain by a base layer of between 90 and 190 mm, thickening in a north-east direction. Sub-base was present to a depth of approximately 400 mmbgl and was, or close to, a Type 1 specification.

Dynamic cone penetrometer tests (TRL probe) determined equivalent CBR values between 33 and 7.1%, decreasing to the northeast. The increased pavement thickness and reduced CBR values correspond to an increasingly high water table to the northeast.

Within the CA&RC site a design CBR value of 2 % has been determined from laboratory tests and correlation with in-situ testing, hand shear vanes and dynamic probe tests. However, it

should be noted that the tests were performed upon clay soils which were at a depth subject to seasonal fluctuations in moisture content and the investigation was undertaken at the end of an exceptionally warm and very wet winter period. Should the formation levels be exposed at the end of the summer, allowed to dry and lightly trafficked, the design CBR could potentially be increased to 2.5%, however, onsite verification testing would need to be undertaken to confirm any change in design.

5.3 Sulphate Testing

Five samples of soils were selected from exploratory holes and scheduled for a suite of chemical testing to determine the potential for ground conditions aggressive to concrete. The testing suite was undertaken in accordance with the test methods recommended in BRE Special Digest 1 (Ref. 2) A summary of the testing results are summarised in Table 5.1 below.

Table 5.1 – Summary of Sulphate Testing

TP No.	Depth	Acid Soluble Sulphate (%)	pH
TP1	0.7 – 0.8	<0.02	7.09
TP4	0.4	<0.02	6.23
TP5	1.1	<0.02	6.86
TP6	1.5	<0.02	7.12
TP6	2.9 – 2.9	<0.02	7.09

On the basis of the test results and a mobile groundwater situation, a design sulphate class DC-1, ACEC Class AC-1 is obtained.

5.4 Loss on Ignition

Due to the presence of coal measures strata and to aid in determining the re-use and disposal options of strata, five samples were scheduled for loss on ignition (LOI) testing. The LOI testing has shown a moderate to low percentage of combustible material which decreases with depth. The results of this testing are provided in Table 5.0 below:

Table 5.2 – Loss on Ignition Testing

TP No.	Depth (mbgl)	Loss on Ignition (%)
TP4	0.4	5.84
TP1	0.7 – 0.8	5.3
TP5	1.1	3.2
TP6	1.5	2.53
TP6	2.9 – 2.9	1.64

5.5 Excavations, Site Preparation and Obstructions

Removal of superficial deposits at this site should be within the capability of conventional mechanical excavating plant.

Bedrock was encountered at shallow depths (>2.4 mbgl). If excavations are to extend below 4.0 mbgl, heavy plant and/or peckers will need to be employed.

During the ground investigation some of the trial pits exhibited instability of the pit walls. Unless backfilled immediately, excavations below 0.7 m will require shoring during foundation construction in accordance with the guidance provided by the Construction and Industry Research and Information Association, CIRIA Report 97 (Ref. 3).

In the western part of the site, where impersistent thin 'running sand' layers were encountered within the clay soil, close boarding of excavations will be necessary to maintain stability and some limited dewatering may be require.

Groundwater was encountered from approximately 1.8 mbgl within the gravel/residual soils; therefore pumping of excavations is anticipated at these depths.

The excavations for the proposed drainage runs may encounter significant quantities of groundwater, so a planned sequence of excavation to allow groundwater to flow downhill to the drain outfall should be considered. It is recommended that groundwater is treated to remove suspended sediments before being discharged to controlled waters.

Due to the location of the site, underground services are likely to be present and their careful location will be required prior to any excavation.

6. Environmental Assessment

6.1 Overview

The aim of this environmental assessment is to highlight the potential risks posed by contamination of the soils on site.

As a Preliminary Conceptual Site Model and Risk Assessment were not undertaken prior to the investigation, but the site was known to be historically Greenfield, a non targeted sampling strategy was implemented where samples are collected from each exploratory hole to provide a broad coverage of the site conditions.

6.2 Generic Quantitative Risk Assessment of Soil Contamination

This analysis compares the measured concentrations of contaminants within soils, as revealed by laboratory test results, with Generic Assessment Criteria (GAC) values appropriate to the proposed end-use.

6.2.1 Method of Analysis – Soil Contamination

The GAC used for the assessment of soil have been derived using the Capita Symonds: April 2009: Generic Assessment Criteria – Human Health: Derivation Manual (Ref. 4).

The GAC have been derived for preliminary screening purposes only. If a concentration of a determinant is less than the corresponding GAC and the assumptions of the generic land-use scenario are appropriate to the site conditions, it is reasonable to assume the concentration does not pose a risk to human health. However, where a determinant concentration exceeds the corresponding GAC, it does not necessarily indicate an unacceptable risk; it indicates a need for further investigation/assessment and/or inclusion of appropriate mitigating measures during the design and construction phases of a development.

In the developed scenario, the site will be a Civic Amenity site, the majority of which is to be covered with hard standing with small landscaped areas on the peripheries. Soil concentrations have been compared to GAC derived for the typical “commercial” land-use scenario. The laboratory tests carried out on representative samples of shallow natural soils indicated values of organic matter between 0.4 % and 5.7 %, therefore, the GAC used in this assessment are those derived for ‘Sand’ with 1 % SOM, a conservative method. The results of the comparison have been analysed using the statistical methods outlined in Ref. 5.

6.2.2 Analysis of Results - Soil Contamination

In order to assess the presence of contamination with respect to human health, samples recovered from trial pits were analysed for a broad range of determinants:

- Total Petroleum Hydrocarbons (TPH) (CWG-with aliphatic/aromatic split)
- Toxic Metals Suite
- Cyanide

The results of the GQRA are summarised below and presented in full within Appendix D.

- 6 No. samples were tested for the presence of toxic metals and inorganic cyanide. No contaminant was found to exceed its respective GAC.
- 6 No. samples were tested for the presence of Total Petroleum Hydrocarbons (CWG-with aliphatic/aromatic split). Only trace amounts of hydrocarbons were detected. No hydrocarbon fraction was found to exceed its GAC.

6.3 Conclusions

Contamination of the soils was not suspected due to the Greenfield history of the site and the testing suite undertaken has confirmed that the site is suitable (uncontaminated) for it proposed end use.

7. Material Reuse & Waste Disposal

Where possible, excavated material should be retained and reused on site. However, it is anticipated that material may be produced during the works that will exceed the demand for landscaping purposes.

7.1 Waste Disposal

Under the European Waste Directive 2008 it is a legal requirement to treat waste prior to offsite disposal. Such treatment could include selective digging or sorting of materials; which may generate construction materials suitable for reuse.

The first stage of treatment would be to segregate the excavated topsoil / clay.

As the soils are clean uncontaminated natural material they can be disposed of as an inert waste without further testing.

7.2 Material Reuse

The clay soils are considered unsuitable for use as engineered fill.

In order to assess the suitability of the clay soils in landscaping areas, the concentrations of phototoxic metals (Zn, Cu & Ni) within soil samples have been compared with those concentrations defining a multipurpose topsoil in Table 1 of BS3882:2007 (Ref. 6). All samples were found to contain phytotoxic metals at concentrations below the maximum permissible levels. Therefore, the soil is not likely to require treatment if it is to be reused as a landscaping material.

8. Conclusions and Recommendations

The site was found to be mantled by topsoil, underlain by a firm clay layer which is in turn underlain by residual soils, in the form of angular gravels, which grade into weathered siltstone/sandstone rock.

Groundwater was encountered within the residual soils / gravels. The clay stratum is essentially impermeable but did contain layers with high moisture content, indicating the clay has been influenced by the previous wet winter.

The clay is considered an appropriate bearing stratum for the proposed structure due to the low imposed loadings anticipated. Depths in excess of 0.7 mbgl are considered a suitable formation level, that is, below the influence of seasonal moisture content variation. At this depth an allowable bearing capacity of approximately 80 kN/m^2 is anticipated.

Due to the potential for soft spots within the clay, it is recommended that formation levels should be inspected by an experienced geotechnical engineer. Should weaker layers be encountered, they shall be excavated and replaced with concrete.

Sulphate testing of the Made Ground revealed a design sulphate class DS-1, and a concrete ACEC Class AC-1.

Removal of soils at this site should be within the capability of conventional mechanical excavating plant. However, should excavations be required within bedrock below 4.0 mbgl, heavy plant and/or peckers will be need to be employed.

Unless backfilled immediately, excavations deeper than 0.7 mbgl will require shoring. Thin sand layers were observed in the western part of the site which contained some groundwater. These layers bled and if encountered during the site works, close boarding of the excavation sides will be required.

Environmental testing determined the soils to be uncontaminated for the proposed end use. Excavated soils are suitable for re-use as landscaping materials but not for engineered fill. Should soils require offsite disposal, they can be taken at an inert landfill.

Within the CA&RC site a design CBR value of 2 % has been determined from laboratory tests and correlation with in-situ testing. However, it should be noted that the tests were performed upon clay soils at depths subject to seasonal fluctuations in moisture content and the investigation was undertaken at the end of an exceptionally warm and very wet winter period. Should the formation levels be exposed at the end of the summer, allowed to dry and lightly trafficked, the design CBR could potentially be increased to 2.5%, however, onsite verification testing would need to be undertaken to confirm any change in design.

Pavement construction along Devonshire Drive was found to be 400 mm thick, with the bituminous layer varying between 100 to 200 mm. Water was encountered within the sub-base materials in the north-east end of Devonshire Drive which should be drained if road improvements are undertaken.

9. References

1. Crane Cross Civic Amenity Site, Pembrokeshire. Factual Report No. 1306. Apex Drilling Services. May 2014.

2. BRE Special Digest 1.

3. Construction and Industry Research and Information Association, CIRIA Report 97.

4. Capita Symonds: April 2009: Generic Assessment Criteria – Human Health: Derivation Manual.

5. Environment Agency, 2009b. Updated technical background to the CLEA model. Science Report SC050021/SR3.

6. British Standard 3882: 2007. Specification for topsoil and requirements for reuse.

.

Appendix A
Drawings and Figures

DRG. No.	CS/071529/P/105	REVISION REF.

NEW LENGTH OF HEDGEROW FOLLOWING REMOVAL OF EXISTING FIELD ACCESS GATE

SITE ENTRANCE TO PUBLIC SIDE

SITE ENTRANCE & EXIT TO OPERATIONS SIDE

SITE EXIT FROM PUBLIC SIDE

BUILD OUT

STAFF OFFICE

8m WIDE LANDSCAPING STRIP TO BE TOPSOILED WITH MATERIAL STRIPPED FROM SITE AND SEEDED.REFER TO DRAWING NO CS/071529/P/3001.

EXISTING HEDGEROW

NEW FIELD ACCESS GATE, TARMACADAM ENTRANCE POINT AND 10m LENGTH OF HARDCORE TRACK AS PART OF ACCOMMODATION WORKS. SEE DRAWING No CS/071529/P/301 FOR TYPICAL ELEVATION.

2.4m HIGH GALVANIZED STEEL PALISADE FENCE AROUND THE AMENITY SITE

1.2m HIGH STOCK PROOF FENCE

SAFETY FENCE

OPEN SIDED CANOPY BUILDING HEIGHT 4.5m

ACCESS ROAD

STAFF PARKING

RAMP DOWN

FALL 1:40

DEMOUNTABLE BARRIER

FALL 1:100

NEW SCREENING BUND/PLANTING TO MAXIMISE SCREENING OF BUILDINGS WITHIN THE SITE. REFER TO DRAWING No CS/071529/P/3001.

OPERATIONAL AREA

COMPACTOR BUILDING HEIGHT 6.2m TO RIDGE

RETAINING WALL VARIES IN HEIGHT UP TO 1.8m

FALL 1:100

RAMP UP

ACCESS ROAD

ALL NEW EMBANKMENTS/BUNDS TO BE TOPSOILED WITH MATERIAL STRIPPED FROM SITE AND SEEDED. REFER TO DRAWING NO CS/071529/P/3001 FOR DETAILS.

1.2m HIGH STOCK PROOF FENCE

NEW SCREENING PLANTING. REFER TO DRAWING NO CS/071529/P/3001.

ALL NEW EMBANKMENTS/BUNDS TO BE TOPSOILED WITH MATERIAL STRIPPED FROM SITE AND SEEDED. REFER TO DRAWING NO CS/071529/P/3001 FOR DETAILS.

2.4m HIGH GALVANIZED STEEL PALISADE FENCE AROUND THE AMENITY SITE

EXISTING MATURE HEDGEROW TO REMAIN UNAFFECTED BY PROPOSED DEVELOPMENT

NEW SCREENING PLANTING. REFER TO DRAWING NO CS/071529/P/3001.

KEY

- CONCRETE SURFACING
- TARMACADAM/ASPHALT SURFACING
- RETAINING WALL

HEALTH, SAFETY & ENVIRONMENTAL INFORMATION

NOTE:
IT IS ASSUMED THAT THE WORKS WILL BE UNDERTAKEN BY A COMPETENT CONTRACTOR, WHO IS AWARE OF ALL GENERIC RISKS ASSOCIATED WITH THE WORKS. LISTED BELOW ARE 'SIGNIFICANT' RISKS RELATING TO THE WORKS.

INONE IDENTIFIED

ISSUE	AMENDMENTS	DRAWN	CHECKED	DATE

CLIENT

County Hall
Haverfordwest
Pembrokeshire
SA61 1TP
01437 764551

PROJECT

CRANE CROSS CIVIC AMENITY AND RECYCLING CENTRE
SAUNDERSFOOT
PEMBROKESHIRE

TITLE

GENERAL ARRANGEMENT OF AMENITY SITE

PURPOSE

PLANNING

CAPITA
Property and Infrastructure
St Davids House, Pascal Close, St Mellons, Cardiff, CF3 0LW
T: 02920 803500 w: www.capita.co.uk/infrastructure
Capita Property and Infrastructure Ltd.

DRAWN	DATE	SCALE
LR	27/02/2014	1:250@A1
CHECKED	DATE	PROJECT No.
AGB	25/03/2014	CS/071529
DRG. No. CS/071529/P/105		REVISION REF.

FILE: P:\Schemes_CS\cs0715xx\cs071529\CAD\Amenity site\CS_71529_P_105_GENERAL ARRANGEMENT OF AMENITY SITE.dwg

NOTES:

1. GRID REFERENCE SN2117 2038

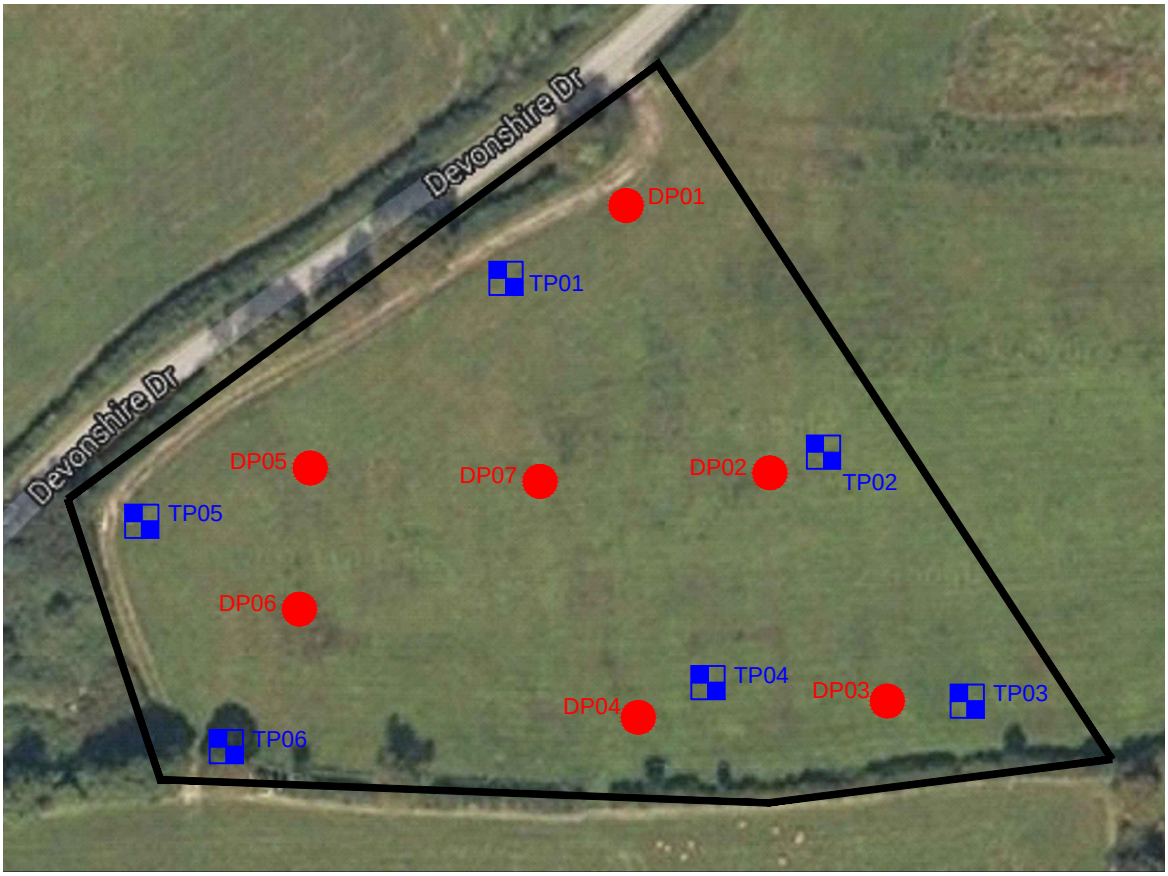
KEY

DYNAMIC PROBE

TRIAL PIT

ISSUE	AMENDMENTS	DRAWN	CHECKED	DATE

CODE	EASTING	NORTHING	HEIGHT
TP01	211702.91	203899.86	71.86
TP02	211747.44	203876.08	72.88
TP03	211743.39	203838.24	73.29
TP04	211726.52	203828.66	73.20
TP05	211650.63	203865.60	72.48
TP06	211659.27	203836.04	72.90
DP01	211719.63	203912.39	71.46
DP02	211743.66	203875.79	72.87
DP03	211740.16	203838.01	73.30
DP04	211721.83	203828.03	73.19
DP05	211670.66	203866.24	72.55
DP06	211665.99	203848.37	72.76
DP07	211697.83	203866.93	72.75



CLIENT

PEMBROKESHIRE COUNTY COUNCIL

PROJECT

CRANE CROSS CA SITE

TITLE

EXPLORATORY HOLE LOCATION PLAN

PURPOSE

INFORMATION

CAPITA

Property and Infrastructure

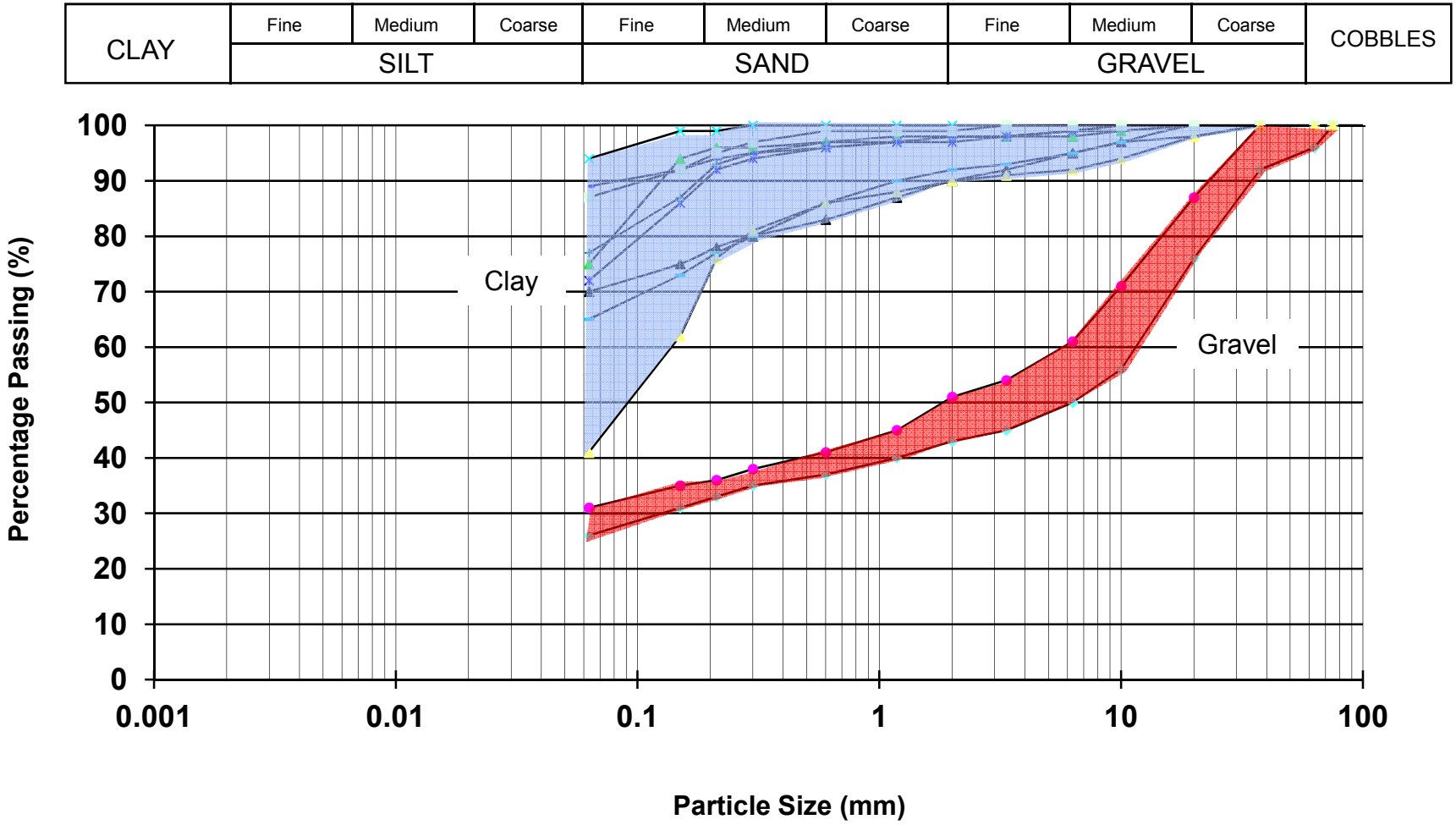
St Davids House, Pascal Close, St Mellons, Cardiff, CF3 0LW
T: 02920 803500 w: www.capita.co.uk/infrastructure
Capita Property and Infrastructure Ltd.

DRAWN	DATE	SCALE
J.CHAPLIN	MAY 2014	N.T.S.
CHECKED	DATE	PROJECT No.
A.ROSIER	MAY 2014	CS/071529

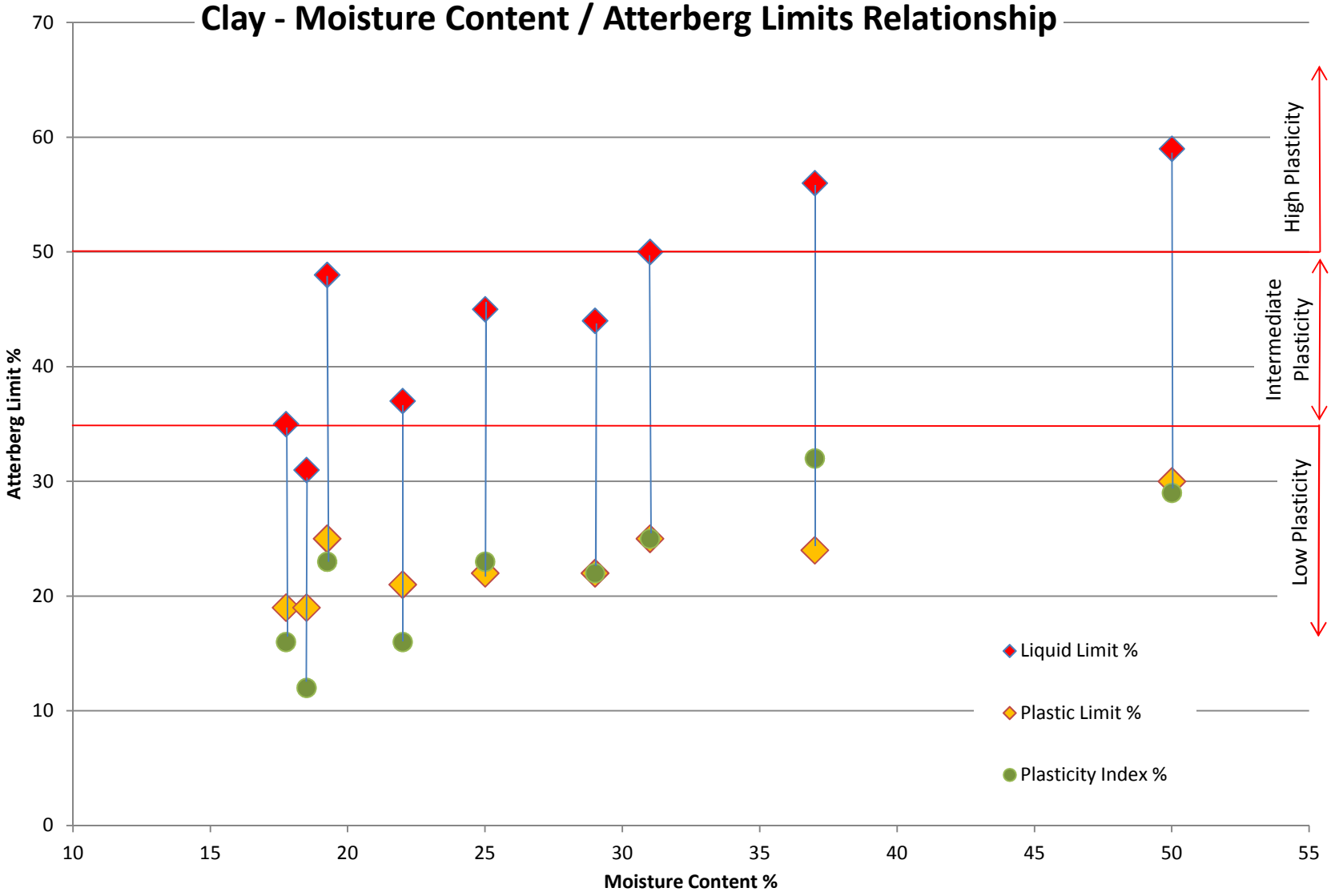
DRG. No. Figure 1

REVISION REF.

FILE: P:\pool\Geot\Schemes TEMP\Crane Cross, Saundersfoot\Drg\GI_Borehole location Plan.dwg

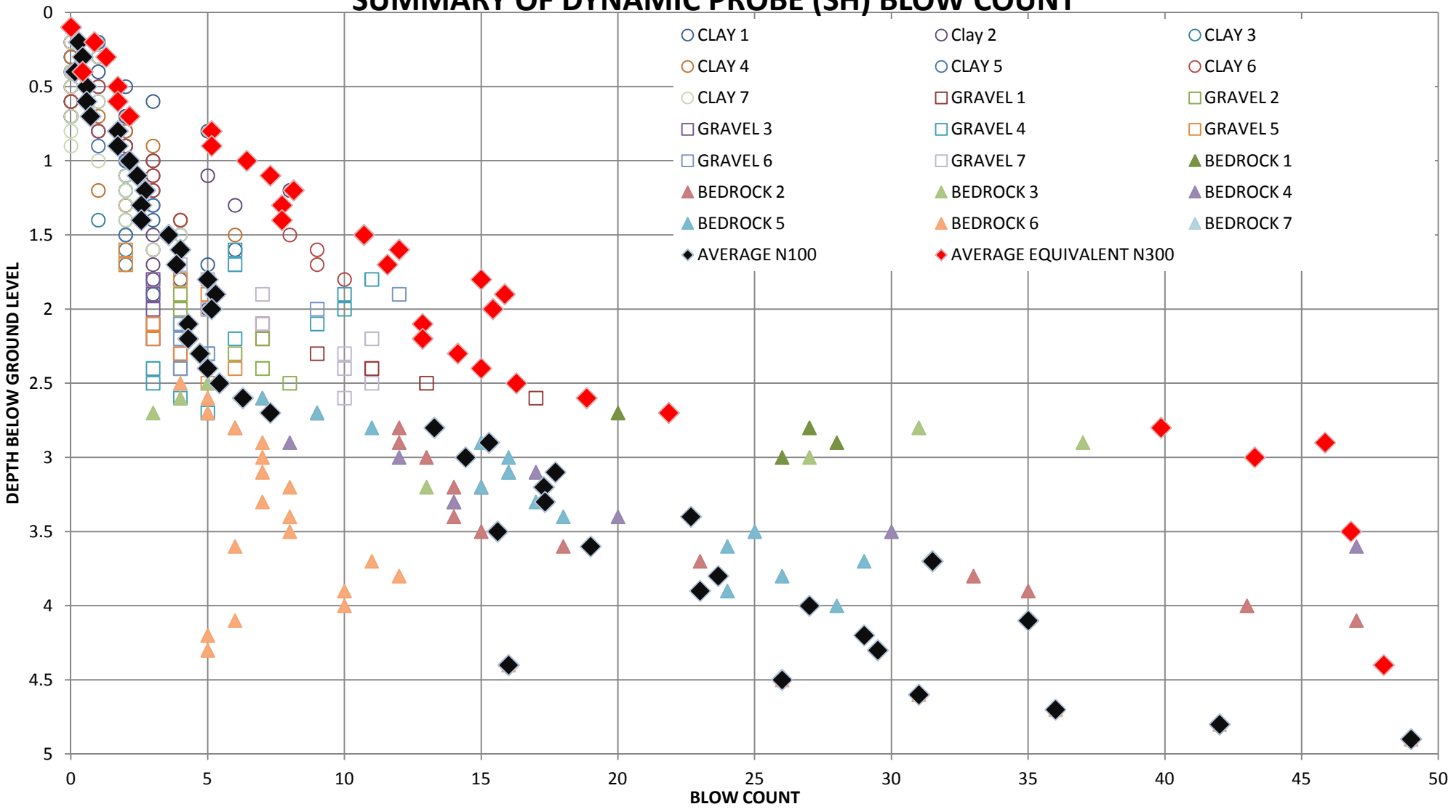


CAPITA	Client: Pembrokeshire County Council	Project: Crane Cross Civic Amenity and Recycling Centre	
		Title: Particle Size Distribution of Superficial / Residual Soils	
		Date: May 2014	Document No.: CS/71529/GT01	Figure No.: 2



Client Pembrokeshire County Council	Crane Cross Civic Amenity and Recycling Centre	Document No. CS/71529/GT01	CAPITA St Davids House, Pascal Close, St Mellons, Cardiff, CF3 0LW Tel: 02920 803 500
	Clay - Moisture Content / Atterberg Limits Relationship	Figure No. 3	

SUMMARY OF DYNAMIC PROBE (SH) BLOW COUNT



Client **Pembrokeshire County Council**	**Crane Cross Civic Amenity and Recycling Centre**	Document No. **CS/71529/GT01**
	Dynamic Probe Test Results	Figure No. **4**

CAPITA
St Davids House, Pascal Close, St Mellons, Cardiff, CF3 0LW
Tel: 02920 803 500

Appendix B
Field Testing and Logsheets

Key to Exploratory Hole Records

APEX DRILLING SERVICES

SAMPLES

Undisturbed

U	Driven tube sample
UT	Driven thin wall tube sample
TW	Pushed thin wall tube sample
P	Pushed piston sample

} nominally 100 mm diameter and full recovery unless otherwise stated

WLS	Liner sample (from Windowless or similar sampler), full recovery unless otherwise stated
CBR	CBR mould sample
BLK	Block sample
C	Core sample (from rotary core) taken for laboratory testing
AMAL	Amalgamated sample

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample
	Environmental chemistry samples (in more than one container where appropriate)
ES	Soil sample
EW	Water sample

Comments Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that attempt was made to take a tube sample, however, there was no recovery.

Monitoring samples taken after completion of hole construction are not shown on the exploratory hole logs.

TESTS

SPT S or SPT C — Standard Penetration Test, open shoe (S) or solid cone (C)

The Standard Penetration Test is defined in BS EN ISO 22476-3 (2005). The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 the total blow count beyond the seating drive is given (without the N = prefix).

IV	*in situ* Vane shear strength, peak (p) and remoulded (r)
HV	Hand vane shear strength, peak (p) and remoulded (r)
PP	Pocket penetrometer test, converted to shear strength
KFH, KRH, KPI	Permeability tests (KFH = falling head, KRH = rising head; KPI = packer inflow); results provided in Field Records column (one value per stage for packer tests)

DRILLING RECORDS

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930+A2 (2010)

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacings are presented. The term non-intact (NI) is used where the core is fragmented.

Flush returns, estimated percentage with colour where relevant, are given in the Records column

CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss
NR	Not recovered

GROUNDWATER

▼	Groundwater strike
▽	Groundwater level after standing period

Key to Exploratory Hole Records

APEX DRILLING SERVICES

INSTALLATION

Standpipe/ piezometer

Details of standpipe/piezometer installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

The type of instrument installed is indicated by a code in the Legend column at the depth of the response zone:

SP Standpipe
SPIE Standpipe piezometer
PPIE Pneumatic piezometer
EPIE Electronic piezometer

Inclinometer or Slip Indicator

The installation of vertical profiling instruments is indicated on the Record. The base of tubing is shown in the Legend column.

The type of instrument installed is indicated by a code in the Legend column at the base of the tubing:

ICE Biaxial inclinometer
ICM Inclinometer tubing for use with probe
SLIP Slip indicator

Settlement Points or Pressure Cells

The installation of single point instruments is indicated on the Record. The location of the measuring device is shown in the Legend column.

The type of instrument installed is indicated by a code in the Legend column:

ESET Electronic settlement cell/gauge
ETM Magnetic extensometer settlement point
EPCE Electronic embedment pressure cell
PPCE Electronic push in pressure cell

INSTALLATION LEGENDS

A legend describing the installation is shown in the rightmost column. Legends additional to BS5930 are used to describe the backfill materials as indicated below.

NOTES

1 Soils and rocks are described in accordance with BS EN ISO 14688-1 (2002) and 14689-1 (2003) respectively as amplified by BS 5930+A2 (2010).

2 For fine soils consistency determined in the field by the logger is reported for those strata where undisturbed samples are available. The consistency is qualified and given (in brackets) when, in the opinion of the logger, the sample is disturbed but the assessed consistency is reasonably representative of the in situ conditions; in these circumstances it will normally underestimate consistency in situ. No consistency is given where the samples available are too disturbed to allow a reasonable assessment.

3 Evidence of the occurrence of very coarse particles (cobbles and boulders) is presented on the logs, however, because of their size in relation to the exploratory hole these records may not be fully representative of their size and frequency in the ground mass.

4 The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.

5 The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures

6 Strata legends are in accordance with BS 5930+A2 (2010).

7 Water level observations of discernible entries during the advancing of the exploratory hole are given at the foot of the log and in the Legend column. The term "none observed" is used where no discrete entries are identified although this does not necessarily indicate that the hole has not been advanced below groundwater level. Under certain conditions groundwater cannot be observed, for instance, drilling with water flush or overwater, or boring at a rate much faster than water can make its way into the borehole (ref BS5930+A2:2010, Clause 47.2.7). In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.

8 The borehole logs present the results of Standard Penetration Tests recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.

Trial Pit Log

APEX DRILLING SERVICES

Logged AH **Checked** RB	**Start** 20/03/2014 **End** 20/03/2014	**Equipment, Methods and Remarks** Komatsu pc138us Tracked Excavator Machine excavated pit G.L. - 3.00m. Terminated on Engineer's instruction.	**Dimensions and Orientation** Width 0.90m Length 4.70m A / D / B / C 230(Deg)	**Ground Level** 71.860 **Coordinates** 211703E 203900N **National Grid** 211698E - 203867N **Chainage**	

Samples and Tests

Depth	Type & No	Date Records
		20/03/2014 1400
0.30	ES 1	
0.70-0.80	B 2	
0.80	ES 3	
1.60	D 4	
2.30-2.40	B 5	
2.70-2.80	B 6	
		20/03/2014 1500

Strata

Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
Soft to firm dark brown slightly sandy slightly gravelly CLAY with many rootlets. Gravel is angular to sub-angular fine to coarse of sandstone and siltstone.	(0.20)		
Stiff to very stiff medium strength brown and orange brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to sub-angular fine to coarse of sandstone and siltstone. Cobbles are angular to sub-angular of sandstone. Hand vane @ 0.40m 45/18, 41/19, 44/18 KPa.	0.20 *71.66* (1.80)		
Brown locally grey slightly clayey sandy angular to sub-angular fine to coarse GRAVEL of sandstone with low to medium cobble content. Cobbles are angular of sandstone.	2.00 *69.86* (0.60)		
Very weak brown fine grained SANDSTONE recovered as slightly clayey angular fine to coarse gravel and angular cobbles.	2.60 *69.26* (0.40)		
Exploratory Hole Ends at 3.00 m	3.00 *68.86*		

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	2.10	Fast Inflow

Depth Related Marks *

From	To (m)

Stability Localised collapsing
Shoring None
Weather Rain

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale: 1:25 www.apexdrilling.co.uk

Project Crane Cross Civic Amenity Site, Pembrokeshire
Project No. 1306
Carried out for Pembrokeshire County Council

Trial Pit TP1
Sheet 1 of 1

Trial Pit Log

APEX DRILLING SERVICES

Logged AH **Checked** RB	**Start** 20/03/2014 **End** 20/03/2014	**Equipment, Methods and Remarks** Komatsu pc138us Tracked Excavator Machine excavated pit G.L. - 3.70m. Terminated due to difficult excavation.	**Dimensions and Orientation** Width 0.80m Length 4.80m A / D / B / C 350(Deg)	**Ground Level** 72.880 **Coordinates** 211747E 203876N **National Grid** 211703E - 203900N **Chainage**	

Samples and Tests

Depth	Type & No	Date Records
		20/03/2014 0800
0.10	ES 1	
0.20-0.30	B 3	
0.25	D 2	
0.50-0.60	B 4	
0.70	ES 5	
1.50-1.60	B 6	
1.90-2.00	B 7	
3.00-3.10	B 8	
		20/03/2014 0800

Strata

Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
Firm dark brown slightly sandy slightly gravelly CLAY with many rootlets. Gravel is angular to sub-angular fine to coarse of sandstone and siltstone.	(0.15)		
	0.15 *72.73*		
Stiff medium strength grey locally brownish grey slightly sandy slightly gravelly CLAY. Gravel is angular to sub-angular fine to coarse of siltstone and sandstone. Hand vane @ 0.30m 46/16, 40/20, 46/18 KPa.	(0.25)		
	0.40 *72.48*		
Firm low to medium strength orange brown locally greyish brown and dark grey slightly sandy locally sandy CLAY. Hand vane @ 0.70m 38/10, 42/16, 36/14 KPa.	(0.80)		
	1.20 *71.68*		
Stiff grey to dark grey slightly sandy slightly gravelly CLAY. Gravel is angular to sub-angular fine to coarse of siltstone.	(0.60)		
	1.80 *71.08*		
Clayey sandy angular to sub-angular fine to coarse GRAVEL of siltstone with low cobble content. Cobbles are angular of siltstone. Becoming less clayey with more cobbles with increasing depth.	(0.70)		
	2.50 *70.38*		
Very weak brown and grey SILTSTONE recovered as sandy angular to sub-angular gravel and angular cobbles.	(1.20)		
	3.70 *69.18*		
Exploratory Hole Ends at 3.70 m			

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	1.90	Fast Inflow

Depth Related Marks *

From	To (m)

Stability Localised collapsing
Shoring None
Weather Dry

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale: 1:25 www.apexdrilling.co.uk

Project Crane Cross Civic Amenity Site, Pembrokeshire
Project No. 1306
Carried out for Pembrokeshire County Council

Trial Pit TP2
Sheet 1 of 1

Trial Pit Log

APEX DRILLING SERVICES

Logged AH **Checked** RB	**Start** 20/03/2014 **End** 20/03/2014	**Equipment, Methods and Remarks** Komatsu pc138us Tracked Excavator Machine excavated pit G.L. - 3.00m. Terminated on Engineer's instruction.	**Dimensions and Orientation** Width 0.90m Length 4.80m A / D / B / C, 100(Deg)	**Ground Level** 73.290 **Coordinates** 211743E 203838N **National Grid** 211747E - 203876N **Chainage**	

Samples and Tests

Strata

Depth	Type & No	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
		20/03/2014 1500	Firm brown slightly sandy slightly gravelly CLAY with many rootlets. Gravel is angular to sub-angular fine to coarse of sandstone and siltstone.	(0.30)		
0.20	D 1			0.30 *72.99*		
			Stiff to very stiff orange brown and light grey slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to sub-angular fine to coarse of siltstone and sandstone. Cobbles are angular of sandstone.			
0.50	ES 2					
0.70-0.80	B 3					
0.90	ES 4			(1.40)		
				1.70 *71.59*		
1.80-1.90	B 5		Brown very silty very sandy angular to sub-angular fine to coarse GRAVEL of sandstone with low cobble content. Cobbles are angular of sandstone.	(0.70)		
			Very weak brown fine grained SANDSTONE recovered as angular gravel and angular cobbles.	2.40 *70.89*		
2.80-2.90	B 6			(0.60)		
		20/03/2014 1606	Exploratory Hole Ends at 3.00 m	3.00 *70.29*		

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	1.90	Fast Inflow

Depth Related Marks *

From	To (m)

Stability Localised collapsing
Shoring None
Weather Rain

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale: 1:25 www.apexdrilling.co.uk

Project Crane Cross Civic Amenity Site, Pembrokeshire
Project No. 1306
Carried out for Pembrokeshire County Council

Trial Pit TP3
Sheet 1 of 1

Trial Pit Log

APEX DRILLING SERVICES

Logged AH **Checked** RB	**Start** 20/03/2014 **End** 20/03/2014	**Equipment, Methods and Remarks** Komatsu pc138us Tracked Excavator Machine excavated pit G.L. - 2.70m. Terminated on Engineer's instruction.	**Dimensions and Orientation** Width 0.90m Length 4.60m A / D / B / C 190(Deg)	**Ground Level** 73.200 **Coordinates** 211727E 203829N **National Grid** 211743E - 203838N **Chainage**	

Samples and Tests

Strata

Depth	Type & No	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
		20/03/2014 0900	Firm dark brown slightly sandy slightly gravelly CLAY with many rootlets. Gravel is angular to sub-angular fine to coarse of sandstone and siltstone.	(0.10) 0.10 *73.10*		
0.30	ES 1		Stiff medium strength greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to sub-angular fine to coarse of siltstone and sandstone. Hand vane @ 0.30m 40/18, 44/18, 42/16 KPa.	(0.50)		
0.40-0.50 0.40	B 2 D 3					
0.70	ES 4		Firm to stiff orange brown and light grey slightly sandy slightly gravelly CLAY. Gravel is angular to sub-angular fine to coarse of siltstone.	0.60 *72.60*		
0.80-0.90	B 5			(0.90)		
			Light grey and brown clayey sandy angular to sub-angular fine to coarse GRAVEL of siltstone with low to medium cobble content. Cobbles are angular of siltstone.	1.50 *71.70*		
1.80-1.90	B 6			(1.20)		
			2.60m: Water rose from 2.60 - 1.80m in 90 min			
		20/03/2014 1000	Exploratory Hole Ends at 2.70 m	2.70 *70.50*		

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	1.80	Fast Inflow

Depth Related Marks *

From	To (m)

Stability Localised collapsing
Shoring None
Weather Dry

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale: 1:25 www.apexdrilling.co.uk

Project Crane Cross Civic Amenity Site, Pembrokeshire
Project No. 1306
Carried out for Pembrokeshire County Council

Trial Pit **TP4**
Sheet 1 of 1

Trial Pit Log

APEX DRILLING SERVICES

Logged AH **Checked** RB	**Start** 20/03/2014 **End** 20/03/2014	**Equipment, Methods and Remarks** Komatsu pc138us Tracked Excavator Machine excavated pit G.L. - 3.00m. Terminated on Engineer's instruction.	**Dimensions and Orientation** Width 0.85m Length 4.60m A / D / B / C, 200(Deg)	**Ground Level** 72.480 **Coordinates** 211651E 203866N **National Grid** 211727E - 203829N **Chainage**

Samples and Tests

Strata

Depth	Type & No	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.10	D 1	20/03/2014 1130	Firm brown slightly sandy slightly gravelly CLAY with many rootlets. Gravel is angular to sub-angular fine to coarse of sandstone and siltstone.	(0.20)		
0.40	ES 2		Stiff to very stiff medium strength brownish grey slightly sandy slightly gravelly CLAY with low cobble content. Gravel is angular to sub-angular fine to coarse of sandstone and siltstone. Cobbles are angular to sub-angular of sandstone.	0.20 *72.28*		
0.50-0.60	B 3		Hand vane @ 0.50m 46/18, 50/17, 42/16 KPa.			
0.90	ES 4			(1.30)		
1.10	D 5					
1.80-1.90	B 6		Orange brown and grey sandy very clayey angular to sub-angular fine to coarse GRAVEL of sandstone and siltstone with low to medium cobble content. Cobbles are angular to sub-angular of sandstone. Becoming less clayey with increasing depth.	1.50 *70.98* (1.00)		
2.60-2.70	B 7		Very weak brown fine grained SANDSTONE recovered as angular to sub-angular fine to coarse gravel and angular cobbles.	2.50 *69.98* (0.50)		
		20/03/2014 1306	Exploratory Hole Ends at 3.00 m	3.00 *69.48*		

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	2.10	Fast Inflow

Depth Related Marks *

From	To (m)

Stability Localised collapsing
Shoring None
Weather Dry

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale: 1:25 www.apexdrilling.co.uk

Project Crane Cross Civic Amenity Site, Pembrokeshire
Project No. 1306
Carried out for Pembrokeshire County Council

Trial Pit TP5
Sheet 1 of 1

Trial Pit Log

APEX DRILLING SERVICES

Logged AH **Checked** RB	**Start** 20/03/2014 **End** 20/03/2014	**Equipment, Methods and Remarks** Komatsu pc138us Tracked Excavator Machine excavated pit G.L. - 4.30m. Terminated due to difficult excavation.	**Dimensions and Orientation** Width 0.90m Length 4.80m A / D / B / C 200(Deg)	**Ground Level** 72.900 **Coordinates** 211659E 203836N **National Grid** 211651E - 203866N **Chainage**	

Samples and Tests

Strata

Depth	Type & No	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
		20/03/2014 1000	Firm dark brown to brown slightly sandy slightly gravelly CLAY with many rootlets. Gravel is angular to sub-angular fine to coarse of sandstone and siltstone.			
0.20	D 1			(0.40)		
0.30	ES 2					
				0.40 *72.50*		
			Stiff locally very stiff medium strength slightly sandy slightly gravelly silty CLAY with low cobble content. Gravel is angular to sub-angular fine to coarse of sandstone. Cobbles are angular to sub-angular of sandstone. Hand vane @ 1.20m 40/18, 46/19, 42/16 KPa.			
0.80	ES 3					
0.90-1.00	B 4					
				(1.40)		
1.50	D 5					
				1.80 *71.10*		
1.90-2.00	B 6		Firm orange brown slightly gravelly sandy CLAY with low to medium cobble content. Gravel is angular to sub-angular fine to coarse of sandstone Cobbles are angular of sandstone.			
				(0.60)		
				2.40 *70.50*		
			Very weak brown fine grained SANDSTONE recovered as angular fine to coarse gravel and angular cobbles.			
2.80-2.90	B 7					
				(1.90)		
3.50-3.60	B 8					
		20/03/2014 1100	Exploratory Hole Ends at 4.30 m	4.30 *68.60*		

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
1	1.80	Fast inflow

Depth Related Marks *

From	To (m)

Stability Localised collapsing
Shoring None
Weather Dry

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale: 1:25 www.apexdrilling.co.uk

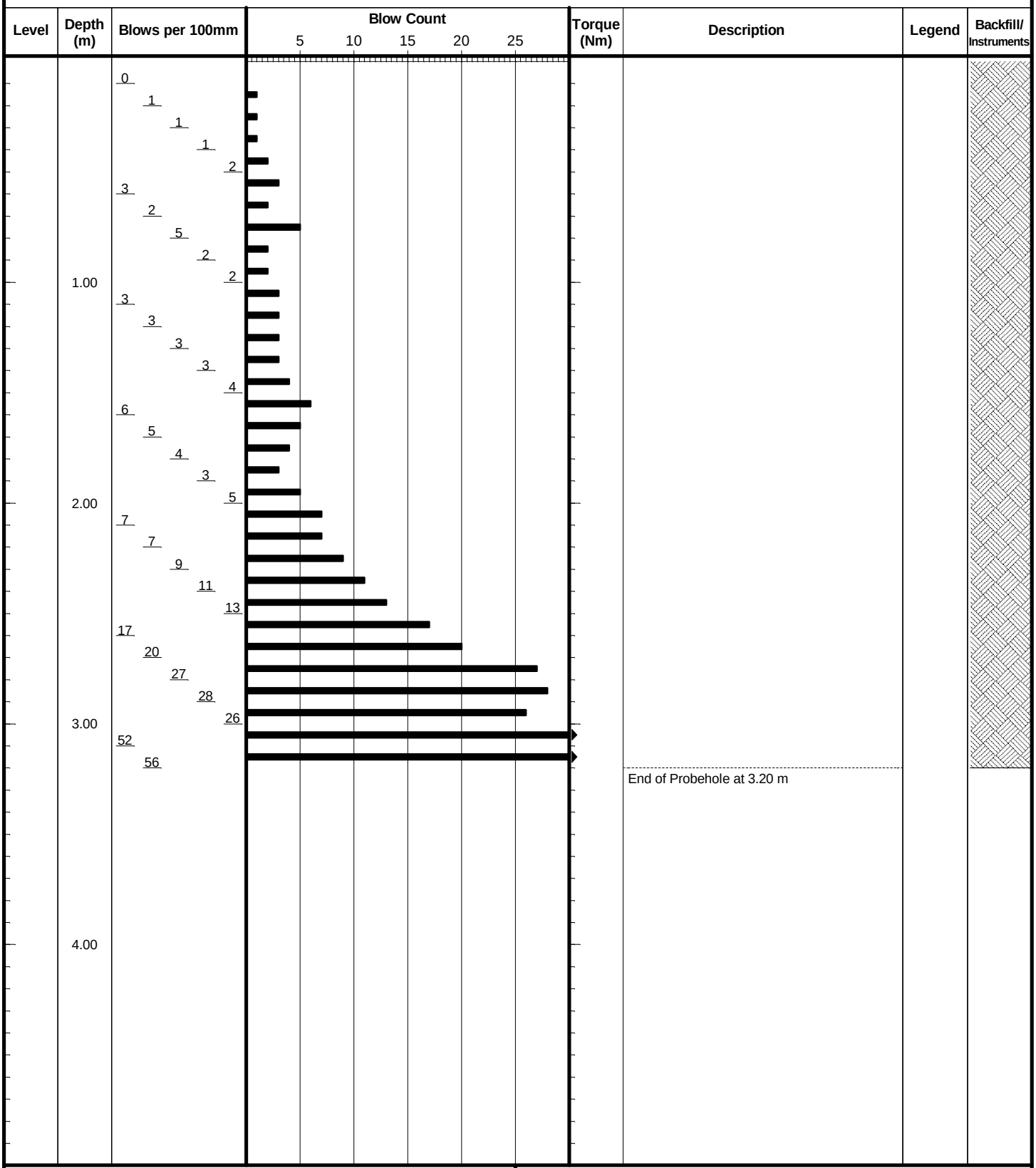
Project Crane Cross Civic Amenity Site, Pembrokeshire
Project No. 1306
Carried out for Pembrokeshire County Council

Trial Pit **TP6**
Sheet 1 of 1

Dynamic Probe Log

APEX DRILLING SERVICES

Operator	AR	**Probe Type**	DPSH	**Cone Diameter (mm)**	50	**Cone tip abandoned at (mBGL)**	-	**Ground Level**	71.460
Logged by	AH	**Rod Diameter (mm)**	35	**Hammer Mass (kg)**	63.50			**Coordinates**	211720E 203912N
Checked by	RB	**Rod Mass (kg/m)**	8	**Fall Height (mm)**	760	**Date of Test**	20/03/2014	**National Grid**	211721E - 203931N
								Chainage	



Remarks

Equipment, Methods and Comments
Dando Terrier Rig
Dynamic sample (super heavy weight) G.L. - 3.20m. Terminated on obstruction.

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres.

Scale: 1:24 www.apexdrilling.co.uk

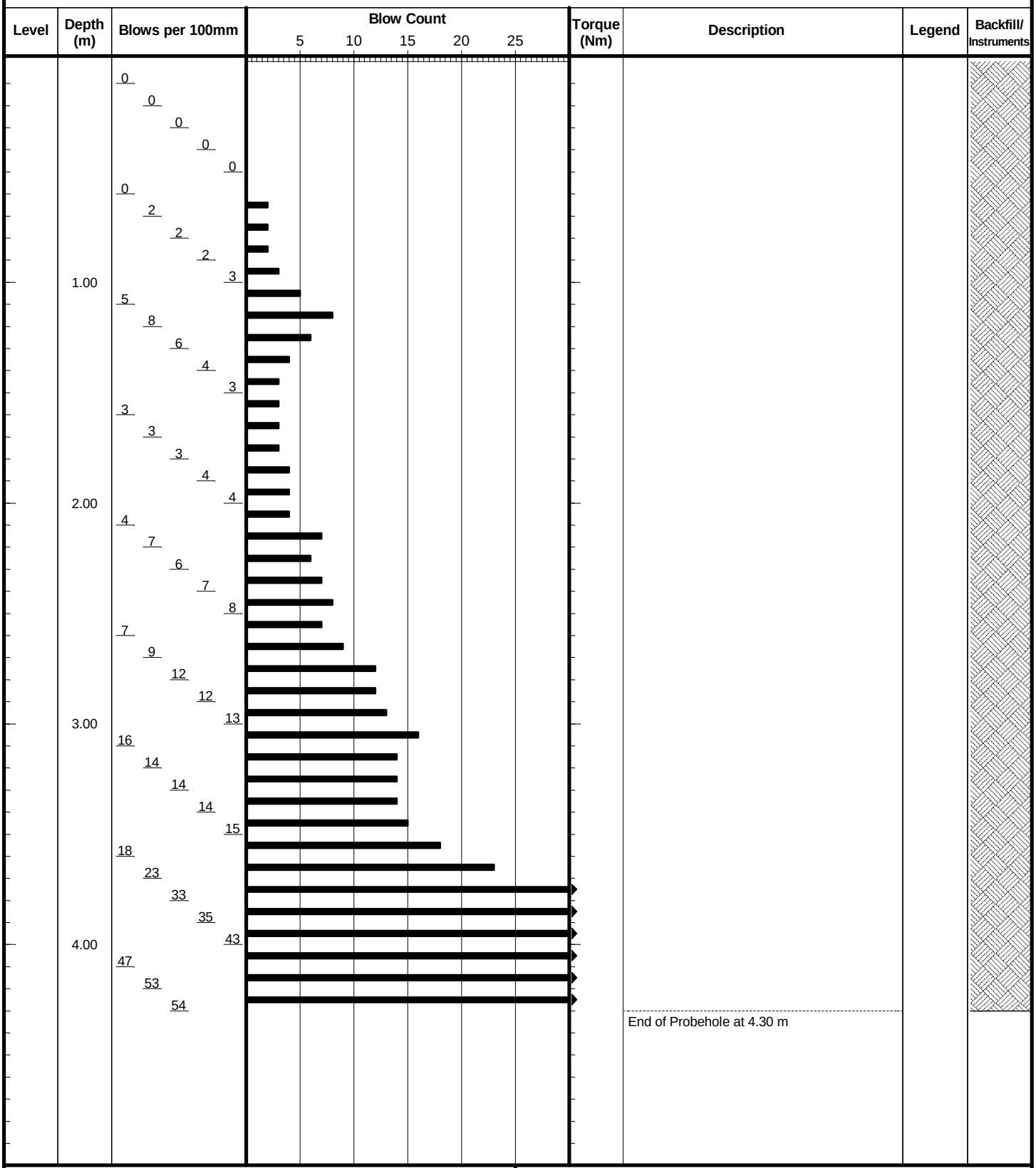
Project	Crane Cross Civic Amenity Site, Pembrokeshire
Project No.	1306
Carried out for	Pembrokeshire County Council

Exploratory Hole
DP1
Sheet 1 of 1

Dynamic Probe Log

APEX DRILLING SERVICES

Operator	AR	**Probe Type**	DPSH	**Cone Diameter (mm)**	50	**Cone tip abandoned at (mBGL)**	-	**Ground Level**	72.870
Logged by	AH	**Rod Diameter (mm)**	35	**Hammer Mass (kg)**	63.50			**Coordinates**	211744E 203876N
Checked by	RB	**Rod Mass (kg/m)**	8	**Fall Height (mm)**	760	**Date of Test**	20/03/2014	**National Grid**	211720E - 203912N
								Chainage	



Remarks

Equipment, Methods and Comments
Dando Terrier Rig
Dynamic sample (super heavy weight) G.L. - 4.30m. Terminated on obstruction.

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres.

Scale: 1:24 www.apexdrilling.co.uk

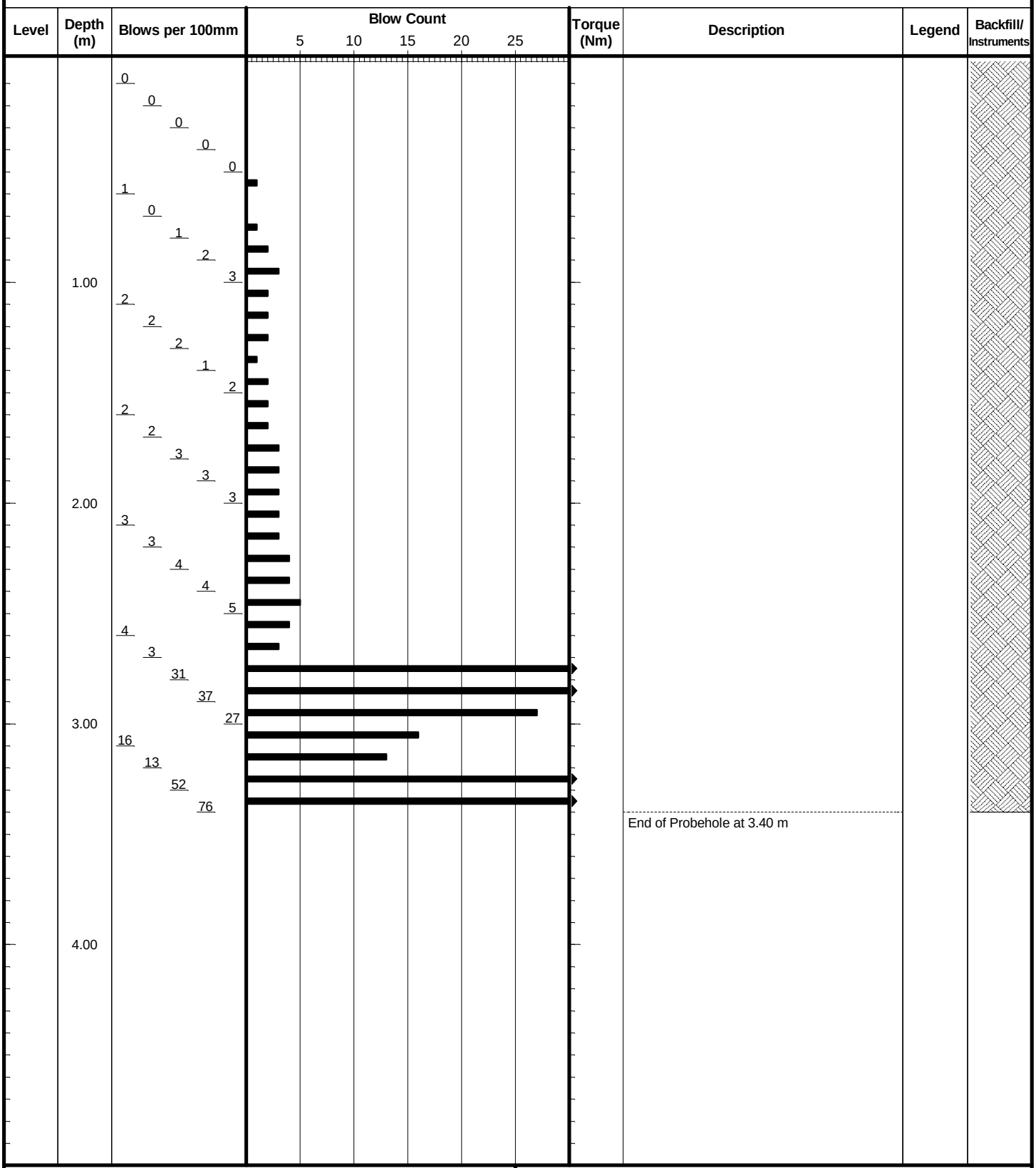
Project	Crane Cross Civic Amenity Site, Pembrokeshire
Project No.	1306
Carried out for	Pembrokeshire County Council

Exploratory Hole
DP2
Sheet 1 of 1

Dynamic Probe Log

APEX DRILLING SERVICES

Operator	AR	**Probe Type**	DPSH	**Cone Diameter (mm)**	50	**Cone tip abandoned at (mBGL)**	-	**Ground Level**	73.300
Logged by	AH	**Rod Diameter (mm)**	35	**Hammer Mass (kg)**	63.50			**Coordinates**	211740E 203838N
Checked by	RB	**Rod Mass (kg/m)**	8	**Fall Height (mm)**	760	**Date of Test**	20/03/2014	**National Grid**	211744E - 203876N
								Chainage	



Remarks

Equipment, Methods and Comments
Dando Terrier Rig
Dynamic sample (super heavy weight) G.L. - 3.40m. Terminated on obstruction.

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres.

Scale: 1:24 www.apexdrilling.co.uk

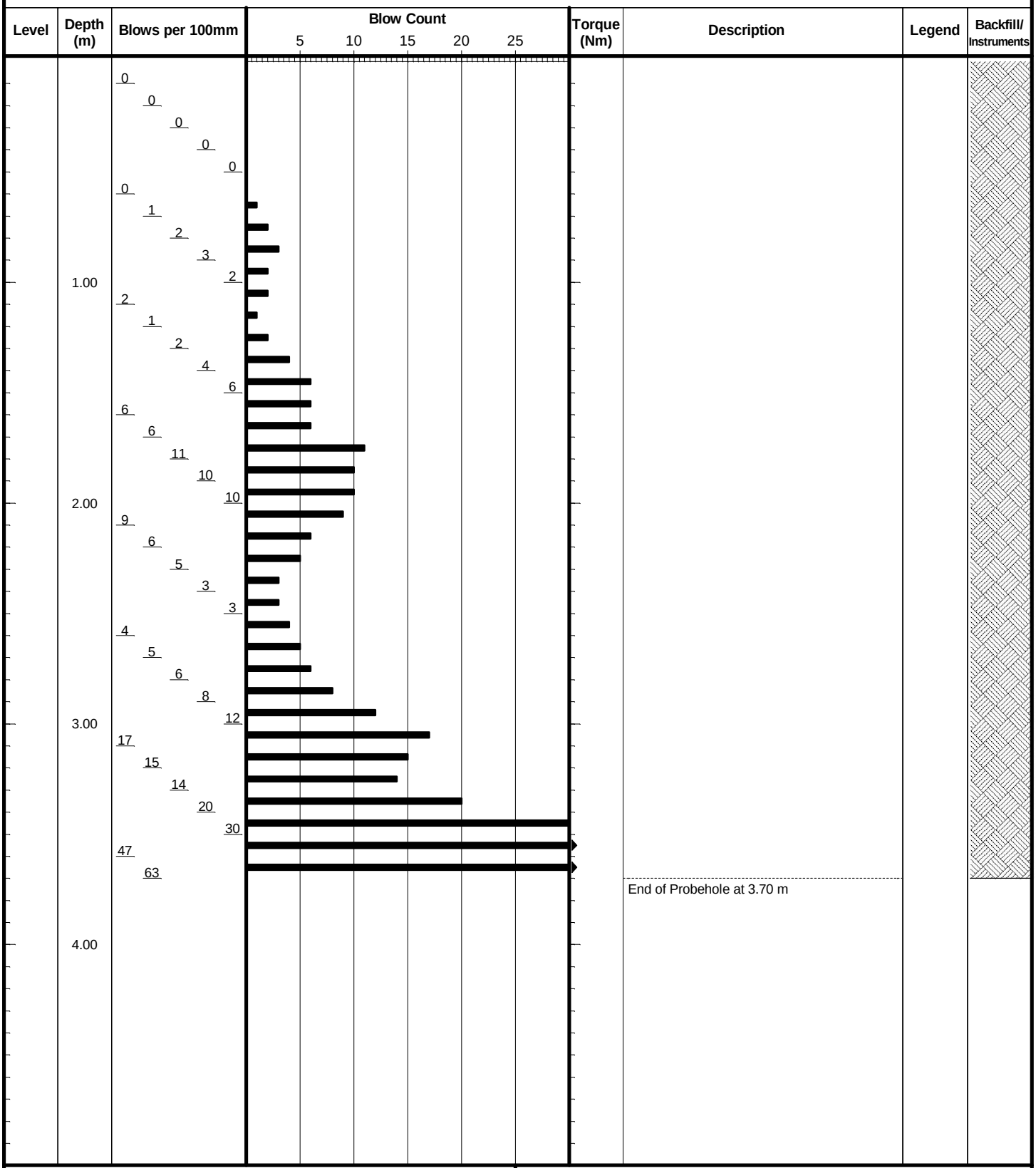
Project	Crane Cross Civic Amenity Site, Pembrokeshire
Project No.	1306
Carried out for	Pembrokeshire County Council

Exploratory Hole
DP3
Sheet 1 of 1

Dynamic Probe Log

APEX DRILLING SERVICES

Operator	AR	**Probe Type**	DPSH	**Cone Diameter (mm)**	50	**Cone tip abandoned at (mBGL)**	-	**Ground Level**	73.190
Logged by	AH	**Rod Diameter (mm)**	35	**Hammer Mass (kg)**	63.50			**Coordinates**	211722E 203828N
Checked by	RB	**Rod Mass (kg/m)**	8	**Fall Height (mm)**	760	**Date of Test**	20/03/2014	**National Grid**	211740E - 203838N
								Chainage	



Remarks

Equipment, Methods and Comments
Dando Terrier Rig
Dynamic sample (super heavy weight) G.L. - 3.70m. Terminated on obstruction.

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres.

Scale: 1:24 www.apexdrilling.co.uk

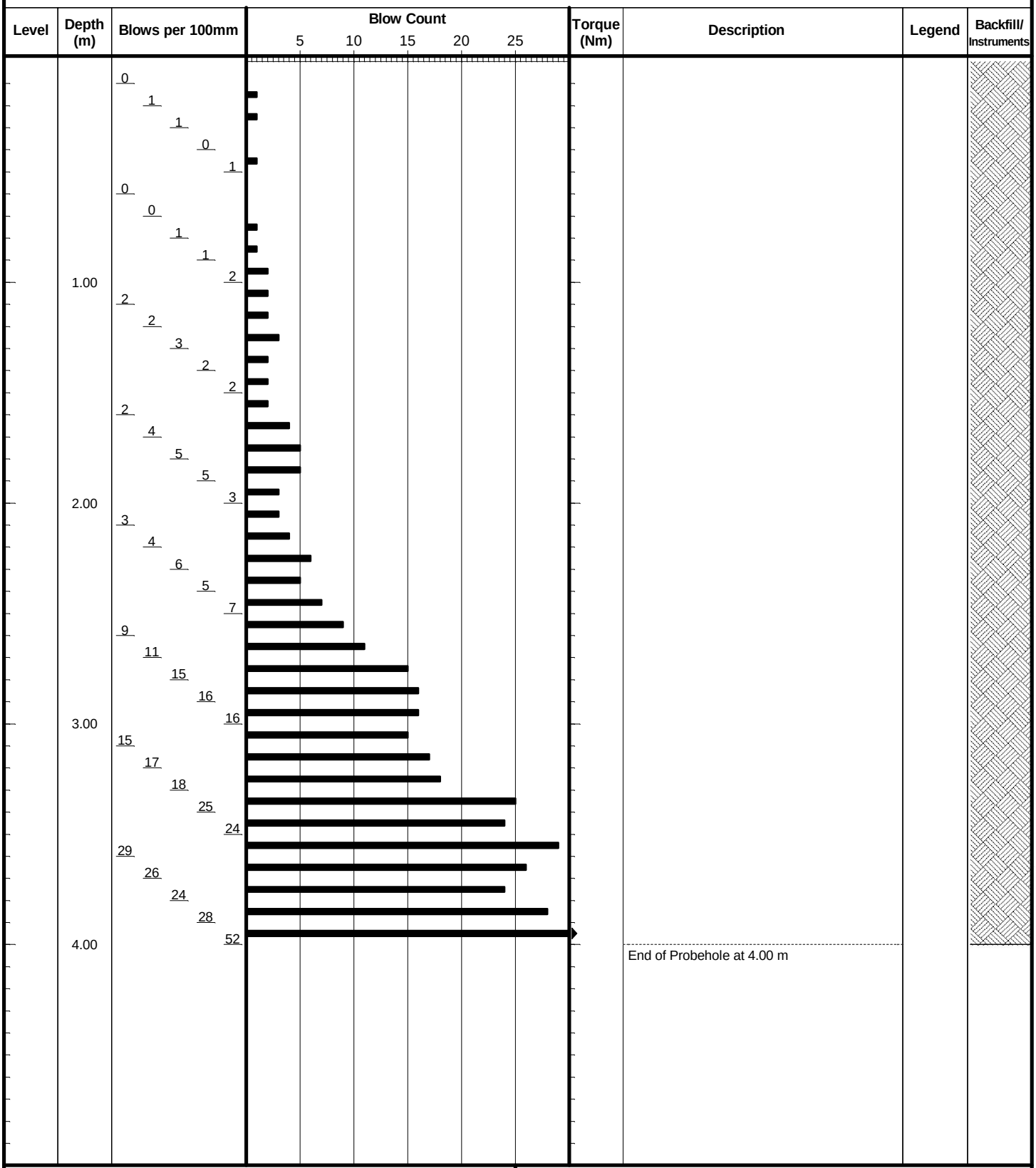
Project	Crane Cross Civic Amenity Site, Pembrokeshire
Project No.	1306
Carried out for	Pembrokeshire County Council

Exploratory Hole
DP4
Sheet 1 of 1

Dynamic Probe Log

APEX DRILLING SERVICES

Operator	AR	**Probe Type**	DPSH	**Cone Diameter (mm)**	50	**Cone tip abandoned at (mBGL)**	-	**Ground Level**	72.550
Logged by	AH	**Rod Diameter (mm)**	35	**Hammer Mass (kg)**	63.50			**Coordinates**	211671E 203866N
Checked by	RB	**Rod Mass (kg/m)**	8	**Fall Height (mm)**	760	**Date of Test**	20/03/2014	**National Grid**	211722E - 203828N
								Chainage	



Remarks

Equipment, Methods and Comments
Dando Terrier Rig
Dynamic sample (super heavy weight) G.L. - 4.00m. Terminated on obstruction.

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres.

Scale: 1:24 www.apexdrilling.co.uk

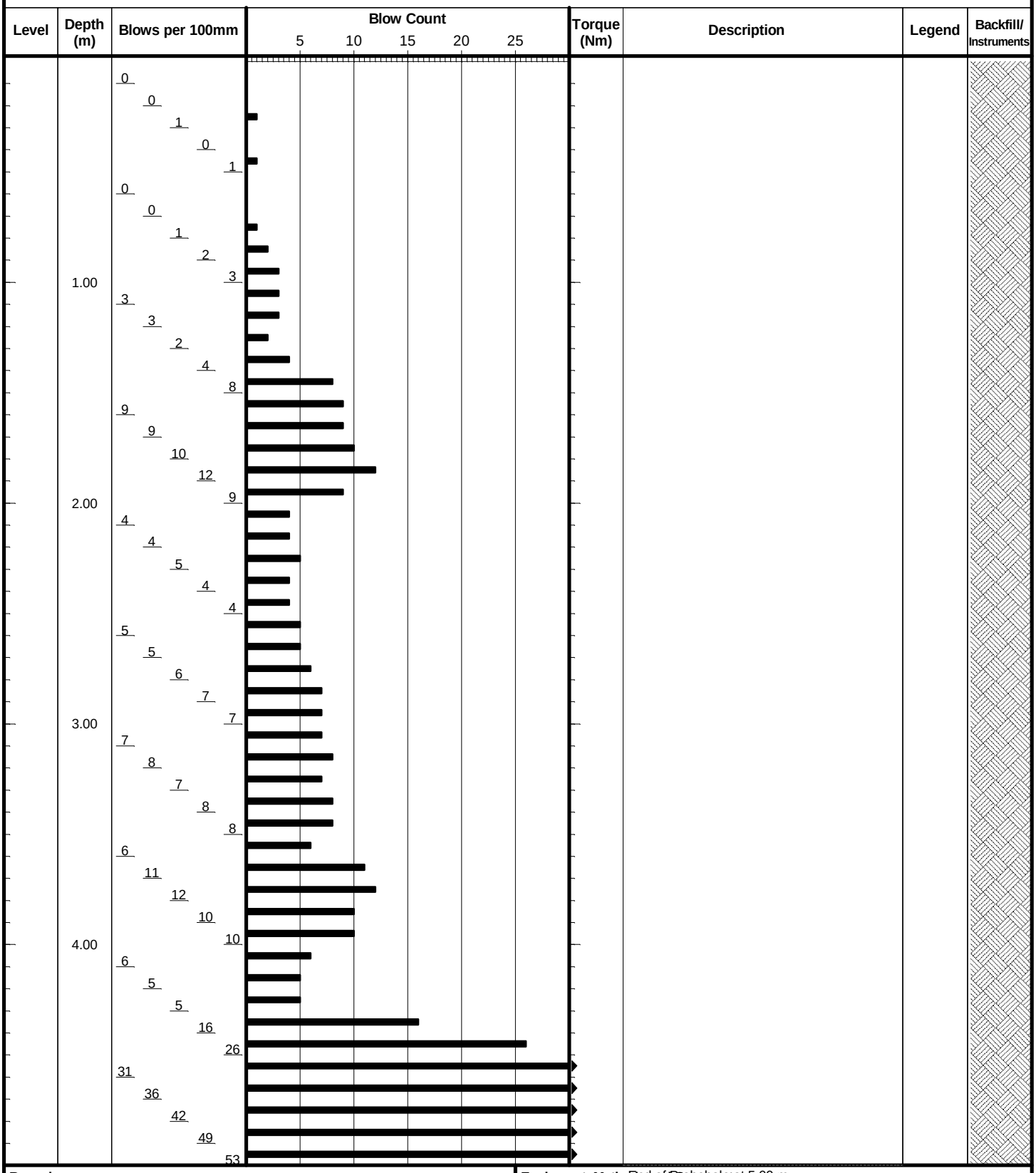
Project	Crane Cross Civic Amenity Site, Pembrokeshire
Project No.	1306
Carried out for	Pembrokeshire County Council

Exploratory Hole
DP5
Sheet 1 of 1

Dynamic Probe Log

APEX DRILLING SERVICES

Operator	AR	**Probe Type**	DPSH	**Cone Diameter (mm)**	50	**Cone tip abandoned at (mBGL)**	-	**Ground Level**	72.760
Logged by	AH	**Rod Diameter (mm)**	35	**Hammer Mass (kg)**	63.50			**Coordinates**	211666E 203848N
Checked by	RB	**Rod Mass (kg/m)**	8	**Fall Height (mm)**	760	**Date of Test**	20/03/2014	**National Grid**	211671E - 203866N
								Chainage	



Remarks

Equipment, Methods and Comments

Dando Terrier Rig

Dynamic sample (super heavy weight) G.L. - 5.00m. Terminated on obstruction.

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres.

Scale: 1:24 www.apexdrilling.co.uk

Project	Crane Cross Civic Amenity Site, Pembrokeshire
Project No.	1306
Carried out for	Pembrokeshire County Council

Exploratory Hole

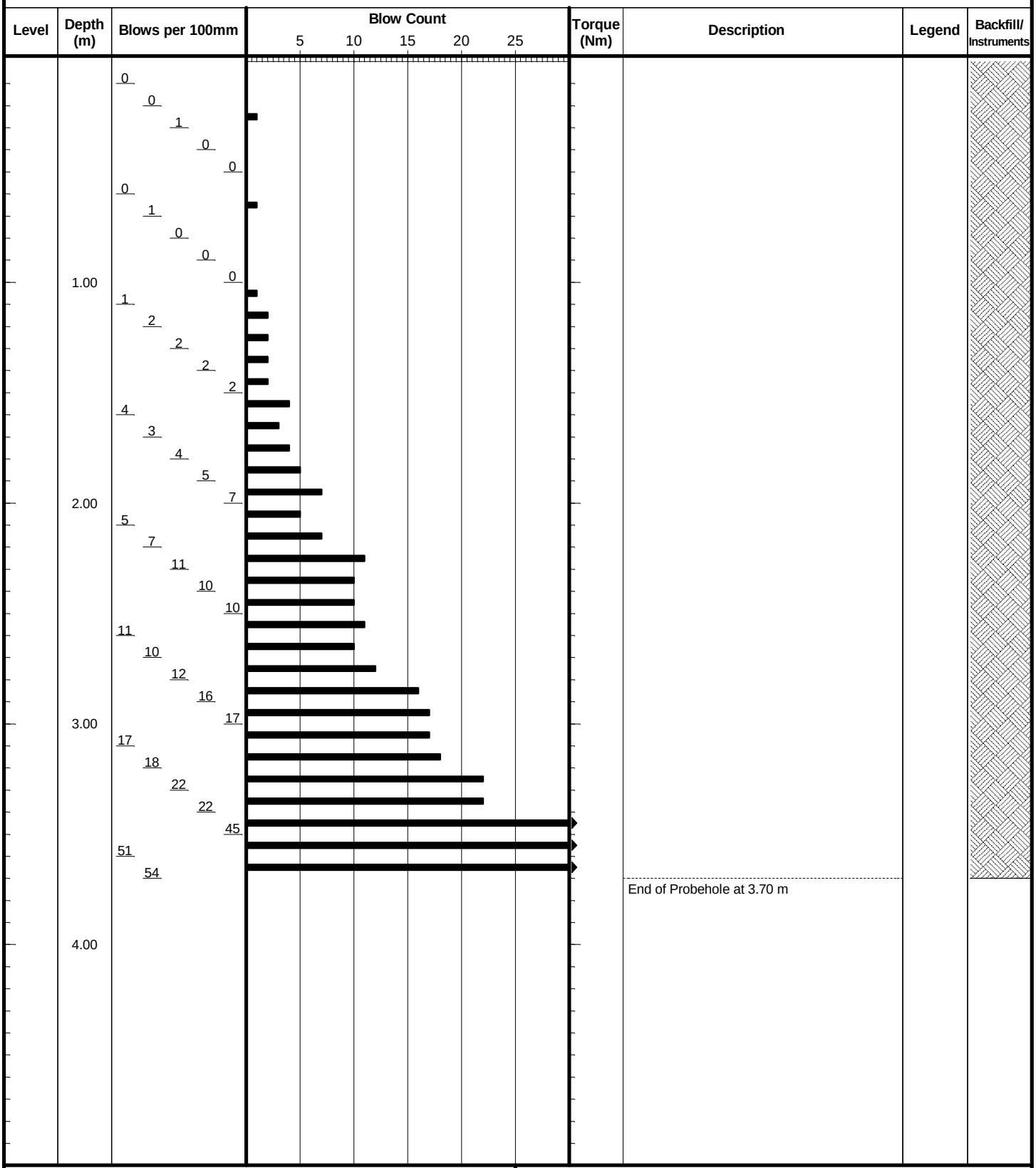
DP6

Sheet 1 of 1

Dynamic Probe Log

APEX DRILLING SERVICES

Operator	AR	**Probe Type**	DPSH	**Cone Diameter (mm)**	50	**Cone tip abandoned at (mBGL)**	-	**Ground Level**	72.750
Logged by	AH	**Rod Diameter (mm)**	35	**Hammer Mass (kg)**	63.50			**Coordinates**	211698E 203867N
Checked by	RB	**Rod Mass (kg/m)**	8	**Fall Height (mm)**	760	**Date of Test**	20/03/2014	**National Grid**	211666E - 203848N
								Chainage	



Remarks

Equipment, Methods and Comments
Dando Terrier Rig
Dynamic sample (super heavy weight) G.L. - 3.70m. Terminated on obstruction.

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres.

Scale: 1:24 www.apexdrilling.co.uk

Project	Crane Cross Civic Amenity Site, Pembrokeshire
Project No.	1306
Carried out for	Pembrokeshire County Council

Exploratory Hole
DP7
Sheet 1 of 1

Trial Pit Log

APEX DRILLING SERVICES

Logged AH **Checked** RB	**Start** 04/04/2014 **End** 04/04/2014	**Equipment, Methods and Remarks** Hand excavated inspection pit G.L. - 0.40m. Dynamic cone penetrometer undertaken at base.	**Dimensions and Orientation** Width 0.50m Length 0.60m A / D / B / C	**Ground Level** 73.110 **Coordinates** 211887E 204106N **National Grid** 211887E - 204106N **Chainage**	

Samples and Tests

Strata

Depth	Type & No	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-0.20	B 1	04/04/2014 1300	Bituminous bound aggregate surface layer wearing course.	0.01 (0.01) *73.10*		
			Bituminous bound aggregate base layer.	(0.17) 0.19 *72.92*		
0.30-0.40	B 2		MADE GROUND: Brown and grey slightly silty sandy angular medium to coarse GRAVEL of limestone (sub-base).	(0.21)		
		04/04/2014 1500	Firm brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone.	0.40 (0.00) *72.71*		
		0.20	Exploratory Hole Ends at 0.40 m	*72.71*		

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
-	0.20	Fast Inflow

Depth Related Marks *

From	To (m)

Stability N/A
Shoring N/A
Weather Dry

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale: 1:25 www.apexdrilling.co.uk

Project Crane Cross Civic Amenity Site, Pembrokeshire
Project No. 1306
Carried out for Pembrokeshire County Council

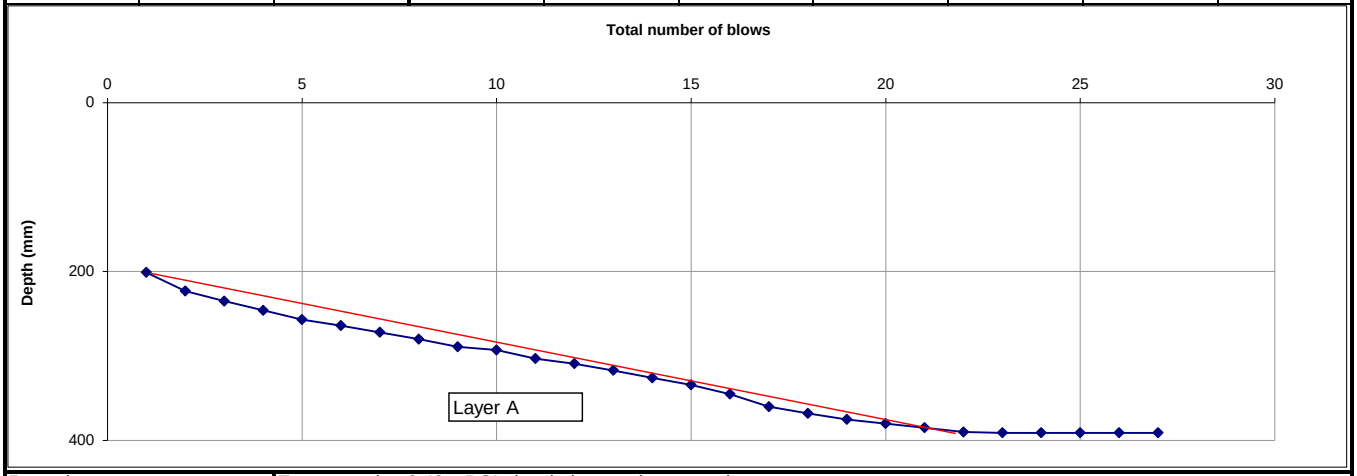
Trial Pit DCP1
Sheet 1 of 1

DYNAMIC CONE PENETROMETER TEST RESULTS

Client Name	Pembrokeshire County Council	Date	04/04/2014
Job Name	Crane Cross, Pembrokeshire	Job No.	1306
		Zero Reading	176
		Test Location	**DCP1**

APEX DRILLING SERVICES

No. of Blows	Reading (mm)	Mean penetration per blow (mm)	Layer	Top of layer (mm)	Base of layer (mm)	Blows at top of layer (no)	Blows at base of layer (no)	Mean penetration per blow (mm)	CBR of layer (%)
0	176								
1	201	25	Layer A	176	391	0	27	8.0	**33.7**
2	223	22							
3	235	12							
4	246	11							
5	257	11							
6	264	7							
7	272	8							
8	280	8							
9	289	9							
10	293	4							
11	303	10							
12	309	6							
13	317	8							
14	326	9							
15	334	8							
16	345	11							
17	360	15							
18	368	8							
19	375	7							
20	380	5							
21	385	5							
22	390	5							
23	391	1							
24	391	0							
25	391	0							
26	391	0							
27	391	0							



Remarks:	Test started at 0.40m BGL, just below road construction					
Note	Test location saturated with water, test abandoned on refusal					
Particles >20mm	Unknown	Weather	Dry		Operators	AH / AR

Trial Pit Log

APEX DRILLING SERVICES

Logged AH **Checked** RB	**Start** 04/04/2014 **End** 04/04/2014	**Equipment, Methods and Remarks** Hand excavated inspection pit G.L. - 0.40m. Dynamic cone penetrometer undertaken at base.	**Dimensions and Orientation** Width 0.50m Length 0.60m A / D / B / C	**Ground Level** 70.960 **Coordinates** 211808E 204027N **National Grid** 211887E - 204106N **Chainage**	

Samples and Tests

Strata

Depth	Type & No	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.00-0.10	B 1	04/04/2014 1030	Bituminous bound aggregate surface layer wearing course.	0.01 (0.01) *70.95*		
0.20-0.30	B 2		Bituminous bound aggregate base layer.	0.08 (0.07) *70.88*		
			MADE GROUND: Dark brown and dark grey silty sandy angular medium to coarse GRAVEL of limestone (sub-base).	(0.30)		
		04/04/2014 1200	Firm brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone.	0.38 (0.02) *70.58*		
			Exploratory Hole Ends at 0.40 m	0.40 *70.56*		

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
		No Groundwater Encountered

Depth Related Marks *

From	To (m)

Stability N/A
Shoring N/A
Weather Dry

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale: 1:25 www.apexdrilling.co.uk

Project Crane Cross Civic Amenity Site, Pembrokeshire
Project No. 1306
Carried out for Pembrokeshire County Council

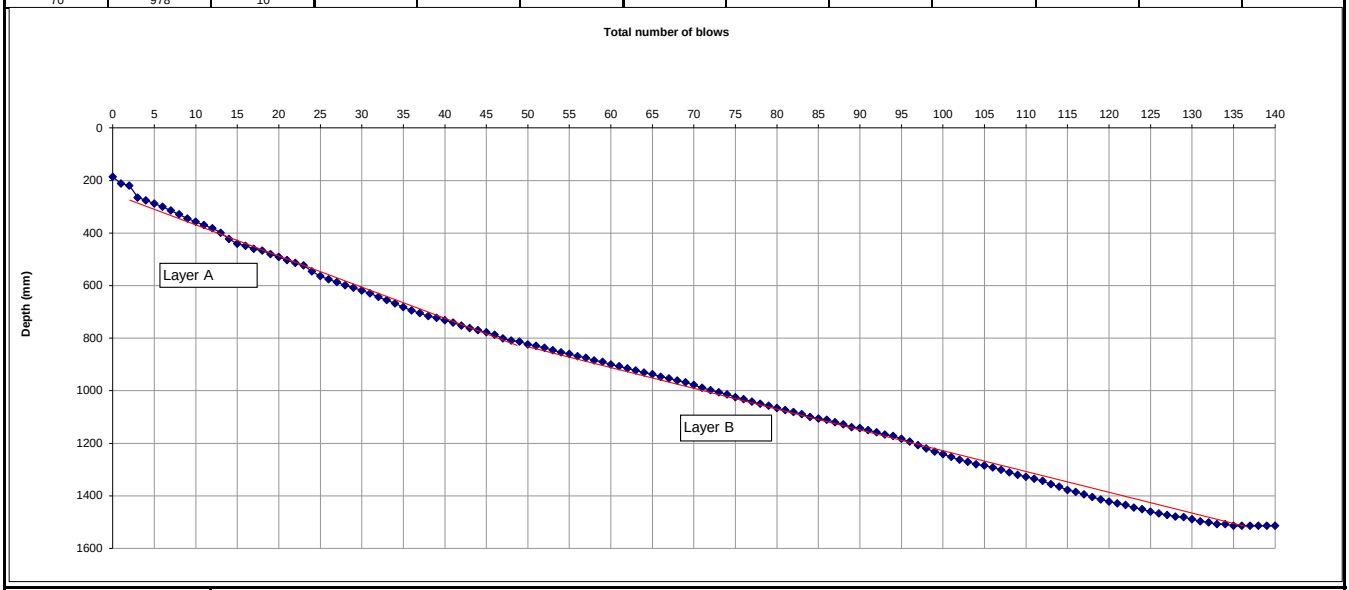
Trial Pit DCP2

DYNAMIC CONE PENETROMETER TEST RESULTS

Client Name	Pembrokeshire County Council	Date	04/04/2014
Job Name	Crane Cross, Pembrokeshire	Job No.	1306
		Zero Reading	186
		Test Location	DCP2

APEX DRILLING SERVICES

No. of Blows	Reading (mm)	Mean penetration per blow (mm)	No. of Blows	Reading (mm)	Mean penetration per blow (mm)	Layer	Top of layer (mm)	Base of layer (mm)	Blows at top of layer (no)	Blows at base of layer (no)	Mean penetration per blow (mm)	CBR of layer (%)
0	186		71	989	14							
1	212	26	72	998	9	Layer A	186	809	0	48	13.0	**20.1**
2	220	8	73	1006	8							
3	265	45	74	1014	8							
4	276	11	75	1025	11							
5	288	12	76	1032	7							
6	300	12	77	1042	10							
7	314	14	78	1050	8							
8	329	15	79	1057	7							
9	345	16	80	1066	9							
10	357	12	81	1074	8							
11	370	13	82	1081	7							
12	382	12	83	1089	8							
13	399	17	84	1100	11							
14	423	24	85	1106	6							
15	441	18	86	1111	5							
16	449	8	87	1120	9	Layer B	809	1504	48	135	8.0	**33.6**
17	460	11	88	1128	8							
18	467	7	89	1139	11							
19	480	13	90	1142	3							
20	491	11	91	1150	8							
21	503	12	92	1158	8							
22	514	11	93	1167	9							
23	523	9	94	1172	5							
24	546	23	95	1183	11							
25	564	18	96	1194	11							
26	576	12	97	1207	13							
27	587	11	98	1220	13							
28	599	12	99	1232	12							
29	608	9	100	1241	9							
30	619	11	101	1252	11							
31	630	11	102	1263	11							
32	643	13	103	1271	8							
33	655	12	104	1280	9							
34	668	13	105	1285	5							
35	682	14	106	1292	7							
36	695	13	107	1301	9							
37	705	10	108	1311	10							
38	716	11	109	1320	9							
39	723	7	110	1328	8							
40	732	9	111	1335	7							
41	741	9	112	1343	8							
42	752	11	113	1356	13							
43	762	10	114	1365	9							
44	770	8	115	1378	13							
45	778	8	116	1385	7							
46	787	9	117	1395	10							
47	801	14	118	1405	10							
48	809	8	119	1414	9							
49	813	4	120	1422	8							
50	824	11	121	1429	7							
51	829	5	122	1435	6							
52	837	8	123	1445	10							
53	846	9	124	1451	6							
54	854	8	125	1460	9							
55	860	6	126	1467	7							
56	869	9	127	1473	6							
57	875	6	128	1479	6							
58	885	10	129	1481	2							
59	890	5	130	1489	8							
60	900	10	131	1497	8							
61	907	7	132	1501	4							
62	915	8	133	1508	7							
63	923	8	134	1508	0							
64	931	8	135	1514	6							
65	937	6	136	1514	0							
66	947	10	137	1514	0							
67	953	6	138	1514	0							
68	961	8	139	1514	0							
69	968	7	140	1514	0							
70	978	10										



Remarks:	Test started at 0.40m BGL, just below road construction						
Note	Test abandoned on refusal						
Particles >20mm	Unknown	Weather	Dry			Operators	AH / AR

Trial Pit Log

APEX DRILLING SERVICES

Logged AH **Checked** RB	**Start** 04/04/2014 **End** 04/04/2014	**Equipment, Methods and Remarks** Hand excavated inspection pit G.L. - 0.40m. Dynamic cone penetrometer undertaken at base.	**Dimensions and Orientation** Width 0.60m Length 0.50m A / D / B / C	**Ground Level** 70.940 **Coordinates** 211721E 203931N **National Grid** 211808E - 204027N **Chainage**

Samples and Tests

Depth	Type & No	Date Records
0.00	B 1	04/04/2014 0830
0.30-0.40	B 2	04/04/2014 1000

Strata

Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
Bituminous bound aggregate surface layer wearing course.	0.01 (0.01) *70.93*		
Bituminous bound aggregate base layer.	0.09 (0.07) *70.86*		
MADE GROUND: Dark grey and black slightly silty sandy angular medium to coarse GRAVEL of limestone (sub-base).	0.20 (0.12) *70.74*		
MADE GROUND: Light grey slightly slightly clayey sandy angular medium to coarse GRAVEL of limestone (sub-base). Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone.	0.40 (0.20) *70.54*		
Exploratory Hole Ends at 0.40 m	(0.00) *70.54*		

Groundwater Entries

No.	Struck (m)	Post Strike Behaviour
No Groundwater Encountered		

Depth Related Marks *

From	To (m)

Stability N/A
Shoring N/A
Weather Dry

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale: 1:25 www.apexdrilling.co.uk

Project Crane Cross Civic Amenity Site, Pembrokeshire
Project No. 1306
Carried out for Pembrokeshire County Council

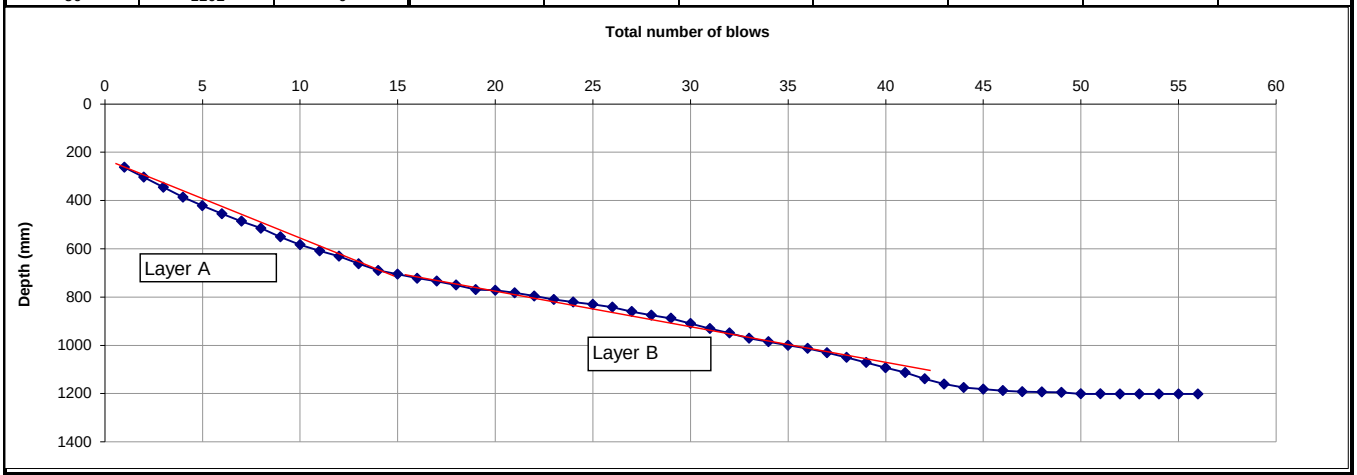
Trial Pit DCP3

DYNAMIC CONE PENETROMETER TEST RESULTS

Client Name	Pembrokeshire County Council	Date	04/04/2014
Job Name	Crane Cross, Pembrokeshire	Job No.	1306
		Zero Reading	201
		Test Location	**DCP3**

APEX DRILLING SERVICES

No. of Blows	Reading (mm)	Mean penetration per blow (mm)	Layer	Top of layer (mm)	Base of layer (mm)	Blows at top of layer (no)	Blows at base of layer (no)	Mean penetration per blow (mm)	CBR of layer (%)
0	201								
1	262	61	Layer A	201	722	0	15	34.7	**7.1**
2	303	41							
3	345	42							
4	386	41							
5	422	36							
6	455	33							
7	486	31							
8	515	29							
9	551	36							
10	583	32							
11	609	26							
12	631	22							
13	662	31							
14	690	28							
15	705	15							
16	722	17	Layer B	722	1202	15	52	13.0	**20.1**
17	734	12							
18	750	16							
19	769	19							
20	772	3							
21	783	11							
22	796	13							
23	810	14							
24	821	11							
25	830	9							
26	842	12							
27	860	18							
28	875	15							
29	888	13							
30	910	22							
31	931	21							
32	949	18							
33	971	22							
34	985	14							
35	1000	15							
36	1013	13							
37	1031	18							
38	1050	19							
39	1071	21							
40	1093	22							
41	1113	20							
42	1139	26							
43	1161	22							
44	1175	14							
45	1182	7							
46	1188	6							
47	1192	4							
48	1193	1							
49	1195	2							
50	1201	6							
51	1201	0							
52	1202	1							
53	1202	0							
54	1202	0							
55	1202	0							
56	1202	0							



Remarks:	Test started at 0.40m BGL, just below road construction						
Note	Test abandoned on refusal						
Particles >20mm	Unknown	Weather	Dry			Operators	AH / AR

Appendix C
Laboratory Testing Reports

TEST REPORT
MOISTURE CONTENT
BS1377: Part 2: 1990 : Clause 3.2

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2585		

Site Ref / Hole ID:	TP1	**Depth (m):**	0.70 - 0.80
Sample No:	2	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	28 March 2014

Test Results

Moisture Content (%)	19

Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig
BS1377-2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 7771	K Maid L Maiden, Laboratory Supervisor	10/04/2014	**MC 1**

TEST REPORT
MOISTURE CONTENT
BS1377: Part 2: 1990 : Clause 3.2

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2586		

Site Ref / Hole ID:	TP2	**Depth (m):**	0.20 - 0.30
Sample No:	3	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	28 March 2014

Test Results

Moisture Content (%)	29

Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig
BS1377-2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 7771	K Maid L Maiden, Laboratory Supervisor	10/04/2014	**MC 2**

TEST REPORT
MOISTURE CONTENT
BS1377: Part 2: 1990 : Clause 3.2

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2587		

Site Ref / Hole ID:	TP2	**Depth (m):**	0.50 - 0.60
Sample No:	4	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	28 March 2014

Test Results

Moisture Content (%)	50

Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig
BS1377-2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 7771	K Maid L Maiden, Laboratory Supervisor	10/04/2014	**MC 3**

TEST REPORT
MOISTURE CONTENT
BS1377: Part 2: 1990 : Clause 3.2

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2588		

Site Ref / Hole ID:	TP3	**Depth (m):**	0.70 - 0.80
Sample No:	3	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	28 March 2014

Test Results

Moisture Content (%)	25

Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig
BS1377-2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 7771	K Maid L Maiden, Laboratory Supervisor	10/04/2014	**MC 4**

TEST REPORT
MOISTURE CONTENT
BS1377: Part 2: 1990 : Clause 3.2

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2589		

Site Ref / Hole ID:	TP3	**Depth (m):**	1.80 - 1.90
Sample No:	5	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey very silty very sandy GRAVEL
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	

Test Results

Moisture Content (%)	21

Remarks:

TEST REPORT
MOISTURE CONTENT
BS1377: Part 2: 1990 : Clause 3.2

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2590		

Site Ref / Hole ID:	TP4	**Depth (m):**	0.40 - 0.50
Sample No:	2	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	28 March 2014

Test Results

Moisture Content (%)	31

Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig
BS1377-2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 7771	K Maid	10/04/2014	**MC 6**
		L Maiden, Laboratory Supervisor		

TEST REPORT
MOISTURE CONTENT
BS1377: Part 2: 1990 : Clause 3.2

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2591		

Site Ref / Hole ID:	TP4	**Depth (m):**	0.80 - 0.90
Sample No:	5	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	28 March 2014

Test Results

Moisture Content (%)	37

Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig
BS1377-2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 7771	K Maid L Maiden, Laboratory Supervisor	10/04/2014	**MC 7**

TEST REPORT
MOISTURE CONTENT
BS1377: Part 2: 1990 : Clause 3.2

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2592		

Site Ref / Hole ID:	TP5	**Depth (m):**	0.50 - 0.60
Sample No:	3	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	28 March 2014

Test Results

Moisture Content (%)	18

Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig
BS1377-2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 7771	K Maid L Maiden, Laboratory Supervisor	10/04/2014	**MC 8**

TEST REPORT
MOISTURE CONTENT
BS1377: Part 2: 1990 : Clause 3.2

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2593		

Site Ref / Hole ID:	TP5	**Depth (m):**	1.80 - 1.90
Sample No:	6	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey very clayey sandy GRAVEL with low cobble content
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	28 March 2014

Test Results

Moisture Content (%)	14

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
BS1377-2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	K Maid L Maiden, Laboratory Supervisor	10/04/2014	**MC 9**

TEST REPORT
MOISTURE CONTENT
BS1377: Part 2: 1990 : Clause 3.2

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2594		

Site Ref / Hole ID:	TP6	**Depth (m):**	0.90 - 1.00
Sample No:	4	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	28 March 2014

Test Results

Moisture Content (%)	22

Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig
BS1377-2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 7771	K Maid L Maiden, Laboratory Supervisor	10/04/2014	**MC 10**

TEST REPORT
MOISTURE CONTENT
BS1377: Part 2: 1990 : Clause 3.2

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2595		

Site Ref / Hole ID:	TP6	**Depth (m):**	1.90 - 2.00
Sample No:	6	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown slightly gravelly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	28 March 2014

Test Results

Moisture Content (%)	19

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
BS1377-2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	K Maid L Maiden, Laboratory Supervisor	10/04/2014	**MC 11**

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990: Clause 4.3/5.3/5.4

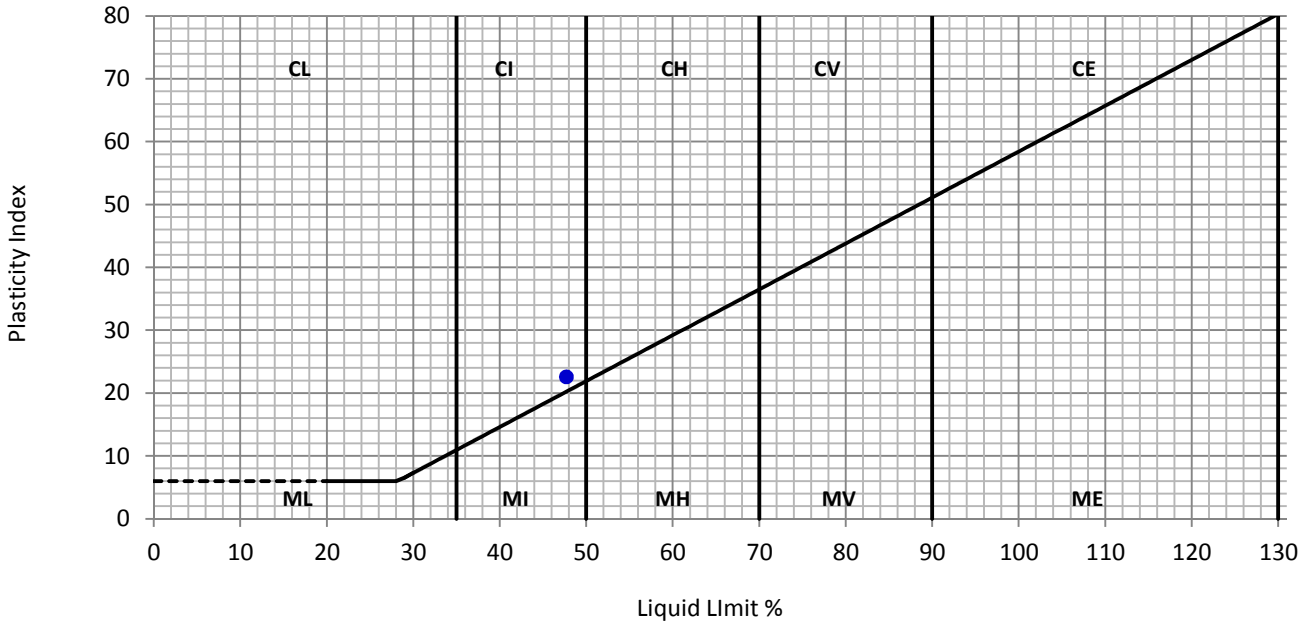
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2585		

Site Ref / Hole ID:	TP1	**Depth (m):**	0.70 - 0.80
Sample No:	2	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	31 March 2014

Test Results

Liquid Limit	48	%
Plastic Limit	25	%
Plasticity Index	23	%

Preparation:	4.2.4 Sieved Specimen	
Proportion retained on 425µm sieve:	18	%



Remarks:

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990: Clause 4.3/5.3/5.4

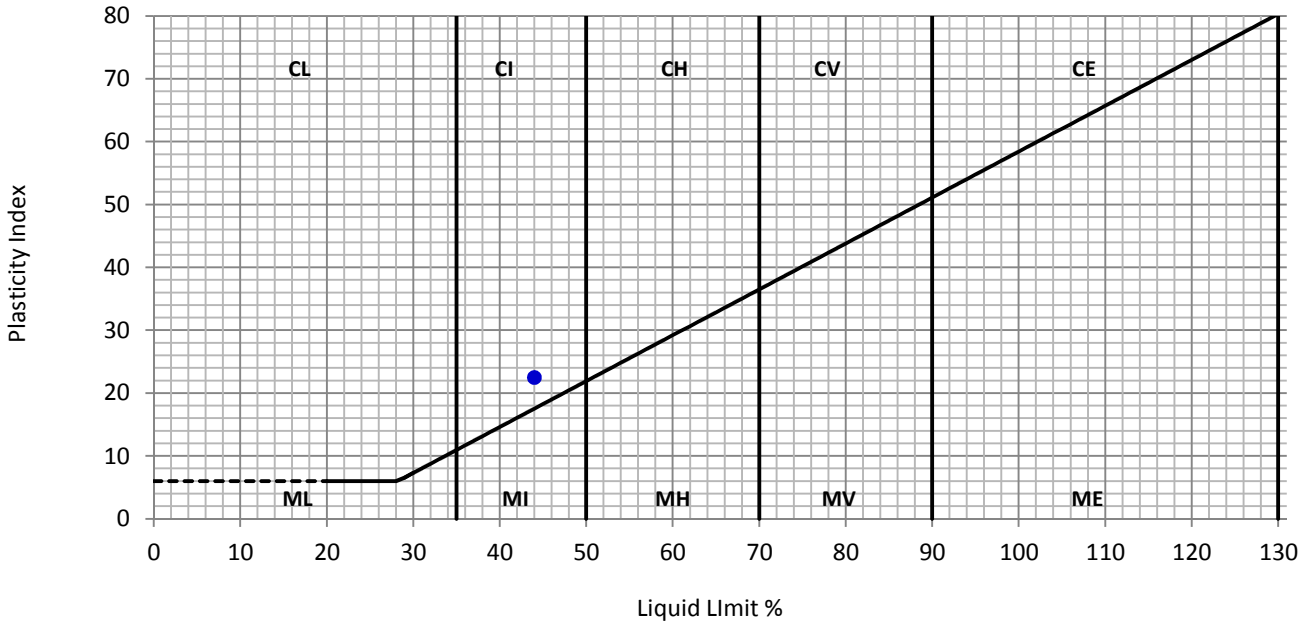
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2586		

Site Ref / Hole ID:	TP2	**Depth (m):**	0.20 - 0.30
Sample No:	3	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	31 March 2014

Test Results

Liquid Limit	44	%
Plastic Limit	22	%
Plasticity Index	22	%

Preparation:	4.2.3 Natural Specimen	
Proportion retained on 425µm sieve:	3	%



Remarks:

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990: Clause 4.3/5.3/5.4

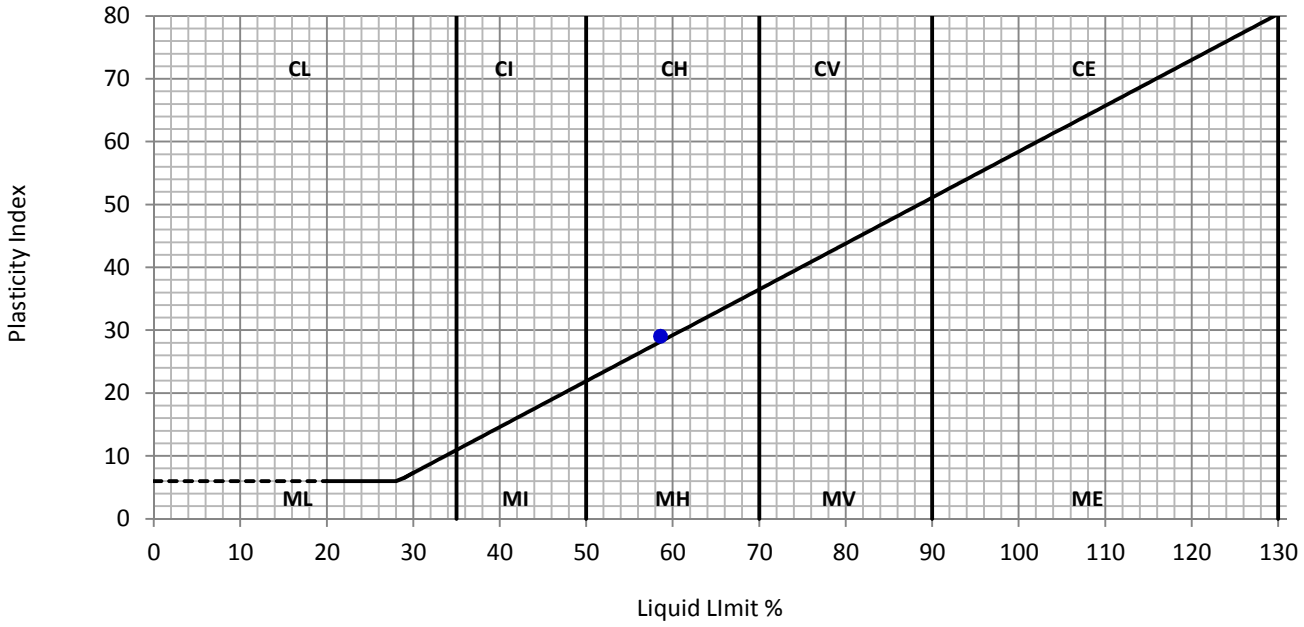
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2587		

Site Ref / Hole ID:	TP2	**Depth (m):**	0.50 - 0.60
Sample No:	4	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	31 March 2014

Test Results

Liquid Limit	59	%
Plastic Limit	30	%
Plasticity Index	29	%

Preparation:	4.2.3 Natural Specimen	
Proportion retained on 425µm sieve:	1	%



Remarks:

QA Ref.	Apex Testing Solutions	Approver	Date	Fig.
BS1377-2 Rev 3.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 7771	K Maid	10/04/2014	ATT 3
		L Maiden, Laboratory Supervisor		

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990: Clause 4.3/5.3/5.4

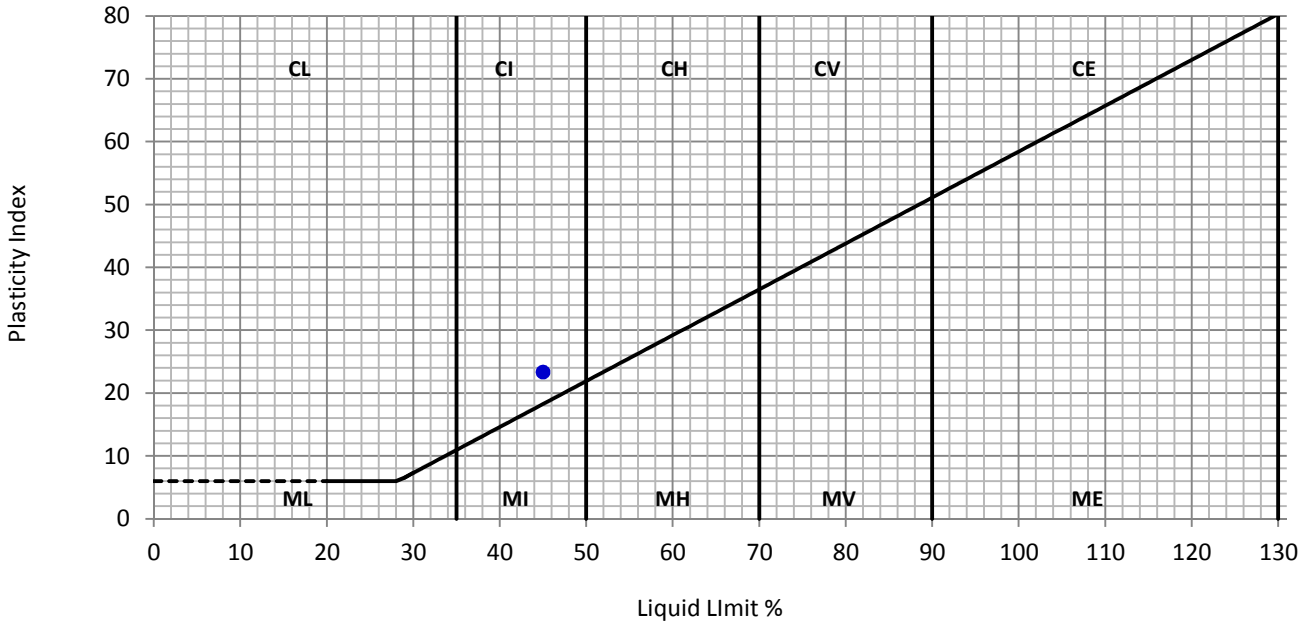
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2588		

Site Ref / Hole ID:	TP3	**Depth (m):**	0.70 - 0.80
Sample No:	3	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	31 March 2014

Test Results

Liquid Limit	45	%
Plastic Limit	22	%
Plasticity Index	23	%

Preparation:	4.2.3 Natural Specimen	
Proportion retained on 425µm sieve:	5	%



Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig.
BS1377-2	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	K Maid	10/04/2014	**ATT 4**
Rev 3.0	Tel: 01656 746762 Fax: 01656 749096 — 7771	L Maiden, Laboratory Supervisor		

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990: Clause 4.3/5.3/5.4

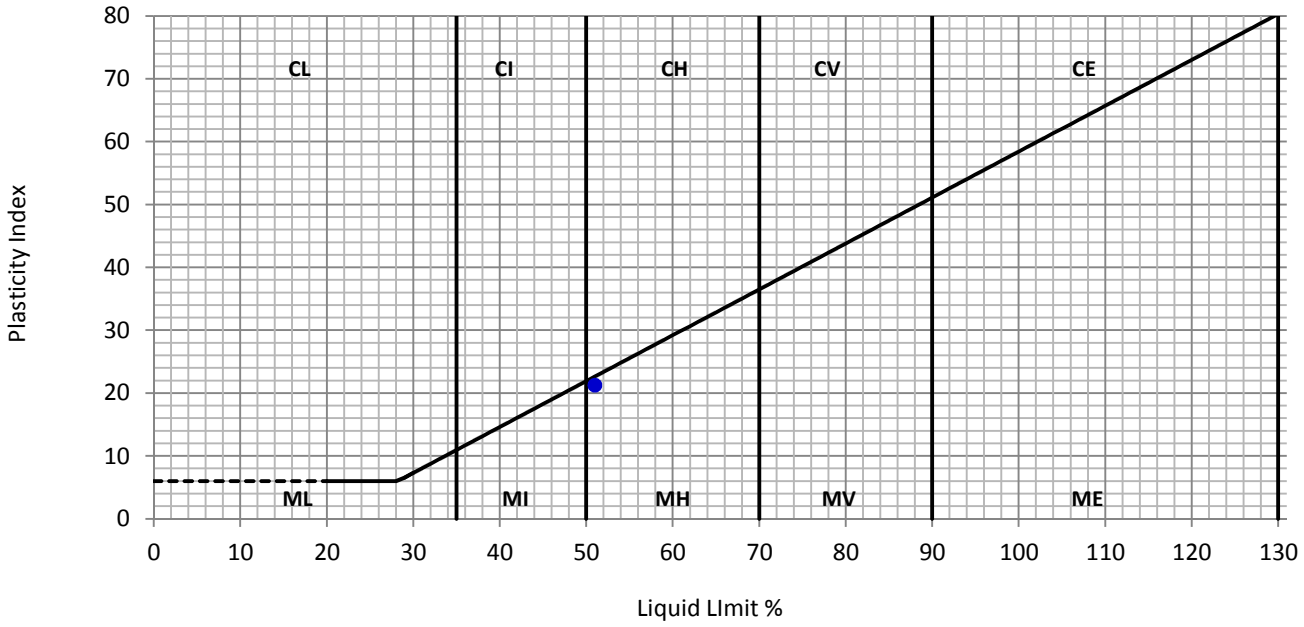
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2589		

Site Ref / Hole ID:	TP3	**Depth (m):**	1.80 - 1.90
Sample No:	5	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey very silty very sandy GRAVEL
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	02 April 2014

Test Results

Liquid Limit	51	%
Plastic Limit	30	%
Plasticity Index	21	%

Preparation:	4.2.4 Sieved Specimen	
Proportion retained on 425µm sieve:	61	%



Remarks:

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990: Clause 4.3/5.3/5.4

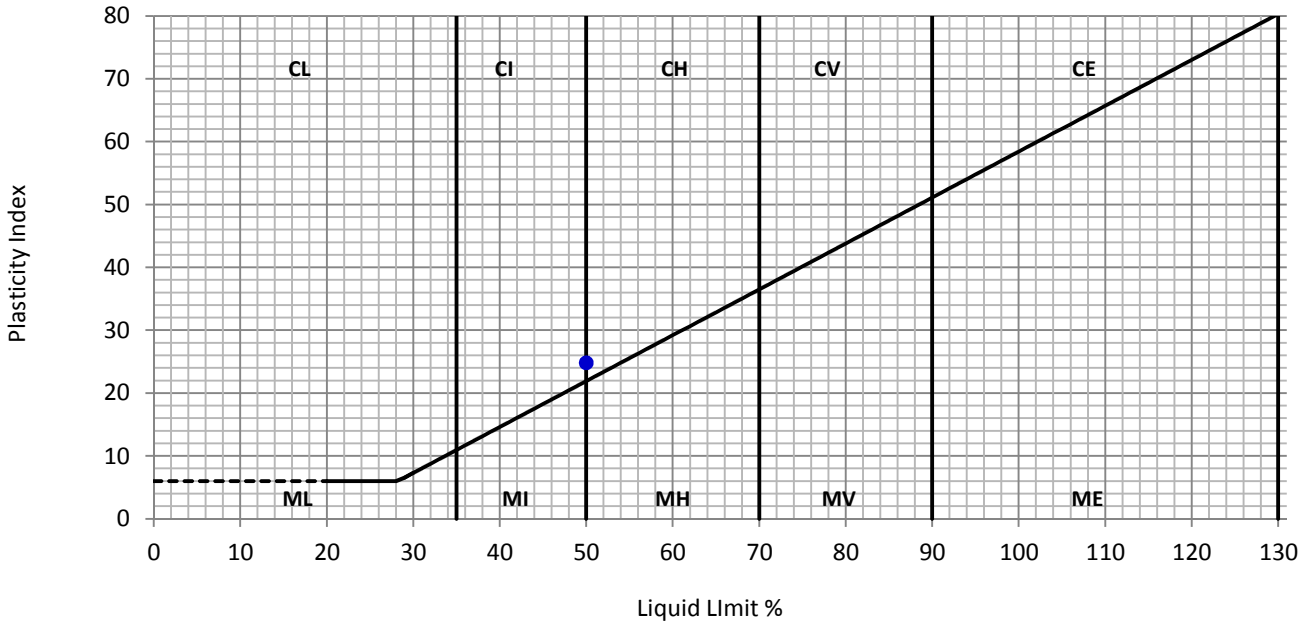
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2590		

Site Ref / Hole ID:	TP4	**Depth (m):**	0.40 - 0.50
Sample No:	2	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	31 March 2014

Test Results

Liquid Limit	50	%
Plastic Limit	25	%
Plasticity Index	25	%

Preparation:	4.2.3 Natural Specimen	
Proportion retained on 425µm sieve:	4	%



Remarks:

QA Ref. BS1377-2 Rev 3.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver: K Maid L Maiden, Laboratory Supervisor	Date: 10/04/2014	Fig. **ATT 6**

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990: Clause 4.3/5.3/5.4

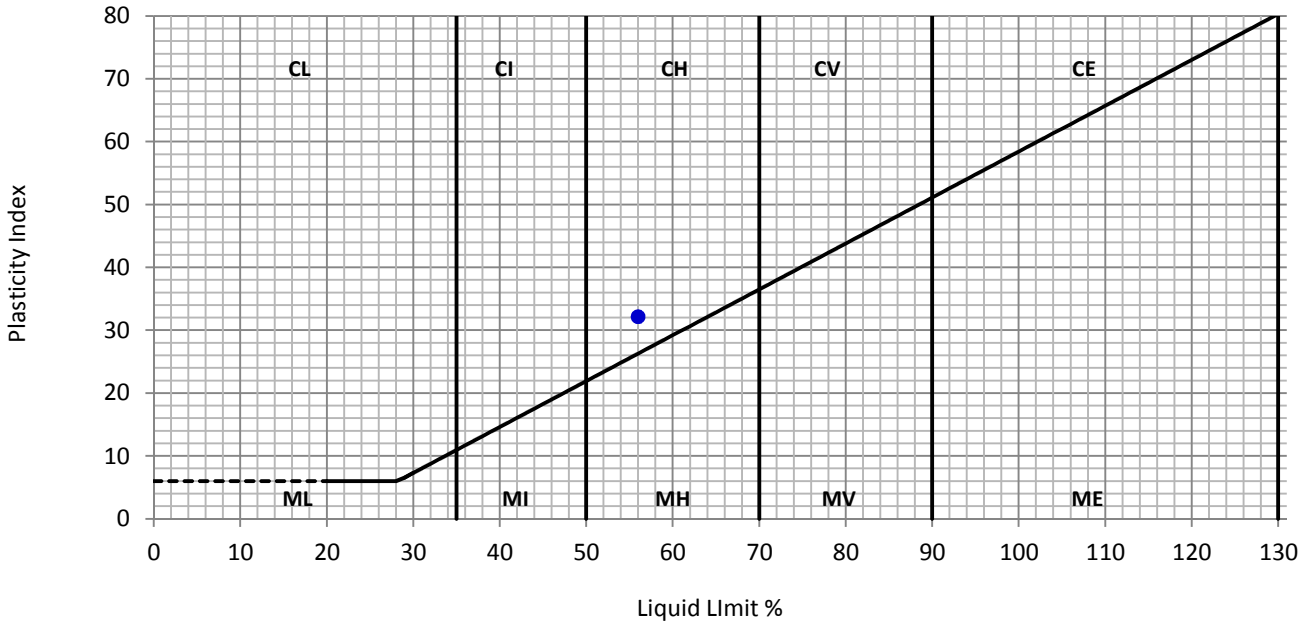
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2591		

Site Ref / Hole ID:	TP4	**Depth (m):**	0.80 - 0.90
Sample No:	5	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	02 April 2014

Test Results

Liquid Limit	56	%
Plastic Limit	24	%
Plasticity Index	32	%

Preparation:	4.2.3 Natural Specimen	
Proportion retained on 425µm sieve:	4	%



Remarks:

QA Ref.	Apex Testing Solutions	Approver	Date	Fig.
BS1377-2	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	K Maid	10/04/2014	ATT 7
Rev 3.0	Tel: 01656 746762 Fax: 01656 749096	L Maiden, Laboratory Supervisor		
	7771			

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990: Clause 4.3/5.3/5.4

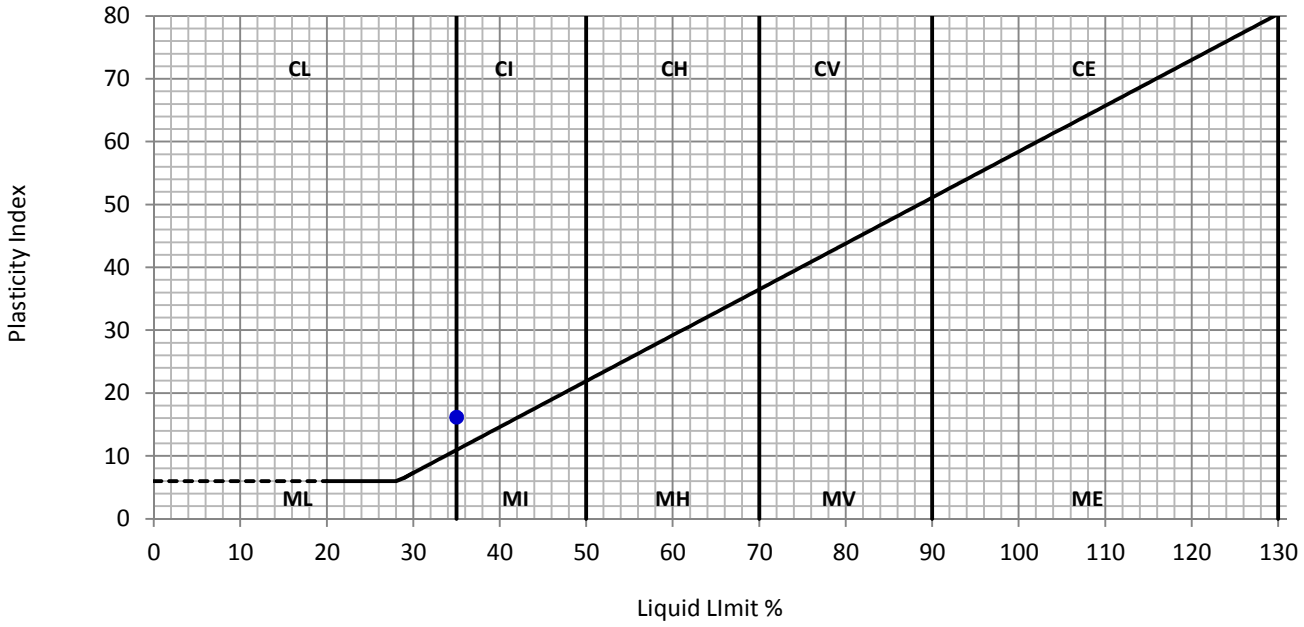
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2592		

Site Ref / Hole ID:	TP5	**Depth (m):**	0.50 - 0.60
Sample No:	3	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	31 March 2014

Test Results

Liquid Limit	35	%
Plastic Limit	19	%
Plasticity Index	16	%

Preparation:	4.2.3 Natural Specimen	
Proportion retained on 425µm sieve:	4	%



Remarks:

QA Ref. BS1377-2 Rev 3.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver: K Maid L Maiden, Laboratory Supervisor	Date: 10/04/2014	Fig. **ATT 8**

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990: Clause 4.3/5.3/5.4

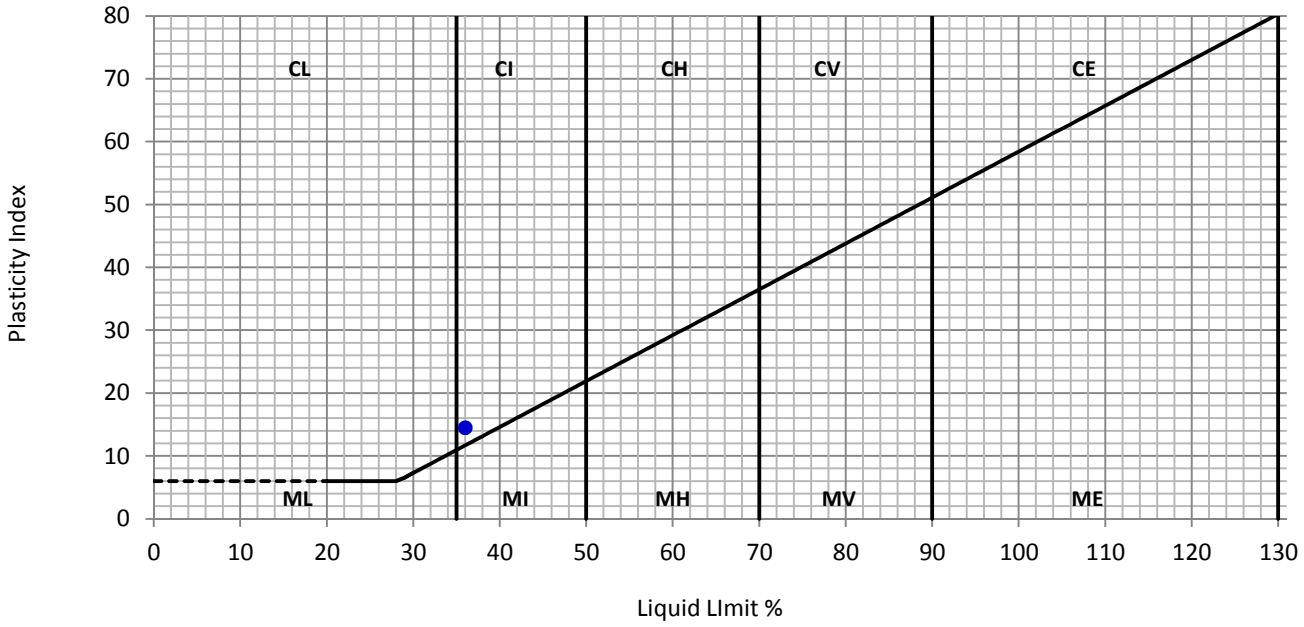
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2593		

Site Ref / Hole ID:	TP5	**Depth (m):**	1.80 - 1.90
Sample No:	6	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey very clayey sandy GRAVEL with low cobble content
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	02 April 2014

Test Results

Liquid Limit	36	%
Plastic Limit	22	%
Plasticity Index	14	%

Preparation:	4.2.4 Sieved Specimen	
Proportion retained on 425µm sieve:	64	%



Remarks:

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990: Clause 4.3/5.3/5.4

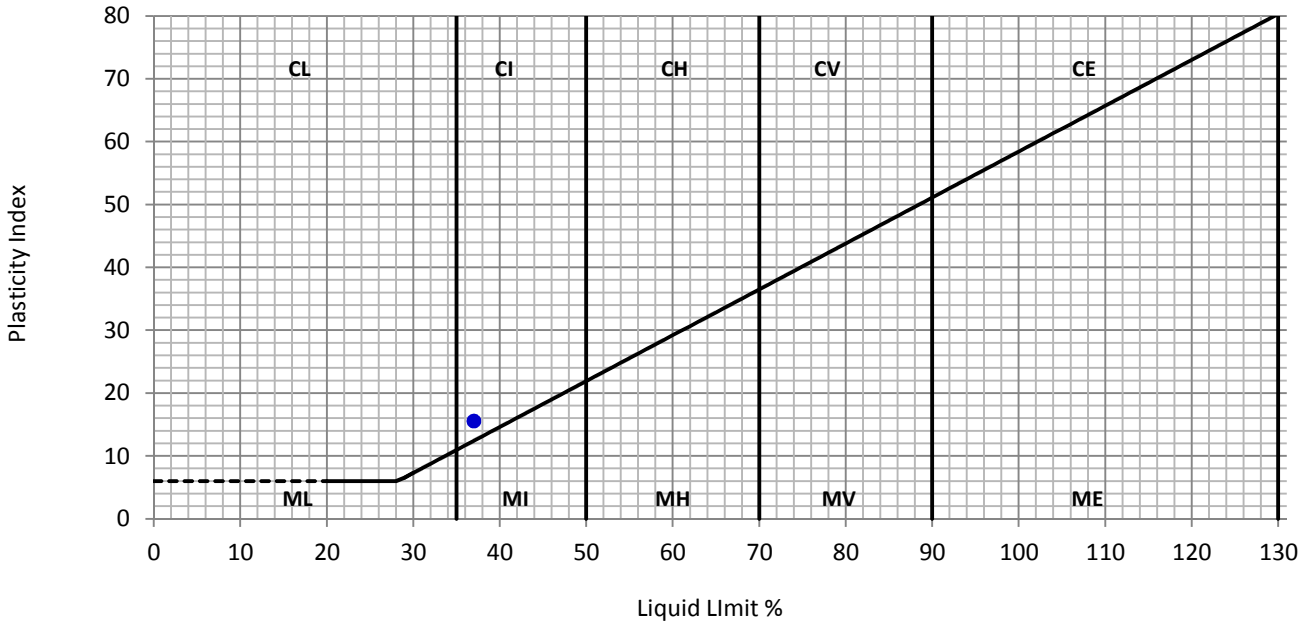
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2594		

Site Ref / Hole ID:	TP6	**Depth (m):**	0.90 - 1.00
Sample No:	4	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	31 March 2014

Test Results

Liquid Limit	37	%
Plastic Limit	21	%
Plasticity Index	16	%

Preparation:	4.2.3 Natural Specimen	
Proportion retained on 425µm sieve:	1	%



Remarks:

QA Ref.	Apex Testing Solutions	Approver	Date	Fig.
BS1377-2 Rev 3.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 7771	K Maid	10/04/2014	ATT 10
		L Maiden, Laboratory Supervisor		

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

BS 1377:Part 2:1990: Clause 4.3/5.3/5.4

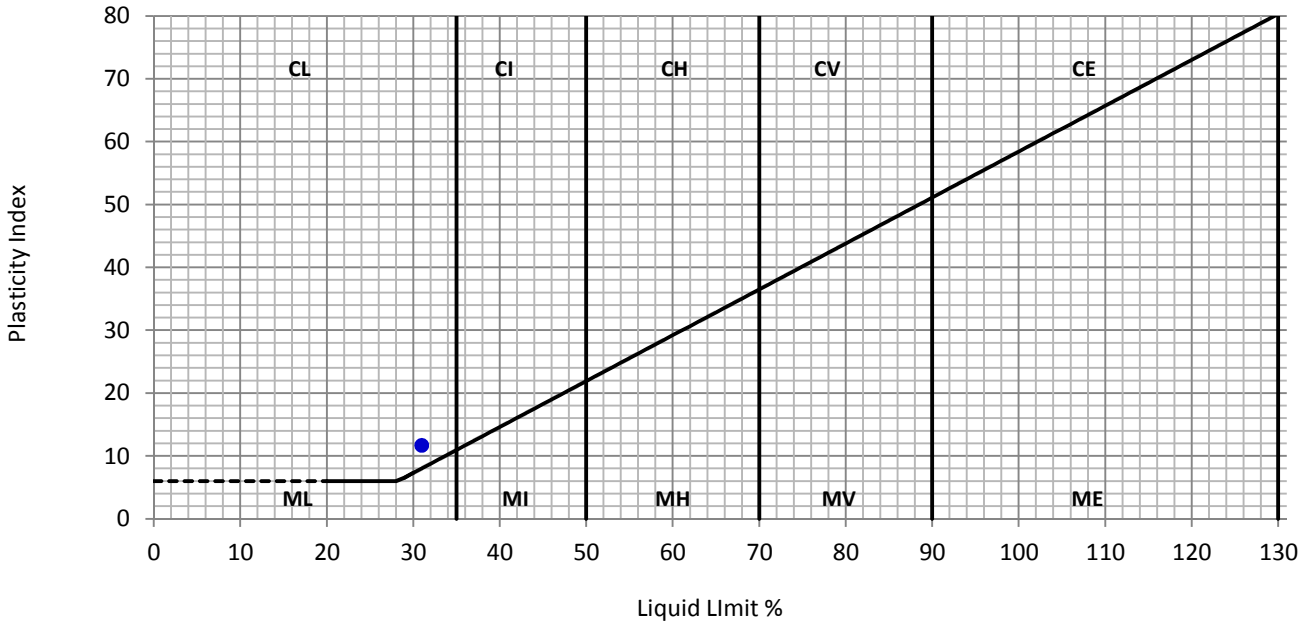
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2595		

Site Ref / Hole ID:	TP6	**Depth (m):**	1.90 - 2.00
Sample No:	6	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown slightly gravelly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	02 April 2014

Test Results

Liquid Limit	31	%
Plastic Limit	19	%
Plasticity Index	12	%

Preparation:	4.2.4 Sieved Specimen	
Proportion retained on 425µm sieve:	16	%



Remarks:

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

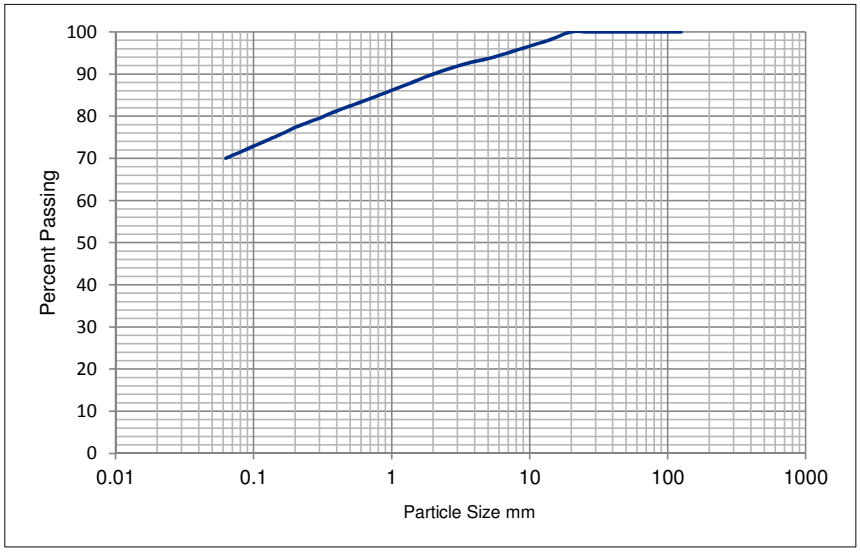
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2585		

Site Ref / Hole ID:	TP1	**Depth (m):**	0.70 - 0.80
Sample No:	2	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	04 April 2014

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	98
10	97
6.3	95
5.0	94
3.35	92
2.00	90
1.18	87
0.600	83
0.425	82
0.300	80
0.212	78
0.150	75
0.063	70

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	10		
Sand	20	**Dry mas of sample, kg**	
Silt / Clay	70	1.4	N/A

Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig
BS1377 - 2	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	K Maid	10/04/2014	**PSD 1**
Rev 3.0	Tel: 01656 746762 Fax: 01656 749096	7771	L Maiden, Laboratory Supervisor	

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

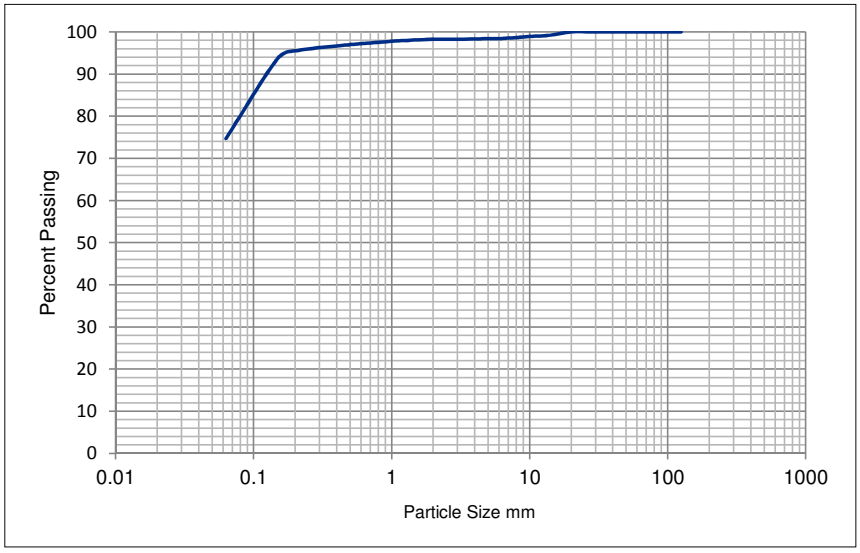
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2586		

Site Ref / Hole ID:	TP2	**Depth (m):**	0.20 - 0.30
Sample No:	3	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	04 April 2014

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	99
10	99
6.3	98
5.0	98
3.35	98
2.00	98
1.18	98
0.600	97
0.425	97
0.300	96
0.212	96
0.150	94
0.063	75

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	2		
Sand	23	**Dry mas of sample, kg**	
Silt / Clay	75	1.2	N/A

Remarks:

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

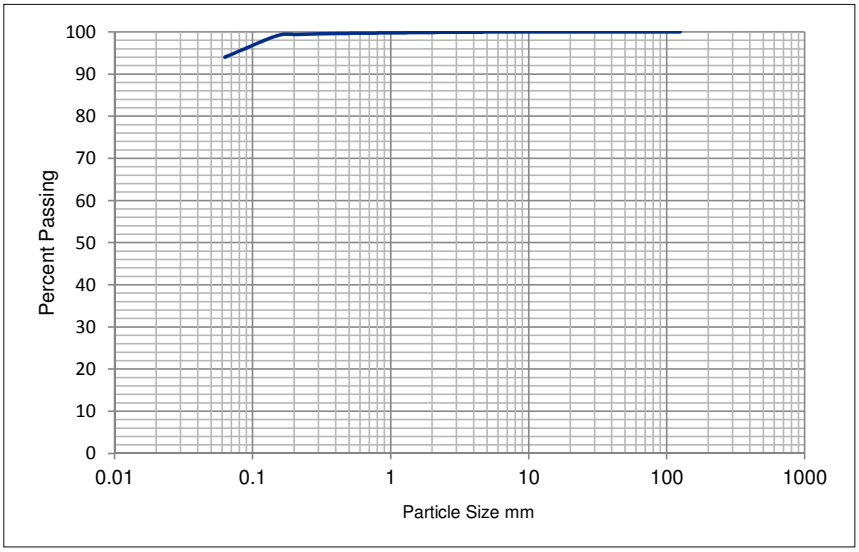
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2587		

Site Ref / Hole ID:	TP2	**Depth (m):**	0.50 - 0.60
Sample No:	4	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	04 April 2014

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	100
1.18	100
0.600	100
0.425	100
0.300	100
0.212	99
0.150	99
0.063	94

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	0		
Sand	6	**Dry mas of sample, kg**	
Silt / Clay	94	0.9	N/A

Remarks:

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

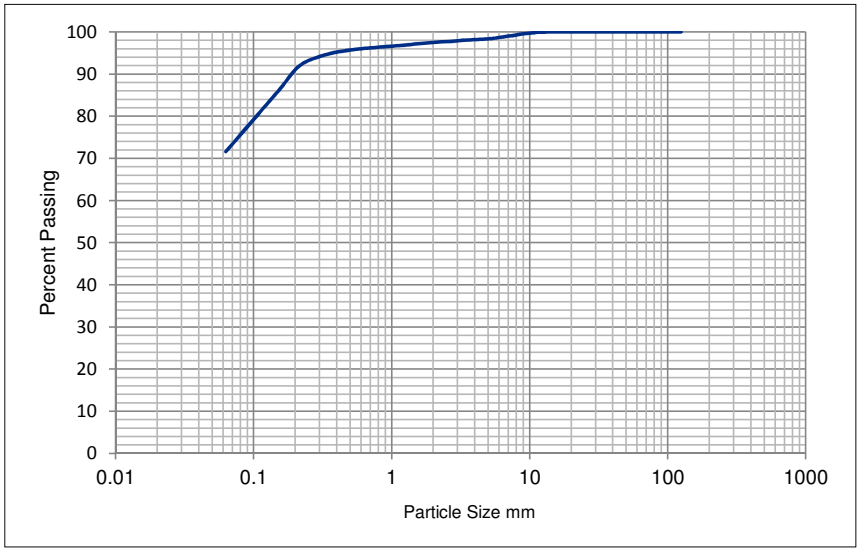
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2588		

Site Ref / Hole ID:	TP3	**Depth (m):**	0.70 - 0.80
Sample No:	3	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	04 April 2014

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	99
5.0	98
3.35	98
2.00	97
1.18	97
0.600	96
0.425	95
0.300	94
0.212	92
0.150	86
0.063	72

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	3		
Sand	25	**Dry mas of sample, kg**	
Silt / Clay	72	2.4	N/A

Remarks:

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

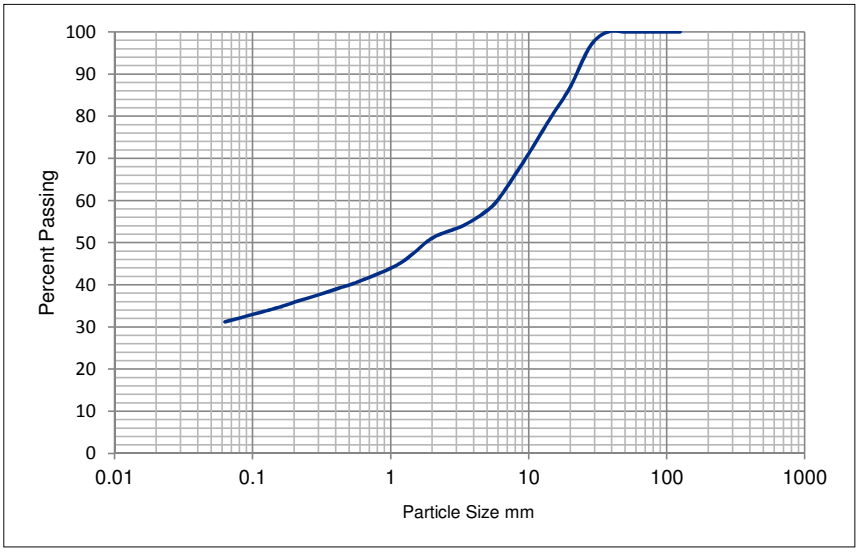
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2589		

Site Ref / Hole ID:	TP3	**Depth (m):**	1.80 - 1.90
Sample No:	5	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey very silty very sandy GRAVEL
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	04 April 2014

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	97
20	87
14	79
10	71
6.3	61
5.0	58
3.35	54
2.00	51
1.18	45
0.600	41
0.425	39
0.300	38
0.212	36
0.150	35
0.063	31

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	49		
Sand	20	**Dry mas of sample, kg**	
Silt / Clay	31	9.8	N/A

Remarks:

QA Ref.					
BS1377 - 2 Rev 3.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver K Maid L Maiden, Laboratory Supervisor	Date 10/04/2014	Fig **PSD 5**

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

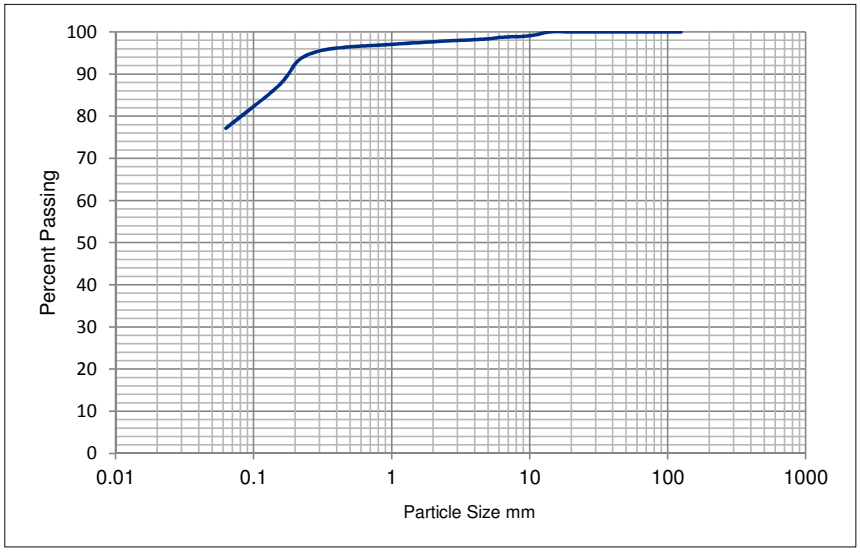
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2590		

Site Ref / Hole ID:	TP4	**Depth (m):**	0.40 - 0.50
Sample No:	2	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	07 April 2014

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	99
6.3	99
5.0	98
3.35	98
2.00	98
1.18	97
0.600	97
0.425	96
0.300	95
0.212	93
0.150	87
0.063	77

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	2		
Sand	21	**Dry mas of sample, kg**	
Silt / Clay	77	1.1	N/A

Remarks:

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS 1377:Part 2:1990: Clause 9.2 / 9.4

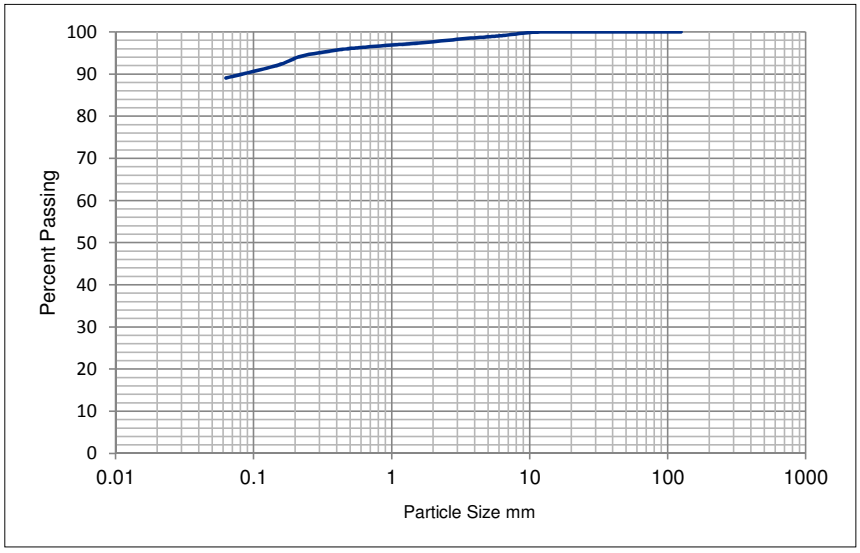
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2591		

Site Ref / Hole ID:	TP4	**Depth (m):**	0.80 - 0.90
Sample No:	5	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	04 April 2014

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	99
5.0	99
3.35	98
2.00	98
1.18	97
0.600	96
0.425	96
0.300	95
0.212	94
0.150	92
0.063	89

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	2		
Sand	9	**Dry mas of sample, kg**	
Silt / Clay	89	1.2	N/A

Remarks:

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

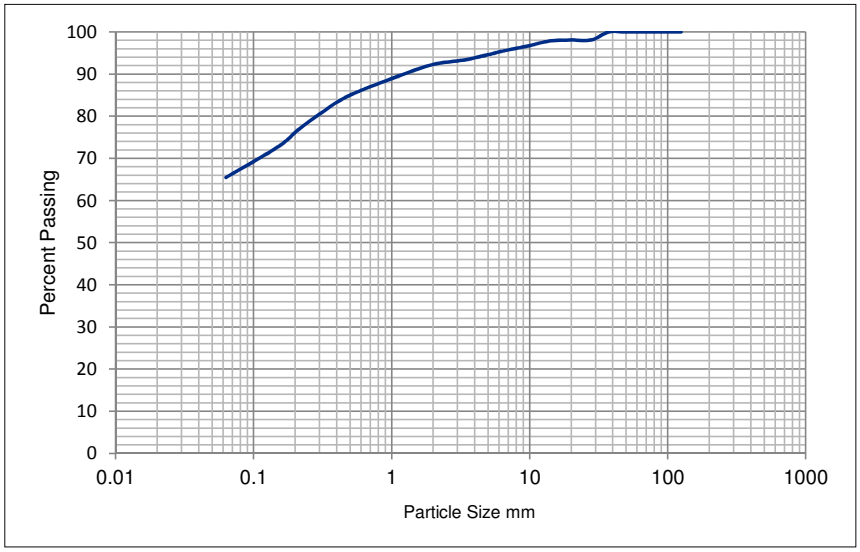
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2592		

Site Ref / Hole ID:	TP5	**Depth (m):**	0.50 - 0.60
Sample No:	3	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	07 April 2014

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	98
20	98
14	98
10	97
6.3	95
5.0	95
3.35	93
2.00	92
1.18	90
0.600	86
0.425	84
0.300	80
0.212	77
0.150	73
0.063	65

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	8		
Sand	27	**Dry mas of sample, kg**	
Silt / Clay	65	1.3	N/A

Remarks:

UKAS TESTING 7771

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

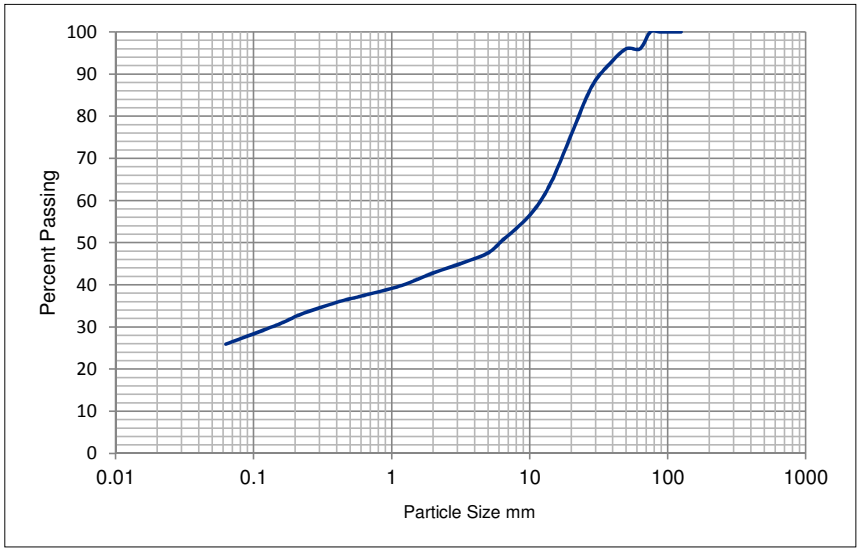
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2593		

Site Ref / Hole ID:	TP5	**Depth (m):**	1.80 - 1.90
Sample No:	6	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey very clayey sandy GRAVEL with low cobble content
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	07 April 2014

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	96
50	96
37.5	92
28	87
20	76
14	64
10	56
6.3	50
5.0	48
3.35	45
2.00	43
1.18	40
0.600	37
0.425	36
0.300	35
0.212	33
0.150	31
0.063	26

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	4	N/A	D_{60} / D_{10}
Gravel	53		
Sand	17	**Dry mas of sample, kg**	
Silt / Clay	26	12.9	N/A

Remarks:

QA Ref.					
BS1377 - 2 Rev 3.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver K Maid L Maiden, Laboratory Supervisor	Date 10/04/2014	Fig **PSD 9**

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

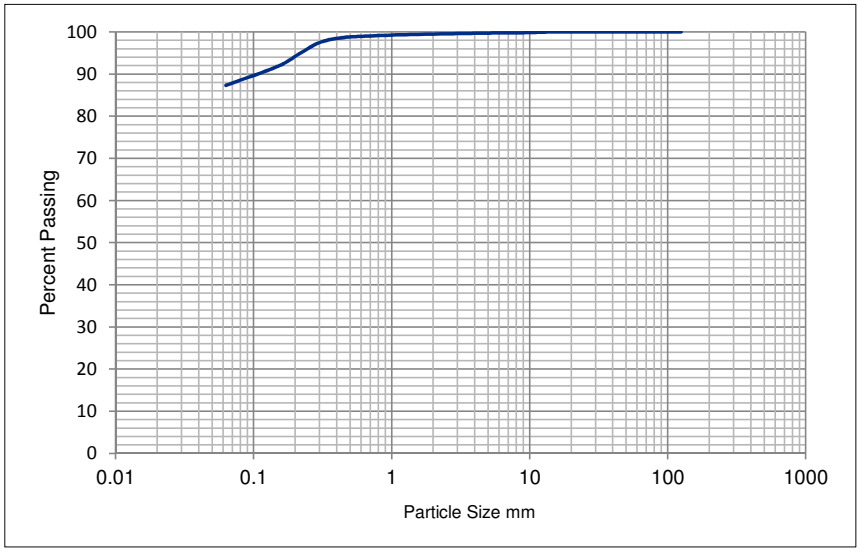
Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2594		

Site Ref / Hole ID:	TP6	**Depth (m):**	0.90 - 1.00
Sample No:	4	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown grey slightly gravelly slightly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	07 April 2014

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	100
14	100
10	100
6.3	100
5.0	100
3.35	100
2.00	99
1.18	99
0.600	99
0.425	99
0.300	97
0.212	95
0.150	92
0.063	87

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	1		
Sand	12	**Dry mas of sample, kg**	
Silt / Clay	87	2.5	N/A

Remarks:

QA Ref.					
BS1377 - 2 Rev 3.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver K Maid L Maiden, Laboratory Supervisor	Date 10/04/2014	Fig **PSD 10**

TEST REPORT

PARTICLE SIZE DISTRIBUTION ANALYSIS

BS 1377:Part 2:1990: Clause 9.2 / 9.4

Project No:	D4056-14	**Client:**	Apex Drilling
Project Name:	Crane Cross	**Address:**	Sturmi Way, Village Farm Industrial Estate, Bridgend CF33 6BZ
ATS Sample No:	2595		

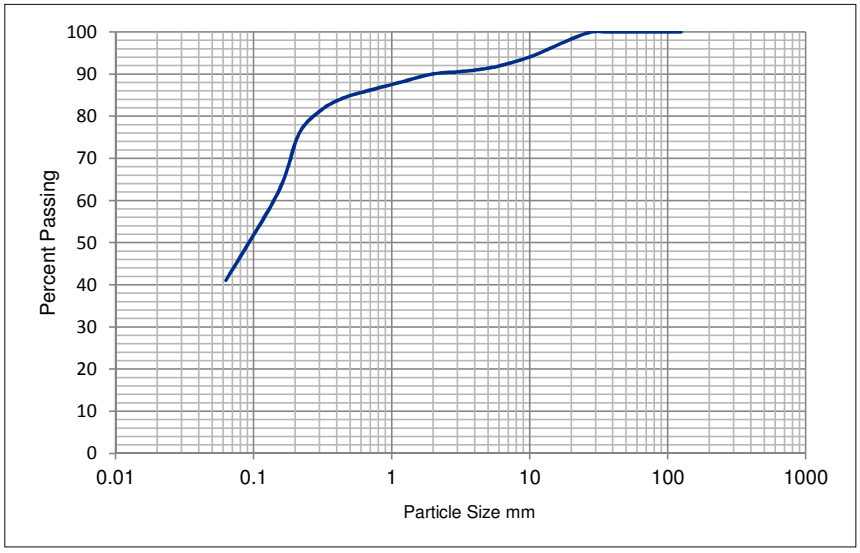
Site Ref / Hole ID:	TP6	**Depth (m):**	1.90 - 2.00
Sample No:	6	**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown slightly gravelly sandy CLAY
Location in Works:	Unknown	**Material Source:**	N/A
Date Sampled:	Unknown	**Material Supplier:**	N/A
Sampled By:	Unknown	**Specification:**	BS1377
Date Received:	26 March 2014	**Date Tested:**	07 April 2014

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	100
20	98
14	96
10	94
6.3	92
5.0	91
3.35	91
2.00	90
1.18	88
0.600	86
0.425	84
0.300	81
0.212	76
0.150	62
0.063	41

Sedimentation	
Particle Size mm	% Passing
0.0201	
0.0060	
0.0020	

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	10		
Sand	49	**Dry mas of sample, kg**	
Silt / Clay	41	6.6	N/A

Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig
BS1377 - 2	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	K Maiden	10/04/2014	**PSD 11**
Rev 3.0	Tel: 01656 746762 Fax: 01656 749096	7771	L Maiden, Laboratory Supervisor	

Laboratory Test Certificate

Site	Crane Cross
Client	Apex Testing Solutions
F.A.O.	Lisa Maiden
Address	Sturmi Way Village Farm Industrial Estate Pyle Bridgend CF33 6BZ
Job Number	AC0428
Lab Number	L10420
Order Number	AT144

Number of samples submitted for testing:	3	sample (s)
CBR / Moisture Content Relationship	3	test (s)

Date (s) sample (s) received at laboratory:	8	Apr-14
Date of receipt of testing instructions	9	Apr-14
Date testing started:	9	Apr-14
Date of issue:	25	Apr-14

Please note that we will keep the sample (s) for one month after submission of our report and will then dispose of them without notice unless you ask us to store them. We will then make a separate charge for this.

Approved by :

Lorna Logan

C.J. Associates Geotechnical Ltd
King Road Avenue
Avonmouth - Bristol BS11 9HF
Tel: 0117 982 1473 Fax: 0117 982 8200

CBR / Dry Density / Moisture Content Relationship

BS1377:Part 4:1990

Method **3.4** 2.5Kg rammer - Soils with some coarse-gravel size particles

Site Crane Cross

Client Apex Testing Solutions

Job Number AC0428

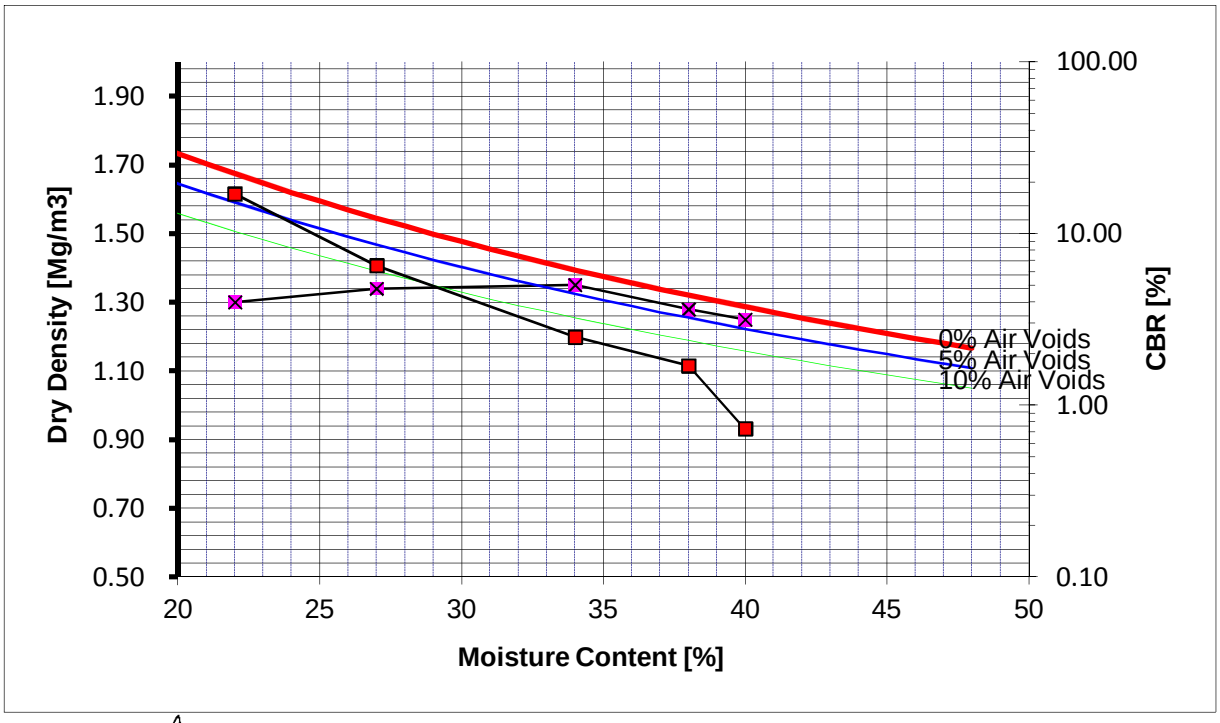
Lab Number L10420

Hole	Sample	Depth [m]
TP2	B4	0.50

Particle density	[Mg/m3]	2.65
Passing 37.5mm	[%]	100
Passing 20mm	[%]	100
Weight of rammer	[Kg]	2.5
No Blows		62
Drop Height	[mm]	300
Number of Layers		3
Crushable Material	[Y/N]	n
Single Sample or Separate Samples		single
Initial Moisture Content	[%]	44

Comments
Particle Density assumed.
Material Description
Firm orange mottled grey and dark brown slightly gravelly slightly silty CLAY

Point Number		**1**	**2**	**3**	**4**	**5**
Moisture content	[%]	40	38	34	27	22
Bulk Density	[Mg/m3]	1.75	1.76	1.81	1.71	1.59
Dry Density	[Mg/m3]	1.25	1.28	1.35	1.34	1.30
CBR Correction Applied	Y/N	N	N	N	N	N
CBR Sample	Top/Bottom	Top	Top	Top	Top	Top
CBR 2.5mm	[%]	0.58	1.7	2.5	6.5	17
CBR 5.0mm	[%]	0.73	1.7	2.5	6.0	14
Design CBR	[%]	0.73	1.7	2.5	6.5	17



Checked

Approved

CBR / Dry Density / Moisture Content Relationship

BS1377:Part 4:1990

Method **3.4** 2.5Kg rammer - Soils with some coarse-gravel size particles

Site Crane Cross

Client Apex Testing Solutions

Job Number AC0428

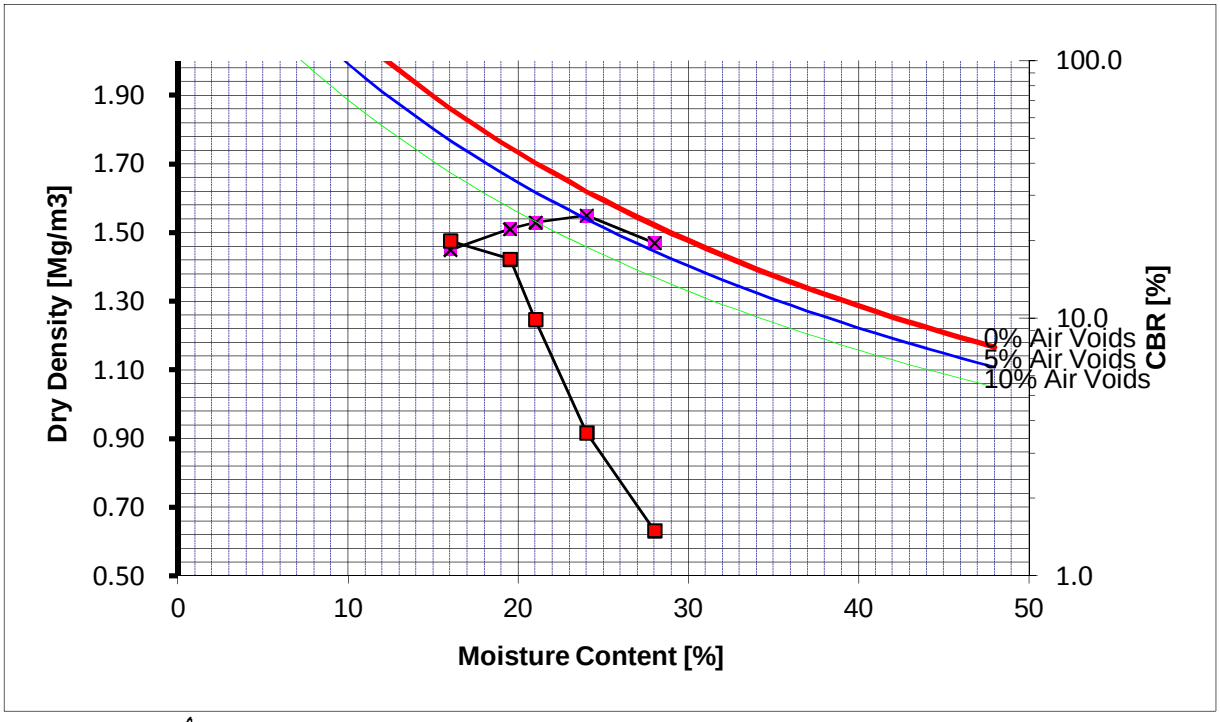
Lab Number L10420

Hole	Sample	Depth [m]
TP4	B2	0.40

Particle density	[Mg/m3]	2.65
Passing 37.5mm	[%]	100
Passing 20mm	[%]	99
Weight of rammer	[Kg]	2.5
No Blows		62
Drop Height	[mm]	300
Number of Layers		3
Crushable Material	[Y/N]	n
Single Sample or Separate Samples		single
Initial Moisture Content	[%]	31

Comments
Particle Density assumed.
Material Description
Firm purplish brown mottled brown and orange clayey slightly gravelly SILT.

Point Number		**1**	**2**	**3**	**4**	**5**
Moisture content	[%]	28	24	21	20	16
Bulk Density	[Mg/m3]	1.89	1.91	1.85	1.81	1.67
Dry Density	[Mg/m3]	1.47	1.55	1.53	1.51	1.45
CBR Correction Applied	Y/N	N	N	N	N	N
CBR Sample	Top/Bottom	Top	Top	Top	Top	Top
CBR 2.5mm	[%]	1.3	3.2	9.2	17	14
CBR 5.0mm	[%]	1.5	3.6	9.9	16	20
Design CBR	[%]	1.5	3.6	9.9	17	20



Checked

Approved

CBR / Dry Density / Moisture Content Relationship

BS1377:Part 4:1990

Method **3.4** 2.5Kg rammer - Soils with some coarse-gravel size particles

Site Crane Cross

Client Apex Testing Solutions

Job Number AC0428

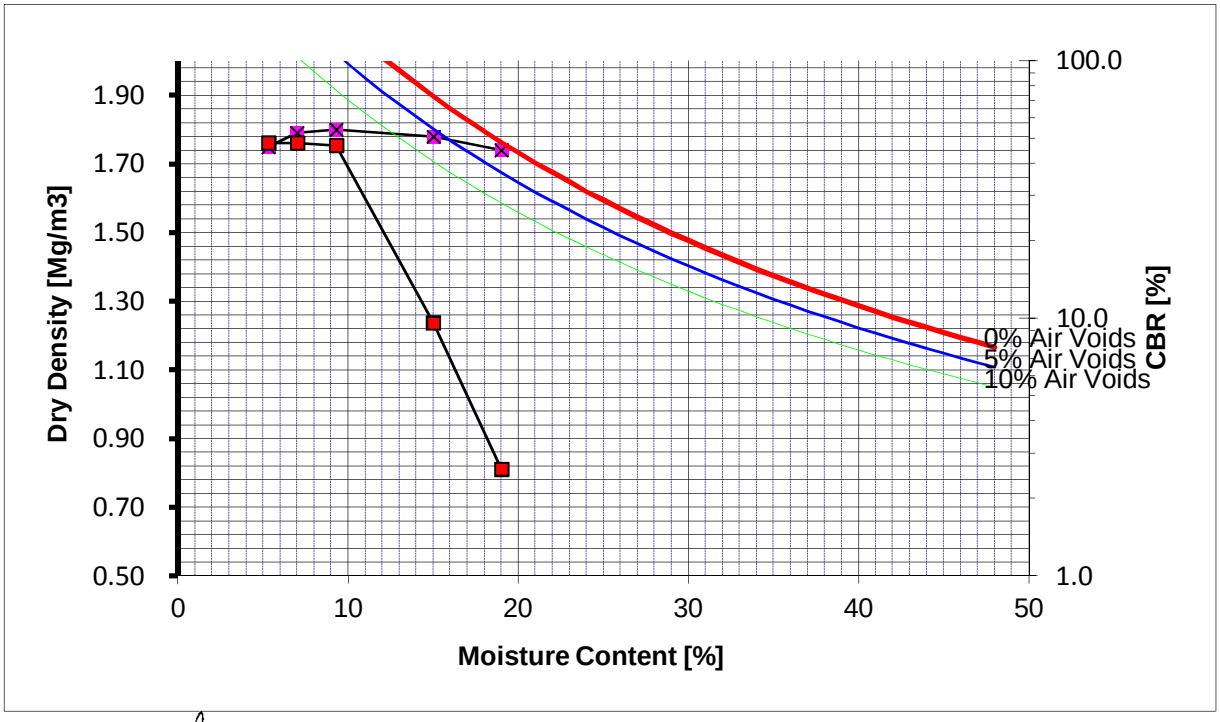
Lab Number L10420

Hole	Sample	Depth [m]
TP5	B3	0.50

Particle density	[Mg/m3]	2.65
Passing 37.5mm	[%]	100
Passing 20mm	[%]	96
Weight of rammer	[Kg]	2.5
No Blows		62
Drop Height	[mm]	300
Number of Layers		3
Crushable Material	[Y/N]	n
Single Sample or Separate Samples		single
Initial Moisture Content	[%]	19

Comments
Particle Density assumed.
Material Description
MADE GROUND (soft to firm dark grey slightly gravelly slightly sandy clay).

Point Number		**1**	**2**	**3**	**4**	**5**
Moisture content	[%]	19	15	9.3	7.0	5.3
Bulk Density	[Mg/m3]	2.08	2.05	1.96	1.92	1.84
Dry Density	[Mg/m3]	1.74	1.78	1.80	1.79	1.75
CBR Correction Applied	Y/N	N	N	N	N	N
CBR Sample	Top/Bottom	Top	Top	Top	Top	Top
CBR 2.5mm	[%]	2.4	7.5	47	41	40
CBR 5.0mm	[%]	2.6	9.6	45	48	48
Design CBR	[%]	2.6	9.6	47	48	48



Checked

Approved

TEST REPORT
PARTICLE SIZE DISTRIBUTION
BS EN 933-1

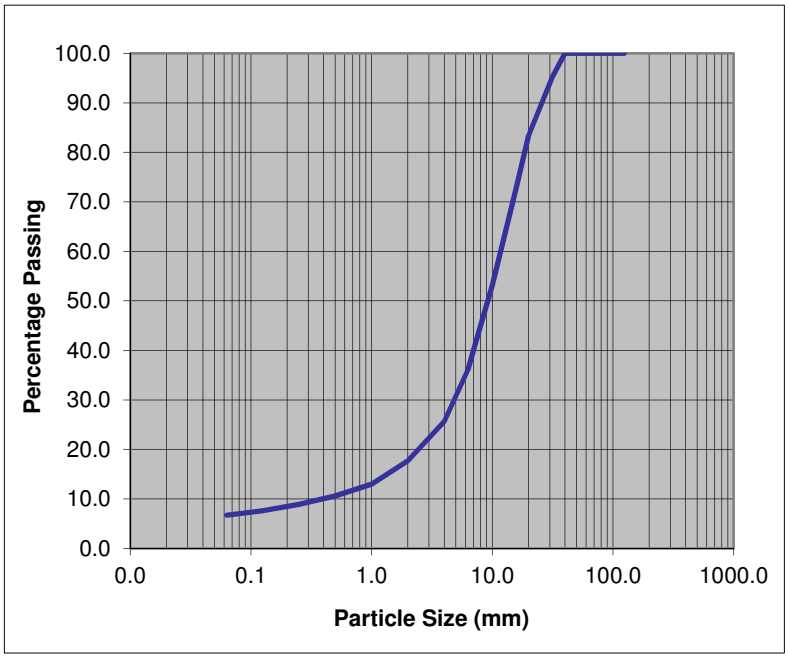
Project No.:	**D4056-14**	Client:	**Apex Drilling**
Project Name:	**Crane Cross**	Address:	**Sturmi Way Village Farm Industrial Estate Pyle Bridgend**
Sample No.:	**2723**		

Site Reference:	**DCP1**	Sample Type:	**Bulk**
Location in works:	**Unknown**	Material Description:	**Brown grey slightly silty sandy GRAVEL**
Date Sampled:	**Unknown**	Material Source:	**Unknown**
Sampled By:	**Client**	Material Supplier:	**Unknown**
Sampling Certificate Received:	**No**	Specification:	**SHW Series 800**
Date Received:	**11 April 2014**	Date Tested:	**17 April 2014**

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	100
40.0	100	
31.5	95	75 - 99
20.0	83	
16.0	73	43 - 81
10.0	53	
8.0	45	23 - 66
6.3	36	
4.0	26	12 - 53
2.0	18	6 - 42
1.0	13	3 - 32
0.5	11	
0.250	9	
0.125	8	
0.063	7	0 - 9

Moisture Content (%)	6.6



Remarks: Material complies with Type 1 grading requirements

QA Ref.	Apex Testing Solutions	Approver	Date	Fig.
EN 933-1 Rev. 1.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 UKAS TESTING 7771	R. Anstee	24/04/2014	AGG 1
		R Anstee, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION
BS EN 933-1

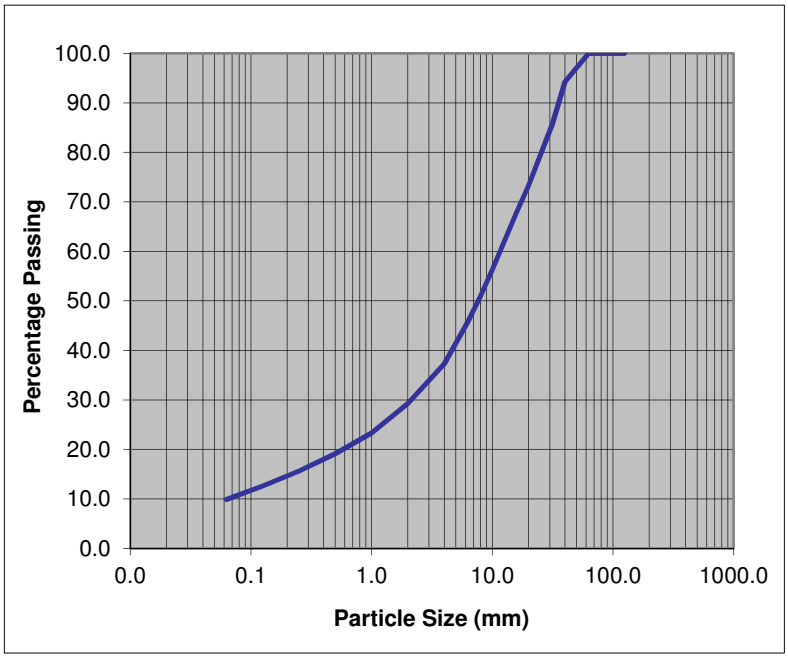
Project No.:	**D4056-14**	Client:	**Apex Drilling**
Project Name:	**Crane Cross**	Address:	**Sturmi Way Village Farm Industrial Estate Pyle Bridgend**
Sample No.:	**2724**		

Site Reference:	**DCP2**	Sample Type:	**Bulk**
Location in works:	**Unknown**	Material Description:	**Brown grey silty sandy GRAVEL**
Date Sampled:	**Unknown**	Material Source:	**Unknown**
Sampled By:	**Client**	Material Supplier:	**Unknown**
Sampling Certificate Received:	**No**	Specification:	**SHW Series 800**
Date Received:	**11 April 2014**	Date Tested:	**17 April 2014**

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	100
40.0	94	
31.5	86	75 - 99
20.0	73	
16.0	68	43 - 81
10.0	56	
8.0	51	23 - 66
6.3	46	
4.0	37	12 - 53
2.0	29	6 - 42
1.0	23	3 - 32
0.5	19	
0.250	16	
0.125	13	
0.063	10	0 - 9*

Moisture Content (%)	5.0



Remarks: Material does not comply with Type 1 grading requirements

QA Ref.	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	UKAS TESTING 7771	Approver R. Anstee	Date 24/04/2014	Fig. AGG 2
EN 933-1 Rev. 1.0			R Anstee, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION
BS EN 933-1

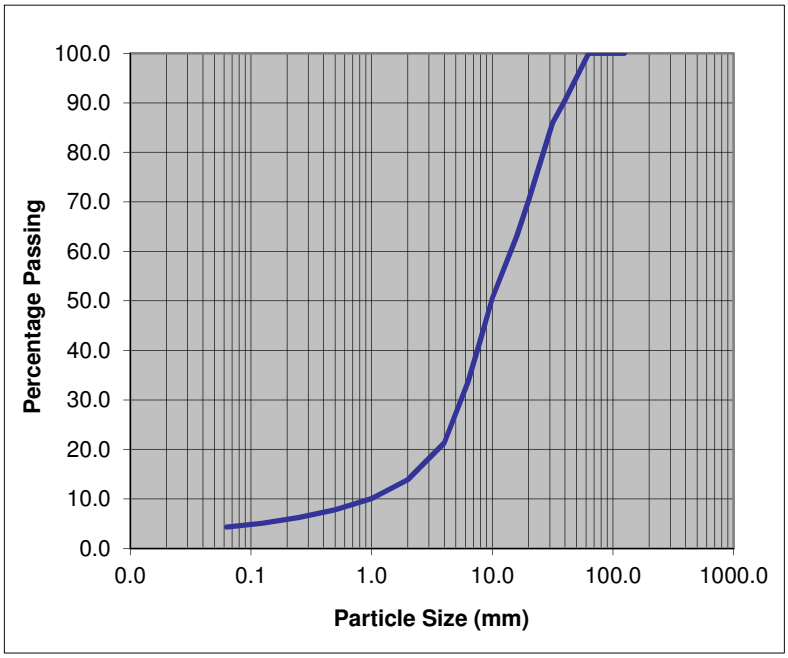
Project No.:	**D4056-14**	Client:	**Apex Drilling**
Project Name:	**Crane Cross**	Address:	**Sturmi Way Village Farm Industrial Estate Pyle Bridgend**
Sample No.:	**2725**		

Site Reference:	**DCP3**	Sample Type:	**Bulk**
Location in works:	**Unknown**	Material Description:	**Brown grey slightly silty sandy GRAVEL**
Date Sampled:	**Unknown**	Material Source:	**Unknown**
Sampled By:	**Client**	Material Supplier:	**Unknown**
Sampling Certificate Received:	**No**	Specification:	**SHW Series 800**
Date Received:	**11 April 2014**	Date Tested:	**17 April 2014**

TEST RESULTS

Particle Size (mm)	Percentage Passing	Specification
125.0	100	
80.0	100	
63.0	100	100
40.0	90	
31.5	86	75 - 99
20.0	70	
16.0	63	43 - 81
10.0	51	
8.0	42	23 - 66
6.3	34	
4.0	21	12 - 53
2.0	14	6 - 42
1.0	10	3 - 32
0.5	8	
0.250	6	
0.125	5	
0.063	4	0 - 9

Moisture Content (%)	7.5



Remarks: Material complies with Type 1 grading requirements

LAB TEST CERTIFICATE

Certificate No: K14/3072/28687/1/1

To: Robert Brewer

Client: Apex Drilling
Sturmi Way
Village Farm Ind Est
Pyle
Bridgend,CF33 6BZ

MATtest Southern Limited
materials testing & consultancy

Unit 2 Glover Court
Burymead Road
Hitchin
Herts, SG5 1RT

Tel: 01462 423 040
email: info@mattestsouth.co.uk
Website: www.mattestsouth.co.uk

Summary of Bituminous Laboratory Testing

Crane Cross GI

Location: Crane Cross GI

Date Received: 01.05.14

Testing Completed

MSL Sample Number	28687	28688	28689							
Analysis	X	X	X							
Maximum Density										
Refusal Air Voids										
Bulk Density										
Wheel Tracking										
ITSM										
Core Log										
Binder Recovery										
Surface Layer Depth	12	11	12							
Base Layer Depth	174	69	73							
Total Depth	186	80	85							

Comments:

Approved For Issue

S Wilson (Laboratory Manager - Herts)

Date: 12/05/2014

UKAS TESTING 1740

MATtest Southern Ltd
Unit 1 Glover Court
Burymead Road
Hitchin
Hertfordshire
SG5 1RT
Tel: 01462 423040
Email: info@mattestsouth.co.uk

UKAS TESTING
1740

BITUMINOUS ANALYSIS TEST REPORT
for Product: 03019/ Unknown Specification_ Bitumen
Supplier/ source: Not Known

Material type: Unknown Supplier Test method: Binder by difference to BS EN 12697-1

SAMPLE INFORMATION

Sampled/ tested
Thu 01 May 2014/ 07-05-14
at 0000 hrs

Sample number	**28687**		
Location	Crane Cross Gl	Chainage/layer	Depth gl - 0.2m
Ticket/truck number	Client Sample Ref: DCP1gl-0.2m	Weather conditions	-
Sampling notes	Client Sampled	Aggregate type	-
Sampling Method	Cut Out	Sampling Certificate	-

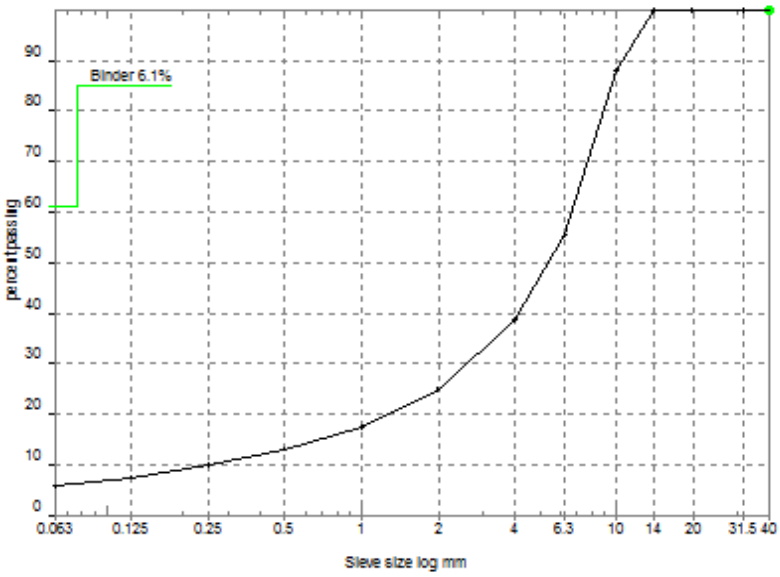
SAMPLE ANALYSIS

Sieve size	Percent passing	Specification limits	Complies ?
40mm	100	100 - 100	yes
31.5mm	100	-	-
20mm	100	-	-
14mm	100	-	-
10mm	88	-	-
6.3mm	55	-	-
4mm	39	-	-
2mm	25	-	-
1mm	18	-	-
500µm	13	-	-
250µm	10	-	-
125µm	8	-	-
63µm	6	-	-
Binder content %	6.1	not specified	na

Parameters are evaluated to the accuracy of spec. limits

REMARKS

Compliance status ok



Signed __

MATtest Southern Ltd
Unit 1 Glover Court
Burymead Road
Hitchin
Hertfordshire
SG5 1RT
Tel: 01462 423040
Email: info@mattestsouth.co.uk

UKAS TESTING
1740

BITUMINOUS ANALYSIS TEST REPORT

for Product: 03019/ Unknown Specification_ Bitumen

Supplier/ source: Not Known

Material type: Unknown Supplier Test method: Binder by difference to BS EN 12697-1

SAMPLE INFORMATION

Sampled/ tested
Thu 01 May 2014/ 07-05-14
at 0000 hrs

Sample number	**28688**		
Location	Crane Cross Gl	Chainage/layer	Depth gl - 0.1m
Ticket/truck number	Client Sample Ref: DCP2gl-0.1m	Weather conditions	-
Sampling notes	Client Sampled	Aggregate type	-
Sampling Method	Cut Out	Sampling Certificate	-

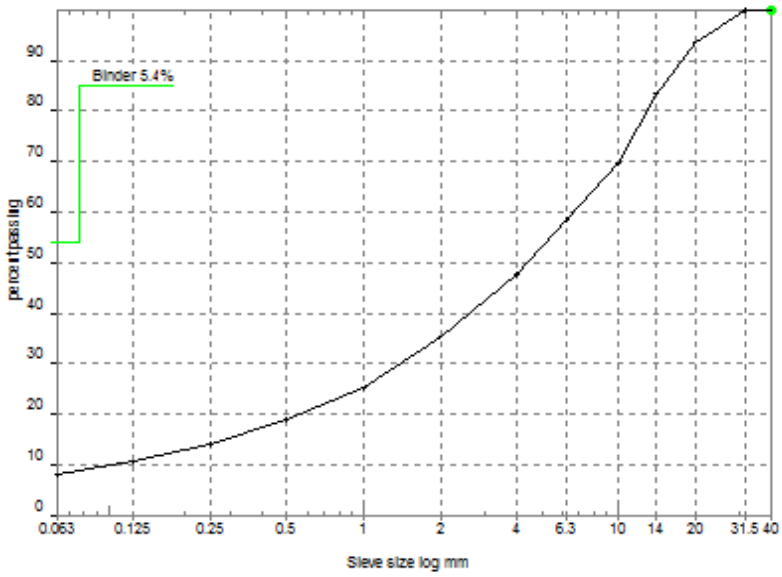
SAMPLE ANALYSIS

Sieve size	Percent passing	Specification limits	Complies ?
40mm	100	100 - 100	yes
31.5mm	100	-	-
20mm	94	-	-
14mm	83	-	-
10mm	70	-	-
6.3mm	59	-	-
4mm	48	-	-
2mm	35	-	-
1mm	25	-	-
500µm	19	-	-
250µm	14	-	-
125µm	11	-	-
63µm	8	-	-
Binder content %	5.4	not specified	na

Parameters are evaluated to the accuracy of spec. limits

REMARKS

Compliance status ok



Signed __

MATtest Southern Ltd
Unit 1 Glover Court
Burymead Road
Hitchin
Hertfordshire
SG5 1RT
Tel: 01462 423040
Email: info@mattestsouth.co.uk

UKAS TESTING
1740

BITUMINOUS ANALYSIS TEST REPORT
for Product: 03019/ Unknown Specification_ Bitumen
Supplier/ source: Not Known

Material type: Unknown Supplier Test method: Binder by difference to BS EN 12697-1

SAMPLE INFORMATION

Sampled/ tested
Thu 01 May 2014/ 07-05-14
at 0000 hrs

Sample number	**28689**		
Location	Crane Cross Gl	Chainage/layer	Depth gl - 0.1m
Ticket/truck number	Client Sample Ref: DCP3gl-0.1m	Weather conditions	-
Sampling notes	Client Sampled	Aggregate type	-
Sampling Method	Cut Out	Sampling Certificate	-

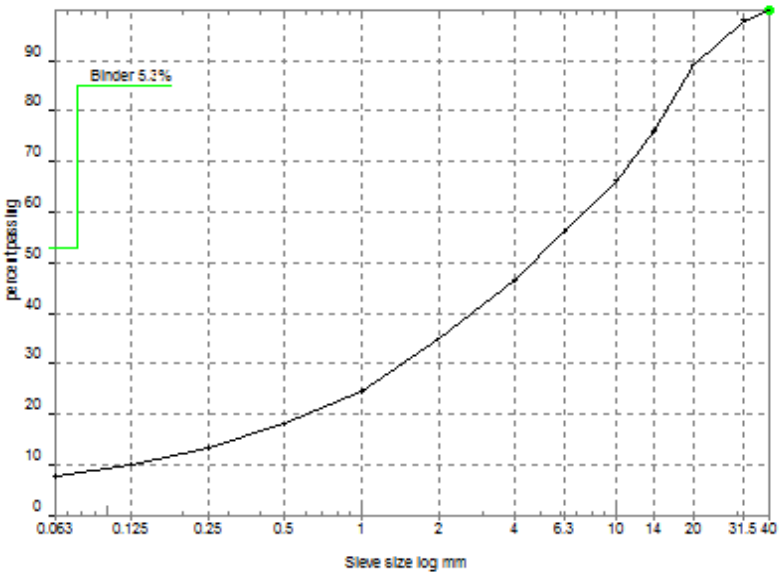
SAMPLE ANALYSIS

Sieve size	Percent passing	Specification limits	Complies ?
40mm	100	100 - 100	yes
31.5mm	98	-	-
20mm	89	-	-
14mm	76	-	-
10mm	66	-	-
6.3mm	56	-	-
4mm	46	-	-
2mm	35	-	-
1mm	25	-	-
500µm	18	-	-
250µm	13	-	-
125µm	10	-	-
63µm	8	-	-
Binder content %	5.3	not specified	na

Parameters are evaluated to the accuracy of spec. limits

REMARKS

Compliance status ok



Signed __

ALcontrol Laboratories

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: mkt@alcontrol.com
Website: www.alcontrol.com

Apex Drilling Services Limited
Sturmi Way
Village Farm Industrial Estate
Pyle
Bridgend
CF33 6BZ

Attention: Aled Henry

CERTIFICATE OF ANALYSIS

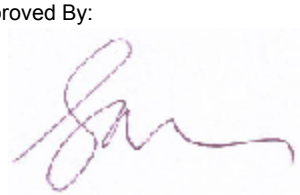
Date:	03 April 2014
Customer:	H_APEXDRL_BGD
Sample Delivery Group (SDG):	140322-72
Your Reference:	1306
Location:	Crane Cross
Report No:	265510

We received 12 samples on Saturday March 22, 2014 and 6 of these samples were scheduled for analysis which was completed on Thursday April 03, 2014. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	140322-72	**Location:**	Crane Cross	**Order Number:**	
Job:	H_APEXDRL_BGD-15	**Customer:**	Apex Drilling Services Limited	**Report Number:**	265510
Client Reference:	1306	**Attention:**	Aled Henry	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
9026391	TP1		0.30	20/03/2014
9026392	TP1		0.80	20/03/2014
9026393	TP2		0.10	20/03/2014
9026394	TP2		0.70	20/03/2014
9026396	TP3		0.50	20/03/2014
9026397	TP3		0.90	20/03/2014
9026398	TP4		0.30	20/03/2014
9026399	TP4		0.70	20/03/2014
9026400	TP5		0.40	20/03/2014
9026401	TP5		0.90	20/03/2014
9026402	TP6		0.30	20/03/2014
9026403	TP6		0.80	20/03/2014

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG:	140322-72	**Location:**	Crane Cross	**Order Number:**	
Job:	H_APEXDRL_BGD-15	**Customer:**	Apex Drilling Services Limited	**Report Number:**	265510
Client Reference:	1306	**Attention:**	Aled Henry	**Superseded Report:**	

SOLID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container
			9026391	TP1		0.30	250g Amber Jar (AL
							400g Tub (ALE214)
							60g VOC (ALE215)
			9026393	TP2		0.10	250g Amber Jar (AL
							400g Tub (ALE214)
							60g VOC (ALE215)
			9026396	TP3		0.50	250g Amber Jar (AL
							400g Tub (ALE214)
							60g VOC (ALE215)
			9026398	TP4		0.30	250g Amber Jar (AL
							400g Tub (ALE214)
							60g VOC (ALE215)
			9026400	TP5		0.40	250g Amber Jar (AL
							400g Tub (ALE214)
							60g VOC (ALE215)
			9026402	TP6		0.30	250g Amber Jar (AL
							400g Tub (ALE214)
							60g VOC (ALE215)
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 6					X X X X X X
EPH CWG (Aliphatic) GC (S)	All	NDPs: 0 Tests: 6	X X X X X X				
EPH CWG (Aromatic) GC (S)	All	NDPs: 0 Tests: 6	X X X X X X				
GRO by GC-FID (S)	All	NDPs: 0 Tests: 6	X X X X X X				
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 6	X X X X X X				
Metals in solid samples by OES	All	NDPs: 0 Tests: 6	X X X X X X				
Sample description	All	NDPs: 0 Tests: 6	X X X X X X				
Total Organic Carbon	All	NDPs: 0 Tests: 6	X X X X X X				
TPH CWG GC (S)	All	NDPs: 0 Tests: 6	X X X X X X				

CERTIFICATE OF ANALYSIS

SDG:	140322-72	**Location:**	Crane Cross	**Order Number:**	
Job:	H_APEXDRL_BGD-15	**Customer:**	Apex Drilling Services Limited	**Report Number:**	265510
Client Reference:	1306	**Attention:**	Aled Henry	**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
9026391	TP1	0.30	Light Brown	Silty Clay	0.063 - 0.1 mm	Stones	None
9026393	TP2	0.10	Dark Brown	Silty Clay Loam	0.1 - 2 mm	Vegetation	None
9026396	TP3	0.50	Light Brown	Clay Loam	0.1 - 2 mm	Vegetation	N/A
9026398	TP4	0.30	Dark Brown	Silty Clay Loam	0.1 - 2 mm	Vegetation	N/A
9026400	TP5	0.40	Light Brown	Clay Loam	0.063 - 0.1 mm	Stones	N/A
9026402	TP6	0.30	Dark Brown	Silty Clay Loam	0.1 - 2 mm	Vegetation	N/A

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

CERTIFICATE OF ANALYSIS

SDG:	140322-72	**Location:**	Crane Cross	**Order Number:**	
Job:	H_APEXDRL_BGD-15	**Customer:**	Apex Drilling Services Limited	**Report Number:**	265510
Client Reference:	1306	**Attention:**	Aled Henry	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	TP1	TP2	TP3	TP4	TP5	TP6
			Depth (m)	0.30	0.10	0.50	0.30	0.40	0.30
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
			Date Sampled	20/03/2014	20/03/2014	20/03/2014	20/03/2014	20/03/2014	20/03/2014
			Sample Time	.	.	.	.	.	.
			Date Received	22/03/2014	22/03/2014	22/03/2014	22/03/2014	22/03/2014	22/03/2014
			SDG Ref	140322-72	140322-72	140322-72	140322-72	140322-72	140322-72
			Lab Sample No.(s)	9026391	9026393	9026396	9026398	9026400	9026402
			AGS Reference						
Moisture Content Ratio	%	PM024		18	31	20	23	19	23
Soil Organic Matter (SOM)	<0.35 %	TM132		0.434 #	5.74 #	0.629 #	1.74 #	0.478 #	3.97 #
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #	<0.6 #	<0.6 #	<0.6 #	<0.6 #
Cyanide, Total	<1 mg/kg	TM153		<1 M	<1 M	<1 M	<1 M	<1 M	<1 M
Arsenic	<0.6 mg/kg	TM181		4.27 M	8.67 M	6.26 M	7.53 M	13.4 M	8.36 M
Boron	<0.7 mg/kg	TM181		1.14 #	1.69 #	1.3 #	1.59 #	1.69 #	2.07 #
Cadmium	<0.02 mg/kg	TM181		0.0812 M	0.235 M	0.0459 M	0.106 M	0.226 M	0.198 M
Copper	<1.4 mg/kg	TM181		22.8 M	7.63 M	9.55 M	4.74 M	13.3 M	8.14 M
Lead	<0.7 mg/kg	TM181		15.6 M	25 M	19.7 M	17.6 M	16.2 M	23.7 M
Mercury	<0.14 mg/kg	TM181		<0.14 M	<0.14 M	<0.14 M	<0.14 M	<0.14 M	<0.14 M
Nickel	<0.2 mg/kg	TM181		35.7 M	7.12 M	11.5 M	10.4 M	21.6 M	9.73 M
Selenium	<1 mg/kg	TM181		<1 #	<1 #	<1 #	<1 #	<1 #	<1 #
Tin	<0.24 mg/kg	TM181		<0.24 #	0.728 #	<0.24 #	<0.24 #	<0.24 #	0.532 #
Vanadium	<0.2 mg/kg	TM181		22.6 #	31.3 #	21.9 #	24.7 #	23.5 #	23.7 #
Zinc	<1.9 mg/kg	TM181		77.6 M	27.4 M	19.4 M	18.9 M	39 M	34.3 M

CERTIFICATE OF ANALYSIS

SDG:	140322-72	**Location:**	Crane Cross	**Order Number:**	
Job:	H_APEXDRL_BGD-15	**Customer:**	Apex Drilling Services Limited	**Report Number:**	265510
Client Reference:	1306	**Attention:**	Aled Henry	**Superseded Report:**	

TPH CWG (S)

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	TP1	TP2	TP3	TP4	TP5	TP6
			Depth (m)	0.30	0.10	0.50	0.30	0.40	0.30
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
			Date Sampled	20/03/2014	20/03/2014	20/03/2014	20/03/2014	20/03/2014	20/03/2014
			Sample Time	.	.	.	.	.	.
			Date Received	22/03/2014	22/03/2014	22/03/2014	22/03/2014	22/03/2014	22/03/2014
			SDG Ref	140322-72	140322-72	140322-72	140322-72	140322-72	140322-72
			Lab Sample No.(s)	9026391	9026393	9026396	9026398	9026400	9026402
			AGS Reference						
GRO Surrogate % recovery**	%	TM089		104	93	93	94	116	103
GRO TOT (Moisture Corrected)	<44 µg/kg	TM089		<44 M	<44 M	<44 M	<44 M	<44 M	<44 M
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089		<5 M	<5 M	<5 M	<5 M	<5 M	<5 M
Benzene	<10 µg/kg	TM089		<10 M	<10 M	<10 M	<10 M	<10 M	<10 M
Toluene	<2 µg/kg	TM089		<2 M	<2 M	<2 M	<2 M	<2 M	<2 M
Ethylbenzene	<3 µg/kg	TM089		<3 M	<3 M	<3 M	<3 M	<3 M	<3 M
m,p-Xylene	<6 µg/kg	TM089		<6 M	<6 M	<6 M	<6 M	<6 M	<6 M
o-Xylene	<3 µg/kg	TM089		<3 M	<3 M	<3 M	<3 M	<3 M	<3 M
sum of detected mpo xylene by GC	<9 µg/kg	TM089		<9	<9	<9	<9	<9	<9
sum of detected BTEX by GC	<24 µg/kg	TM089		<24	<24	<24	<24	<24	<24
Aliphatics >C5-C6	<10 µg/kg	TM089		<10	<10	<10	<10	<10	<10
Aliphatics >C6-C8	<10 µg/kg	TM089		<10	<10	<10	<10	<10	<10
Aliphatics >C8-C10	<10 µg/kg	TM089		<10	<10	<10	<10	<10	<10
Aliphatics >C10-C12	<10 µg/kg	TM089		<10	<10	<10	<10	<10	<10
Aliphatics >C12-C16	<100 µg/kg	TM173		<100	<100	<100	<100	<100	<100
Aliphatics >C16-C21	<100 µg/kg	TM173		<100	<100	<100	<100	<100	<100
Aliphatics >C21-C35	<100 µg/kg	TM173		<100	2310	<100	<100	<100	<100
Aliphatics >C35-C44	<100 µg/kg	TM173		<100	<100	3510	<100	<100	<100
Total Aliphatics >C12-C44	<100 µg/kg	TM173		<100	2310	3510	<100	<100	<100
Aromatics >EC5-EC7	<10 µg/kg	TM089		<10	<10	<10	<10	<10	<10
Aromatics >EC7-EC8	<10 µg/kg	TM089		<10	<10	<10	<10	<10	<10
Aromatics >EC8-EC10	<10 µg/kg	TM089		<10	<10	<10	<10	<10	<10
Aromatics >EC10-EC12	<10 µg/kg	TM089		<10	<10	<10	<10	<10	<10
Aromatics >EC12-EC16	<100 µg/kg	TM173		808	<100	<100	<100	<100	117
Aromatics >EC16-EC21	<100 µg/kg	TM173		<100	<100	<100	<100	<100	<100
Aromatics >EC21-EC35	<100 µg/kg	TM173		1270	11200	<100	7140	<100	8070
Aromatics >EC35-EC44	<100 µg/kg	TM173		4770	5170	956	3300	334	2640
Aromatics >EC40-EC44	<100 µg/kg	TM173		2040	1360	754	1100	258	993
Total Aromatics >EC12-EC44	<100 µg/kg	TM173		3990	12600	<100	9580	<100	9730
Total Aliphatics & Aromatics >C5-C44	<100 µg/kg	TM173		3990	14900	3510	9580	<100	9740

CERTIFICATE OF ANALYSIS

SDG:	140322-72	**Location:**	Crane Cross	**Order Number:**	
Job:	H_APEXDRL_BGD-15	**Customer:**	Apex Drilling Services Limited	**Report Number:**	265510
Client Reference:	1306	**Attention:**	Aled Henry	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)		
TM132	In - house Method	ELTRA CS800 Operators Guide		
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser		
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser		
TM173	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GC-FID		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	140322-72	**Location:**	Crane Cross	**Order Number:**	
Job:	H_APEXDRL_BGD-15	**Customer:**	Apex Drilling Services Limited	**Report Number:**	265510
Client Reference:	1306	**Attention:**	Aled Henry	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	9026391	9026393	9026396	9026398	9026400	9026402
Customer Sample Ref.	TP1	TP2	TP3	TP4	TP5	TP6
AGS Ref.						
Depth	0.30	0.10	0.50	0.30	0.40	0.30
Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Cyanide Comp/Free/Total/Thiocyanate	02-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014
EPH CWG (Aliphatic) GC (S)	02-Apr-2014	02-Apr-2014	03-Apr-2014	03-Apr-2014	03-Apr-2014	03-Apr-2014
EPH CWG (Aromatic) GC (S)	02-Apr-2014	02-Apr-2014	03-Apr-2014	03-Apr-2014	03-Apr-2014	03-Apr-2014
GRO by GC-FID (S)	01-Apr-2014	02-Apr-2014	01-Apr-2014	01-Apr-2014	02-Apr-2014	02-Apr-2014
Hexavalent Chromium (s)	02-Apr-2014	03-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014	03-Apr-2014
Metals in solid samples by OES	02-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014
Sample description	31-Mar-2014	31-Mar-2014	31-Mar-2014	31-Mar-2014	31-Mar-2014	31-Mar-2014
Total Organic Carbon	02-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014
TPH CWG GC (S)	02-Apr-2014	02-Apr-2014	03-Apr-2014	03-Apr-2014	03-Apr-2014	03-Apr-2014

SDG:	140322-72	**Location:**	Crane Cross	**Order Number:**	
Job:	H_APEXDRL_BGD-15	**Customer:**	Apex Drilling Services Limited	**Report Number:**	265510
Client Reference:	1306	**Attention:**	Aled Henry	**Superseded Report:**	

Appendix
General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICS and SVOC TICS.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP -No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals -total metals must be requested separately.

11. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

14. **Product analyses** -Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors
employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before presevation was performed
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -
Trace -Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

ALcontrol Laboratories

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: mkt@alcontrol.com
Website: www.alcontrol.com

Apex Testing Solutions Limited
Sturmi Way
Village Farm Industrial Estate
Pyle
Bridgend
CF33 6BZ

Attention: Lisa Maiden

CERTIFICATE OF ANALYSIS

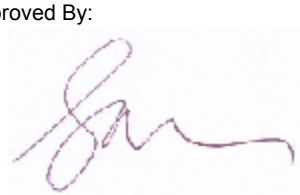
Date:	08 April 2014
Customer:	H_APEXTEST_BRG
Sample Delivery Group (SDG):	140331-12
Your Reference:	D4056-14
Location:	Crane Cross
Report No:	265933

We received 5 samples on Saturday March 29, 2014 and 5 of these samples were scheduled for analysis which was completed on Tuesday April 08, 2014. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:



Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	140331-12	**Location:**	Crane Cross	**Order Number:**	AT139
Job:	H_APEXTEST_BRG-40	**Customer:**	Apex Testing Solutions Limited	**Report Number:**	265933
Client Reference:	D4056-14	**Attention:**	Lisa Maiden	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
9067870	TP1	D2	0.70 - 0.80	
9067873	TP4	D3	0.40	
9067877	TP5	D5	1.10	
9067879	TP6	D5	1.50	
9067880	TP6	D7	2.80 - 2.90	

Only received samples which have had analysis scheduled will be shown on the following pages.

CERTIFICATE OF ANALYSIS

SDG:	140331-12	**Location:**	Crane Cross	**Order Number:**	AT139
Job:	H_APEXTEST_BRG-40	**Customer:**	Apex Testing Solutions Limited	**Report Number:**	265933
Client Reference:	D4056-14	**Attention:**	Lisa Maiden	**Superseded Report:**	

SOLID

Results Legend

X **Test**

N **No Determination Possible**

			Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container
			906870	TP1	D2	0.70 - 0.80	1kg TUB
			906873	TP4	D3	0.40	400g Tub (ALE214)
			906877	TP5	D5	1.10	400g Tub (ALE214)
			906879	TP6	D5	1.50	400g Tub (ALE214)
			906880	TP6	D7	2.80 - 2.90	1kg TUB
Loss on Ignition in soils	All	NDPs: 0 Tests: 5	X	X	X	X	X
pH	All	NDPs: 0 Tests: 5	X	X	X	X	X
Sample description	All	NDPs: 0 Tests: 5	X	X	X	X	X
Total Sulphate	All	NDPs: 0 Tests: 5	X	X	X	X	X

CERTIFICATE OF ANALYSIS

SDG:	140331-12	**Location:**	Crane Cross	**Order Number:**	AT139
Job:	H_APEXTEST_BRG-40	**Customer:**	Apex Testing Solutions Limited	**Report Number:**	265933
Client Reference:	D4056-14	**Attention:**	Lisa Maiden	**Superseded Report:**	

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Grain size	Inclusions	Inclusions 2
9067870	TP1	0.70 - 0.80	Dark Brown	Sandy Silt Loam	0.1 - 2 mm	N/A	N/A
9067873	TP4	0.40	Yellow	Sandy Silt Loam	0.1 - 2 mm	Vegetation	None
9067877	TP5	1.10	Light Brown	Clay Loam	0.1 - 2 mm	Stones	N/A
9067879	TP6	1.50	Light Brown	Loamy Sand	0.1 - 2 mm	Stones	None
9067880	TP6	2.80 - 2.90	Light Brown	Sandy Loam	0.1 - 2 mm	Stones	None

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally ocurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

CERTIFICATE OF ANALYSIS

SDG:	140331-12	**Location:**	Crane Cross	**Order Number:**	AT139
Job:	H_APEXTEST_BRG-40	**Customer:**	Apex Testing Solutions Limited	**Report Number:**	265933
Client Reference:	D4056-14	**Attention:**	Lisa Maiden	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample R	TP1	TP4	TP5	TP6	TP6
			Depth (m)	0.70 - 0.80	0.40	1.10	1.50	2.80 - 2.90
			Sample Type	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid	Soil/Solid
			Date Sampled	-	-	-	-	-
			Sample Time	.	.	.	.	.
			Date Received	29/03/2014	29/03/2014	29/03/2014	29/03/2014	29/03/2014
			SDG Ref	140331-12	140331-12	140331-12	140331-12	140331-12
			Lab Sample No.(s)	9067870	9067873	9067877	9067879	9067880
			AGS Reference	D2	D3	D5	D5	D7
Moisture Content Ratio	%	PM024		16 §	23 §	11 §	18 §	10 §
Loss on ignition	<0.7 %	TM018		5.3 § M	5.84 § M	3.2 § M	2.53 § M	1.64 § M
pH	1 pH Units	TM133		7.09 § M	6.23 § M	6.86 § M	7.12 § M	7.09 § M
Sulphate, acid soluble (total)	<0.02 %	TM221		<0.02 §	<0.02 §	<0.02 §	<0.02 §	<0.02 §

CERTIFICATE OF ANALYSIS

SDG:	140331-12	**Location:**	Crane Cross	**Order Number:**	AT139
Job:	H_APEXTEST_BRG-40	**Customer:**	Apex Testing Solutions Limited	**Report Number:**	265933
Client Reference:	D4056-14	**Attention:**	Lisa Maiden	**Superseded Report:**	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample [1]	Surrogate Corrected
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition		
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer		

[1] Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG:	140331-12	**Location:**	Crane Cross	**Order Number:**	AT139
Job:	H_APEXTEST_BRG-40	**Customer:**	Apex Testing Solutions Limited	**Report Number:**	265933
Client Reference:	D4056-14	**Attention:**	Lisa Maiden	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	9067870	9067873	9067877	9067879	9067880
Customer Sample Ref.	TP1	TP4	TP5	TP6	TP6
AGS Ref.	D2	D3	D5	D5	D7
Depth	0.70 - 0.80	0.40	1.10	1.50	2.80 - 2.90
Type	SOLID	SOLID	SOLID	SOLID	SOLID
Loss on Ignition in soils	04-Apr-2014	04-Apr-2014	04-Apr-2014	04-Apr-2014	04-Apr-2014
pH	02-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014	02-Apr-2014
Sample description	01-Apr-2014	01-Apr-2014	01-Apr-2014	01-Apr-2014	01-Apr-2014
Total Sulphate	07-Apr-2014	07-Apr-2014	08-Apr-2014	08-Apr-2014	08-Apr-2014

SDG:	140331-12	**Location:**	Crane Cross	**Order Number:**	AT139
Job:	H_APEXTEST_BRG-40	**Customer:**	Apex Testing Solutions Limited	**Report Number:**	265933
Client Reference:	D4056-14	**Attention:**	Lisa Maiden	**Superseded Report:**	

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH4 by the BRE method, VOC TICS and SVOC TICS.

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALcontrol Laboratories reserve the right to charge for samples received and stored but not analysed.

4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as “Not detected”. If no asbestos fibre types are found all will be reported as “Not detected” and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

7. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

9. NDP -No determination possible due to insufficient/unsuitable sample.

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals -total metals must be requested separately.

11. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

13. **Surrogate recoveries** -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRO and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

14. **Product analyses** -Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors
employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

17. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

18. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

20. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

22. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

23. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Samples exceeded holding time before presevation was performed
§	Sampled on date not provided
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to sampled on date
&	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using Alcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: -
Trace -Where only one or two asbestos fibres were identified.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix D
Soil GRQA

Key statistical symbols and terms

GAC	Generic Assessment Criteria
Normality	Shapiro-Wilk test provides a reliable check on whether a test based on normailty (like the one-sample t-test) can be applied on the data set under scrutiny. Where the size of a data set is greater than n=50 a visual assessment of the normailty of the data is undertaken using a probabilty plot. **Normal**, deviation of the data set from normality is not significant. One-sample t-test can be used when testing the mean against a Critical concentration/GAC **Not Normal**, deviation of the data set from normality has been identified as being significant. If normality of a relatively large data set appears to be normal through visual assessment but is indicated to be not normal by the Shapiro-Wilk test, then the One-side Chebychev Theorum has used when testing the mean against a Critical concentration/GAC.
No. exceeding GAC	Number of sample concentrations exceeding the defined GAC.
No. Outliers	Number of statistical Outliers determined using Grubbs Test for data sets n>2. Where the maximum value in a data set has been identified as an outlier, the test has been repeated on the second largest value (by removing the max value) and then the 3rd largest value... etc, until the maximum concetration is not reported as an
Test	**t**, the one-sample t-test (for datasets n>1) **c**, the one-sided Chebychev Theorum or Chebychev Inequality (for data sets n>1) N.B. the tests for comparing the mean against a critical concentration can only be applied when n>1 and the sample population standard deviation>0
UCL95%	95% Upper Confidence Limit (of the true population mean)
Test Result	**FAIL**, the 95% UCL exceeds the defined GAC. **PASS**, the 95% UCL does not exceed the defined GAC
Bold Red Type	Used to highlight the "No. exceeding GAC", "no. Outliers" and "Test Result" on the Summary of Statistics Sheet. Where the test result is reported as "FAIL" the whole row for a particular contaminant is highlighted.
Filled Cells	Used to highlight exceedances (individual sample concentrations exceeding the GAC) in the Summary of Concentrations sheets.
Bold Underlined	Used to highlight maximum value outliers (as determined using an iterative Grubbs Test) in the Summary of Concentrations sheets. Outliers may also be shown in filled cells (exceedances).

Summary of Statistics

Geology:	**Silty Clay Loam**
Site End Use:	**Commercial**
Soil Type:	**Sand - 1% SOM**

Project Number CS/71529/GT01
Client: Client

Compound	GAC (mg/kg)	No. Samples	Range of values (mg/kg)	exceeding GAC	Normality	No. Outliers	Test	$UCL_{95\%}$ (of the true population mean)	Test Result
Metals									
Arsenic SGV	640	6	4.27 - 13.4	0	Normal	1	t	10.6	PASS
Boron	110000	6	1.14 - 2.07	0	Normal	None	t	1.8	PASS
Cadmium SGV	230	6	0.046 - 0.235	0	Normal	None	t	0.2	PASS
Chromium VI	330	6	0.6 - 0.6	0					
Copper	39000	6	4.74 - 22.8	0	Normal	1	t	16.3	PASS
Lead	4400	6	15.6 - 25	0	Normal	None	t	22.9	PASS
Mercury SGV	3600	6	0.14 - 0.14	0					
Nickel SGV	1800	6	7.12 - 35.7	0	Normal	2	t	24.9	PASS
Selenium SGV	13000	6	1 - 1	0					
Vanadium	5600	6	21.9 - 31.3	0	Normal	1	t	27.4	PASS
Zinc	660000	6	18.9 - 77.6	0	Normal	1	t	54.1	PASS
Non-Metals									
Inorganic Cyanide	16000	0							
TPH									
Aliphatic C5-6	2600	6	10 - 10	0					
Aliphatic C6-8	5000	6	10 - 10	0					
Aliphatic C8-10	1200	6	10 - 10	0					
Aliphatic C10-12	6300	6	10 - 10	0					
Aliphatic C12-16	25000	6	100 - 100	0					
Aliphatic C16-21	N/A	6	100 - 100	N/A			N/A		N/A
Aliphatic C21-35	N/A	6	100 - 2310	N/A	Not Normal	1	N/A	2074.3	N/A
Aliphatic C16-35	1200000	0							
Aromatic C8-10	2200	6	10 - 10	0					
Aromatic C10-12	9700	6	10 - 10	0					
Aromatic C12-16	25000	6	100 - 808	0	Not Normal	2	c	733.0	PASS
Aromatic C16-21	27000	6	100 - 100	0					
Aromatic C21-35	28000	0							
VOCs									
Benzene SGV	16	6	10 - 10	0					
Chloroethene	0.04	0							
1,2-Dichloroethane	0.36	0							
Ethylbenzene SGV	510	6	3 - 3	0					
Naphthalene	75	0							
Tetrachloroethanes	63	0							
Tetrachloroethene	91	0							
Tetrachloromethane	1.7	0							
Toluene SGV	835	6	2 - 2	0					
1,1,1-Trichloroethane	390	0							
Trichloroethene	6.6	0							
Xylenes SGV	470	6	6 - 6	0					
SVOCs									
Benz[a]anthracene	140	0							
Benzo[a]pyrene	14	0							
Benzo[b]fluoranthene	140	0							
Benzo[ghi]perylene	140	0							
Benzo[k]fluoranthene	150	0							
Chrysene	1400	0							
Dibenz[ah]anthracene	14	0							
Fluoranthene	54000	0							
Indeno[123-cd]pyrene	140	0							
Naphthalene	75	0							
Phenol SGV	685	0							
Pyrene	76000	0							

Summary of Concentrations

Geology:	**Silty Clay Loam**
Site End Use:	**Commercial**
Soil Type:	**Sand - 1% SOM**

Project Number CS/71529/GT01

Client: Client

		1	2	3	4	5	6	7	8	9	10
Compound	**GAC**	**TPTP1** 0.30m	**TPTP2** 0.10m	**TPTP3** 0.50m	**TPTP4** 0.30m	**TPTP5** 0.40m	**TPTP6** 0.30m				
Metals											
Arsenic SGV	640	4.27	8.67	6.26	7.53	**13.4**	8.36	-	-	-	-
Boron	110000	1.14	1.69	1.3	1.59	1.69	2.07	-	-	-	-
Cadmium SGV	230	0.0812	0.235	0.0459	0.106	0.226	0.198	-	-	-	-
Chromium VI	330	0.6	0.6	0.6	0.6	0.6	0.6	-	-	-	-
Copper	39000	**22.8**	7.63	9.55	4.74	13.3	8.14	-	-	-	-
Lead	4400	15.6	25	19.7	17.6	16.2	23.7	-	-	-	-
Mercury SGV	3600	0.14	0.14	0.14	0.14	0.14	0.14	-	-	-	-
Nickel SGV	1800	**35.7**	7.12	11.5	10.4	**21.6**	9.73	-	-	-	-
Selenium SGV	13000	1	1	1	1	1	1	-	-	-	-
Vanadium	5600	22.6	**31.3**	21.9	24.7	23.5	23.7	-	-	-	-
Zinc	660000	**77.6**	27.4	19.4	18.9	39	34.3	-	-	-	-
Non-Metals											
Inorganic Cyanide	16000	-	-	-	-	-	-	-	-	-	-
TPH											
Aliphatic C5-6	2600	10	10	10	10	10	10	-	-	-	-
Aliphatic C6-8	5000	10	10	10	10	10	10	-	-	-	-
Aliphatic C8-10	1200	10	10	10	10	10	10	-	-	-	-
Aliphatic C10-12	6300	10	10	10	10	10	10	-	-	-	-
Aliphatic C12-16	25000	100	100	100	100	100	100	-	-	-	-
Aliphatic C16-21	N/A	100	100	100	100	100	100	-	-	-	-
Aliphatic C21-35	N/A	100	**2310**	100	100	100	100	-	-	-	-
Aliphatic C16-35	1200000	-	-	-	-	-	-	-	-	-	-
Aromatic C8-10	2200	10	10	10	10	10	10	-	-	-	-
Aromatic C10-12	9700	10	10	10	10	10	10	-	-	-	-
Aromatic C12-16	25000	**808**	100	100	100	100	**117**	-	-	-	-
Aromatic C16-21	27000	100	100	100	100	100	100	-	-	-	-
Aromatic C21-35	28000	-	-	-	-	-	-	-	-	-	-
VOCs											
Benzene SGV	16	10	10	10	10	10	10	-	-	-	-
Chloroethene	0.04	-	-	-	-	-	-	-	-	-	-
1,2-Dichloroethane	0.36	-	-	-	-	-	-	-	-	-	-
Ethylbenzene SGV	510	3	3	3	3	3	3	-	-	-	-
Naphthalene	75	-	-	-	-	-	-	-	-	-	-
Tetrachloroethanes	63	-	-	-	-	-	-	-	-	-	-
Tetrachloroethene	91	-	-	-	-	-	-	-	-	-	-
Tetrachloromethane	1.7	-	-	-	-	-	-	-	-	-	-
Toluene SGV	835	2	2	2	2	2	2	-	-	-	-
1,1,1-Trichloroethane	390	-	-	-	-	-	-	-	-	-	-
Trichloroethene	6.6	-	-	-	-	-	-	-	-	-	-
Xylenes SGV	470	6	6	6	6	6	6	-	-	-	-
SVOCs											
Benz[a]anthracene	140	-	-	-	-	-	-	-	-	-	-
Benzo[a]pyrene	14	-	-	-	-	-	-	-	-	-	-
Benzo[b]fluoranthene	140	-	-	-	-	-	-	-	-	-	-
Benzo[ghi]perylene	140	-	-	-	-	-	-	-	-	-	-
Benzo[k]fluoranthene	150	-	-	-	-	-	-	-	-	-	-
Chrysene	1400	-	-	-	-	-	-	-	-	-	-
Dibenz[ah]anthracene	14	-	-	-	-	-	-	-	-	-	-
Fluoranthene	54000	-	-	-	-	-	-	-	-	-	-
Indeno[123-cd]pyrene	140	-	-	-	-	-	-	-	-	-	-
Naphthalene	75	-	-	-	-	-	-	-	-	-	-
Phenol SGV.	685	-	-	-	-	-	-	-	-	-	-
Pyrene	76000	-	-	-	-	-	-	-	-	-	-

Sample concentrations in mg/kg

We | Listen Create Deliver

www.capita.co.uk/infrastructure

St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW T: 02920 803500