

St Athan Northern Access Road

Factual Ground Investigation Report

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Quality information

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The methodology adopted and the sources of information used by AECOM in providing its services are outlined in this Report. The work described in this Report was undertaken between 21st November 2016 and 9th February 2017 and is based on the conditions encountered and the information available during the said period of time.

Where assessments of works or costs identified in this Report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

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Where field investigations are carried out, these have been restricted to a level of detail required to meet the stated objectives of the services. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant delay in issuing this Report.

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Table of Contents

1.	Introduction.....	5
1.1	General.....	5
1.2	Objectives	5
1.3	Investigation Scope.....	5
2.	Site details.....	5
2.1	Site Location.....	5
2.2	Site Description.....	5
2.2.1	Surrounding Land Uses	6
3.	Published Geology.....	6
3.1	Geology	6
4.	Ground investigation details	7
4.1	Fieldwork	7
4.1.1	Site Work Summary.....	7
4.1.2	Site Access Arrangements.....	7
4.1.3	Ecological Considerations.....	7
4.1.4	Archaeological Considerations.....	7
4.1.5	Buried Service Clearance	8
4.1.6	Sampling.....	8
4.1.7	In-situ Testing.....	8
4.1.8	Groundwater	8
5.	Laboratory Testing.....	9
5.1	Geotechnical Laboratory Testing.....	9
5.2	Chemical Laboratory Testing.....	9
6.	Ground conditions.....	11
6.1	Stratigraphy	11
6.1.1	Made Ground.....	11
6.1.2	Probable Alluvium.....	11
6.1.3	Porthkerry Member.....	11
7.	Groundwater.....	13
7.1	Groundwater Observations	13

Figures

FIGURE 1 – Site Location Plan

FIGURE 2 – Exploratory Hole Location Plan

Appendices

APPENDIX A – Trial Pit Logs

APPENDIX G – Groundwater Monitoring Records

APPENDIX B – TRL Probe Results

APPENDIX H – Photographic Records

APPENDIX C – Soakaway Test Results

APPENDIX D – Rotary Borehole Logs

APPENDIX E – Geotechnical Testing Results

APPENDIX F – Chemical Testing Results

1. Introduction

1.1 General

AECOM Infrastructure & Environment UK Ltd (here after referred to as “AECOM”) was commissioned by the Welsh Government to perform a ground investigation to assist in the design of the proposed Northern Access Road, St. Athan, Wales.

Details of the ground investigation (GI) were to be presented as a Factual Report.

This report summarises the findings of the investigation undertaken by AECOM between the 21st November 2016 and 9th February 2017.

1.2 Objectives

The site investigation was carried out in accordance with the Specification for Ground Investigation at St. Athan – Northern Access Road (received 8th November 2016, Doc ref: GEO/ST.ATHAN/SPEC, Version 1) and aimed to identify the ground and groundwater conditions of the area of the proposed access road, in order to inform the design.

This report is factual only and specifically excludes detailed desk study, any geotechnical or geo-environmental interpretation and any advice on structural condition.

1.3 Investigation Scope

The initial investigation scope was provided to AECOM in 8th November 2016 (Doc ref: GEO/ST.ATHAN/SPEC, Version 1) and included 11no. Trial Pit locations with TRL probing - 10no. of which including Soakaway testing, and 4no. Rotary Boreholes with 8m installs.

2. Site details

2.1 Site Location

The site is located approximately 2km north-west of the village of St. Athan and approximately 5.2km south of the town of Cowbridge, South Wales. The site comprises a series of fields parallel to the northern edge of the St. Athan Ministry of Defence compound. The ground investigation exploratory hole locations were aligned along the proposed route of the new road in an approximate straight line running from west to east between the B4265 (SS 98157 68967) and Picketstone Close (ST 00321 69324).

The most westerly point is centered on OS National Grid reference SS 98272 68973, and the most easterly point is located at ST 00337 69316.

Figure 1 shows the location of the site within the surrounding area.

2.2 Site Description

The site is located in the Vale of Glamorgan, South Wales, approximately 3km north of the Bristol Channel coastline. The topography of the site is flat to gently undulating.

In the western area of the site, the B4265 road runs perpendicular to the site and carries traffic north-west towards the town of Llantwit Major and south towards St. Athan. In the eastern area of the site there is an active military training area towards the north and several aircraft hangers and a runway within the MOD compound towards the south.

There are three brooks that run through the site, one to the west, one to the east, and one running along the southern border of the site.

Llanmaes Brook to the west, intersects the site at SS 98571 68956, running approximately northwest to southeast, and has formed a 6 to 8m deep valley, within which a flood bund has been constructed within one of the fields to alleviate flooding in the area. To the east, the Nant y Stepsau brook is smaller and intersects the site

near to SS 99576 69217, running approximately northwest to southeast. Both brooks feed into the Boverton Brook which runs from east to west along the Eglwys-Brewis Road which runs along the southern edge of the site.

2.2.1 Surrounding Land Uses

The land uses in areas surrounding the St. Athan Northern Access Road work package is summarised in Table 1, below:

TABLE 1 – SURROUNDING LAND USE

Direction	Land Use
North	Farmland, Villages of Picketston and Llanmaes
East	Farmland, Cardiff Airport, Cardiff
South	St Athan MOD Base and runway, Aberthaw Power Station, Bristol Channel
West	Town of Llantwit-Major, Farmland, Bristol Channel

3. Published Geology

3.1 Geology

Details of the geology underlying the site and the surrounding area have been referenced from the following sources:

- British Geological Survey Map, scale 1:50,000, Sheet 261 and 262 for Bridgend (Solid and Drift Edition), 1997; and
- British Geological Survey Geodex interactive geology viewer.

The geological maps indicate that there are generally no superficial deposits mapped in the work package, with the exception of localized alluvial deposits mapped in the vicinity of the Llanmaes Brook and Boverton Brook. Alluvial deposits were not mapped but would also be expected along the Nant y Stepsau.

A small area of Head Deposit is mapped to the northwest of the site upstream of the Llanmaes Brook. Tidal Flat, Blown Sand and Marine Beach Deposits associated with the Bristol Channel are mapped approximately 2.8km to the south of the site.

The solid geology in the work site is mapped as the Porthkerry Member of the Blue Lias Formation, comprising Jurassic thick limestones with thin mudstone partings. Locally, the limestone is secondarily silicified with the development of chert nodules and bodies.

4. Ground investigation details

4.1 Fieldwork

4.1.1 Site Work Summary

The locations of the exploratory holes are detailed in Figure 2. The site work comprised the following:

- 11no. Trial Pits (SK501 – SK510 and TP501) excavated using a JCB 3CX Eco to a maximum depth of 1.40m (bgl). Detailed logs are presented in Appendix A;
- 11no. TRL probe tests advanced through the base of machine-dug trial pits SK501 – SK510, and TP501. Detailed logs are presented in Appendix B;
- 10no. Soakaway Tests undertaken in machine excavated trial pits (SK501 – SK510). Detailed test results are presented in Appendix C;
- 4no. Rotary Boreholes (BH501 – BH504) were advanced through the base of a 1.20m hand excavated buried service inspection pit to a maximum depth of 8.50m bgl utilising Dynamic Sampling and Rotary Coring with water recirculation, and were installed with a 50mm standpipe as per instruction from the Engineer. Detailed logs and installation details are presented in Appendix D.

The main fieldwork was conducted over 10no. shifts carried out during day time hours between the 21st November and 2nd December 2016. The weather conditions were unsettled with periods of sunshine, heavy rain and strong winds.

4.1.2 Site Access Arrangements

The GI required access to locations via third party land.

- SK501 was accessed via Plot 17, Boverton Court Farm;
- SK502 was accessed via Plot 16, Tremains Farm;
- SK503, SK504 and BH501 were accessed via Plot 14, Millands Farm;
- SK505 and SK506 were accessed via Plot 12, Froglands Farm;
- SK507, SK508 and BH502 were accessed via Plots 6 and 9, Great House Farm;
- SK 509, BH503 and BH504 were accessed via the Pickestone Gate entrance of MOD land;
- SK510 and TP501 were accessed via the western entrance of the MOD base.

4.1.3 Ecological Considerations

Protected species are known to be present at or near the site.

- A badger sett has been identified in the vicinity of Llanmaes Brook (approx. grid reference SS 9857 6893);
- Slow-worms have been recorded in the Llanmaes Brook corridor near to SK502;
- Dormice have been recorded within the hedgerows near SK507.

Mitigation requirements for the avoidance of harm to protected species were discussed at the site start up meeting, and at each investigation location

4.1.4 Archaeological Considerations

As indicated in the specification, there are areas of archaeological interest at the site, and these were expected to be located within the western part of the site.

Archaeological supervision was present during the excavation of all machine-excavated trial pits.

The buried remains of an archaeologically significant wall were encountered during the excavation of SK501. These were recorded by the Archaeologist and the excavation was backfilled and relocated away from the structure.

4.1.5 Buried Service Clearance

Buried service plans were reviewed prior to any fieldwork activities commencing. At each exploratory holes location a visual check and buried service survey using a Cable Avoidance Tool (CAT) and Signal Generator (Genny) was carried out to satisfy the requirements of the permit to dig. Further CAT scanning was undertaken at 200mm intervals during the excavation of the Trial Pit holes, to a maximum depth of 1.20m bgl.

4.1.6 Sampling

Representative bulk (B) and small disturbed (D) geotechnical samples were taken from suitable strata encountered during the excavation of the exploratory holes. Environmental (ES) samples were taken at 0.30m, 0.50m, and 1.00m intervals in the exploratory holes. In addition, Core samples (C) were taken from suitable strata encountered during the excavation of the Rotary boreholes.

4.1.7 In-situ Testing

Standard Penetration Tests (SPT) were carried out in accordance with BS EN ISO 22476-3: 2005+AL: 2011 in all Rotary Boreholes at the base of the inspection pit and where ground conditions allowed, except for BH504. The SPT tests were carried out using the drop weight fitted to the Comacchio Geo 205 drilling rig for all holes. The trip hammer used was independently calibrated and the details are presented in Table 2, below.

TABLE 2 – SPT HAMMER CALIBRATION DETAILS

Rig	Hammer ID	Energy Ratio [ER] (%)
Comacchio GEO 205	NH 01	71

In-situ Hand Shear Vane (HSV) testing was carried out on suitable cohesive strata encountered within the Exploratory Hole locations to a depth of 1.20m bgl. Each test comprised the taking of 3no. readings to determine the peak shear strength of the material encountered. Unless significant difference was observed, the mean value of these readings was taken and the resultant values are shown on the exploratory hole logs. HSVs were undertaken in excavated material for SK503 and SK504, and recorded as residual values.

In-situ Soakaway testing was carried out in exploratory holes SK501 – SK510 generally in accordance with BRE 365: 2016. Each test comprised the filling of a machine excavated Trial Pit with water to an arbitrary depth to within 0.5m of ground level and recording the time taken for the water to disperse into the ground where practical. Soakaway tests were repeated 3no. times where possible, however due to the high, or often negative infiltration rate in a number of the pits, only 1no. test was undertaken at these locations.

4.1.8 Groundwater

Groundwater levels were recorded during the excavation of all exploratory holes, the details of which are shown in the exploratory hole logs in Appendices A and D.

All Rotary Boreholes were installed with 50mm standpipe and filter pack to a maximum depth of 8.30m bgl for subsequent monitoring following the initial fieldwork period. 3no. rounds of monitoring have been undertaken (on the 8th December 2016, 9th January and 9th February 2017). The monitoring observations are discussed in Section 7.

5. Laboratory Testing

5.1 Geotechnical Laboratory Testing

Geotechnical testing was carried out on selected soil samples by GEO Site & Testing Services Ltd at their laboratory in Llanelli, Carmarthenshire in accordance with their UKAS accreditation. Table 3, below, details the total number of each type of test undertaken. The test results are presented in Appendix E.

TABLE 3 – GEOTECHNICAL LABORATORY TESTING SUMMARY

Test	No. of Tests
Natural Moisture Content BS 1377-2: 3.2	7
Plasticity Index (4-point) BS 1377-2: 4.3 & 5.3	7
Particle Size Distribution (by wet sieving) BS 1377-2: 9.2	5
California Bearing Ratio (CBR) BS 1377: 4	5
Uniaxial Compressive Strength (UCS)	2
Dry Density Compaction – 2.5kg 1377 : 1990 Part 4 : 3.3	2
Lab Shear Vane	3
Point Load Test ISRM / BS 1377-2/3.3 Brock & Franklin 1972.	4
Slake Durability ISRM / BS 1377-2/3.3 2/2	4
Suite D – Brownfield with Pyrite	4

5.2 Chemical Laboratory Testing

Chemical analysis was carried out on selected soil samples and water samples taken from the boreholes by Derwentside Environmental Testing Services (DETS) at their laboratory in Consett, County Durham, in accordance with their UKAS/MCERTS accreditation. Table 4, below, details the total number of each type of test undertaken. The test results are presented in Appendix F.

TABLE 4 – CHEMICAL LABORATORY TESTING SUMMARY

SOIL	
Test	No. of Tests
Asbestos	14
CLEA Metals	24
Cyanide (free)	24
Hexavalent Chromium	24
Total Organic Carbon	28
pH	28
BTEX and MTBE by GC-MS	28
TPH CWG	28
PAH EPA 16 (CGMS) low detection limit	28
VOC	28
WATER	
Test	No. of Tests
CLEA Metals	10
BTEX inc MTBE	10
TPH CWG	10
Phenol (Monohydric)	10
Speciated PAHs	10
VOC	10
Sulphate (SO ₄)	10
Hexavalent chromium	10
Cyanide	10

Test detection limits are indicated with test results in Appendix F.

6. Ground conditions

6.1 Stratigraphy

The ground conditions at the site are summarised in Table 5 below.

TABLE 5 – GROUND CONDITIONS SUMMARY

Stratum	Depth to Top of Stratum (m)	Thickness (m)
Made Ground (including Topsoil)	Ground Level	0.20 - 0.65
Probable Alluvium	0.20 – 0.45	0.10 - 2.20
Distinctly Weathered Porthkerry Member	0.35 – 1.30	0.01* - 1.70
Partially Weathered Porthkerry Member	0.70 – 2.40	0.10* – 7.80*
Porthkerry Member	2.40	5.60*

* Base of stratum not proven, greater thicknesses may be present.

6.1.1 Made Ground

Made Ground was encountered at every exploratory hole location and proved to a maximum depth of 0.65m bgl. The Made Ground generally comprised two layers; a topsoil layer (to an average depth of 0.30m bgl) with grass and vegetation at the surface, and a secondary layer beneath:

- Soft dark brown slightly gravelly sandy CLAY with abundant rootlets. Gravel is subangular to rounded fine to coarse of limestone. Sand is fine to coarse (TOPSOIL);
- Soft becoming firm brown slightly gravelly silty CLAY with rare rootlets. Gravel is subrounded to rounded fine to medium of brick and limestone. Occasionally encountered with fine to coarse sand. Dark brown very sandy very gravelly clay with frequent rootlets. Gravel is subangular to subrounded fine to coarse of igneous rock. Sand is fine to coarse.

6.1.2 Probable Alluvium

Material consistent with Probable Alluvium Deposits was encountered immediately below the topsoil within all locations, with the exception of SK501, SK505, SK506 and SK510, and comprised:

- Soft becoming firm orangish and yellowish brown slightly gravelly CLAY. Gravel is angular to subangular fine to medium of limestone and mudstone;
- Soft locally firm slightly reddish brown silty CLAY with occasional roots and low cobble content. Cobbles are subangular of limestone;
- Soft becoming firm light yellowish brown slightly gravelly CLAY. Gravel is subangular firm of limestone and mudstone;
- Firm occasionally friable brown mottled light grey slightly sandy gravelly CLAY regularly with very frequent roots. Gravel is subangular to subrounded firm to medium of limestone and mudstone. Sand is fine to medium;
- Firm becoming stiff orangish brown mottled light grey slightly gravelly CLAY. Gravel is angular to subrounded firm to medium of mudstone and limestone; and
- Firm light grey mottled yellowish orange silty CLAY.

6.1.3 Porthkerry Member

The solid geology in the area is mapped as the Porthkerry Member. Three units were encountered during the ground investigation, a distinctly weathered upper surface, a partially weathered unit below, and an apparently unweathered unit. The distinctly weathered surface comprised:

- Firm brown to yellowish brown slightly gravelly slightly sandy CLAY with low to medium cobble content. Cobbles are subangular of limestone and/or mudstone. Gravel is angular to rounded fine to medium of limestone and/or limestone. Sand is fine to medium;
- Medium strong to weak grey weathered crystalline LIMESTONE with extremely closely spaced (~2-5mm), planar rough, open fractures infilled with orangish brown clay. Recovered as: Grey angular to subangular cobbles of limestone;
- Medium strong to extremely weak grey weathered LIMESTONE with subhorizontal and subvertical closely spaced, planar rough, open fractures with orangish brown surface staining and soft to firm orangish brown silty clay infill. Recovered as: Grey angular to subangular cobbles of limestone with soft to firm orangish brown silty clay infill;
- Medium strong to weak grey weathered crystalline LIMESTONE occasionally with fossil fragments. Recovered as: Grey angular to subangular cobbles with soft orangish brown silty clay infill; and
- Medium strong locally weak light grey locally yellowish orange weathered LIMESTONE.

The partially weathered Porthkerry Member unit comprised:

- Medium strong locally weak light grey locally stained orange weathered medium bedded LIMESTONE with extremely closely spaced (~2-5mm) open (~1-2mm) fractures with soft orangish brown silty clay infill. Occasionally described as recrystallised limestone. Frequently recovered as cobbles;
- Medium strong light grey weathered crystalline LIMESTONE;
- Strong grey partially weathered medium bedded LIMESTONE with occasional shell fragments and two sets of irregular fractures infilled with firm clay. First set: Subhorizontal, closely spaced, planar rough, open infilled with firm greenish yellowish brown silty clay. Second set: Subvertical (~50°), closely spaced, planar rough, tight with orange surface staining; and
- Strong grey or brown closely bedded calcareous fossiliferous crystalline MUDSTONE with extremely closely spaced (~2-5mm) fractures. Occasionally described as laminated.

The unweathered Porthkerry Member unit comprised:

- Strong dark grey medium bedded shelly LIMESTONE with calcite veins and subvertical (~45°) closely spaced, planar rough, partly open with orange surface stained fractures. Interbedded with hard very dark grey CLAY with shell fragments and Gryphaea fossil (~30mm).

7. Groundwater

7.1 Groundwater Observations

Groundwater observations within the exploratory during the initial fieldwork period are summarised in Table 6 below.

TABLE 6 – GROUNDWATER CONDITIONS SUMMARY

Hole ID	Groundwater Entry (m bgl)	Water Strike Remarks	Observation during Soakaway Tests
TP501	Dry during excavation	-	-
SK501	Dry during excavation	-	-
SK502	Dry during excavation	-	-
SK503	1.30m	Rising to 1.20m after 20 minutes	Water level static during test
SK504	0.80m	Rising to 0.71m after 20 minutes	Water level rising in pit for 165mins to 0.41m bgl
SK505	Dry during excavation	-	-
SK506	Dry during excavation	-	-
SK507	0.80m	Standing after 20 minutes	Water level rising in pit for 60mins to 0.49m bgl
SK508	0.95m	Rising to 0.60m after 20 minutes	Water level rising in pit for 480mins to 0.18m bgl
SK509	1.20m	Rising to 1.00m after 20 minutes	Water level rising in pit for 1110mins to 0.30m bgl
SK510	Dry during excavation	-	-
BH501	1.30m	Standing after 20 minutes	-
BH502	0.70m	Falling to 1.20m after 20 minutes	-
BH503	1.20m	Standing after 20 minutes	-
BH504	1.30m	Falling to 1.38m after 20 minutes	-

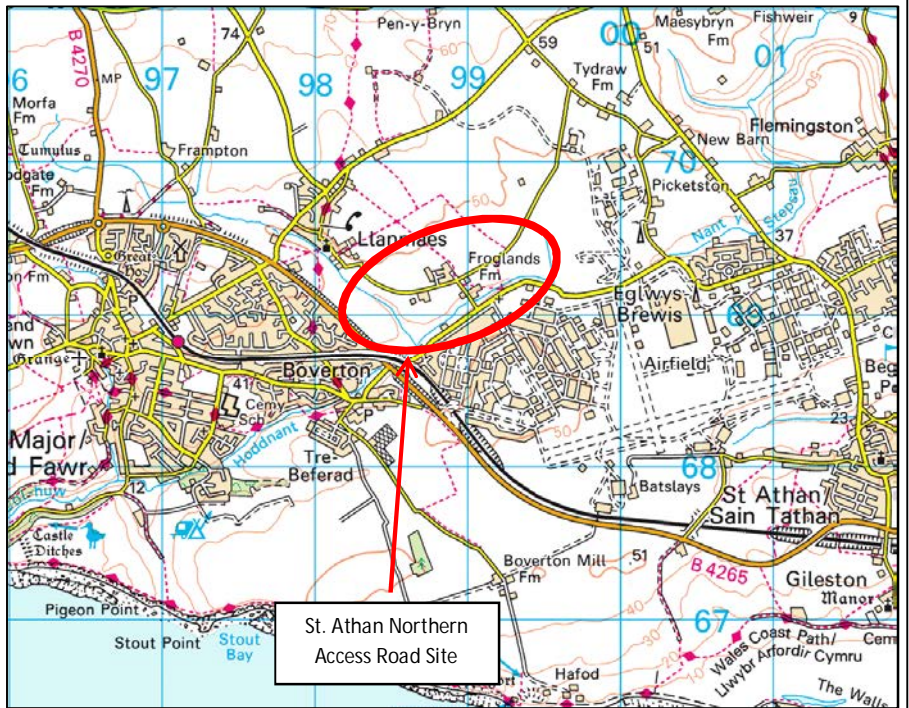
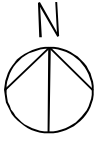
It should be noted that the groundwater conditions observed in the exploratory holes are those appertaining to the period of the investigation. Groundwater levels may vary due to seasonal fluctuations in rainfall, but in the shorter term, can be affected by antecedent weather conditions or other causes.

7.2 Groundwater Monitoring

BH501, BH502, BH503 and BH504 were installed with a 50mm standpipe and filter pack for subsequent monitoring, following the initial fieldwork period. Groundwater monitoring visits were undertaken on 8th December 2016, 9th January 2017 and 9th February 2017. The groundwater observations made during these visits are presented in Appendix G.

During the monitoring visits, groundwater samples were taken from each borehole for subsequent testing (laboratory results are presented in Appendix G). BH501 was not sampled during the first two of the sample rounds due to the presence of wet sediment at the base of the well and insufficient water for a sample.

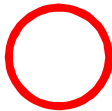
Figures



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KEY

Site Location:



St. Athan Northern Access Road Site

Prepared By	LT
Checked By	MC
Job No	60509148
Date	Jan-17

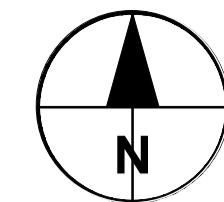
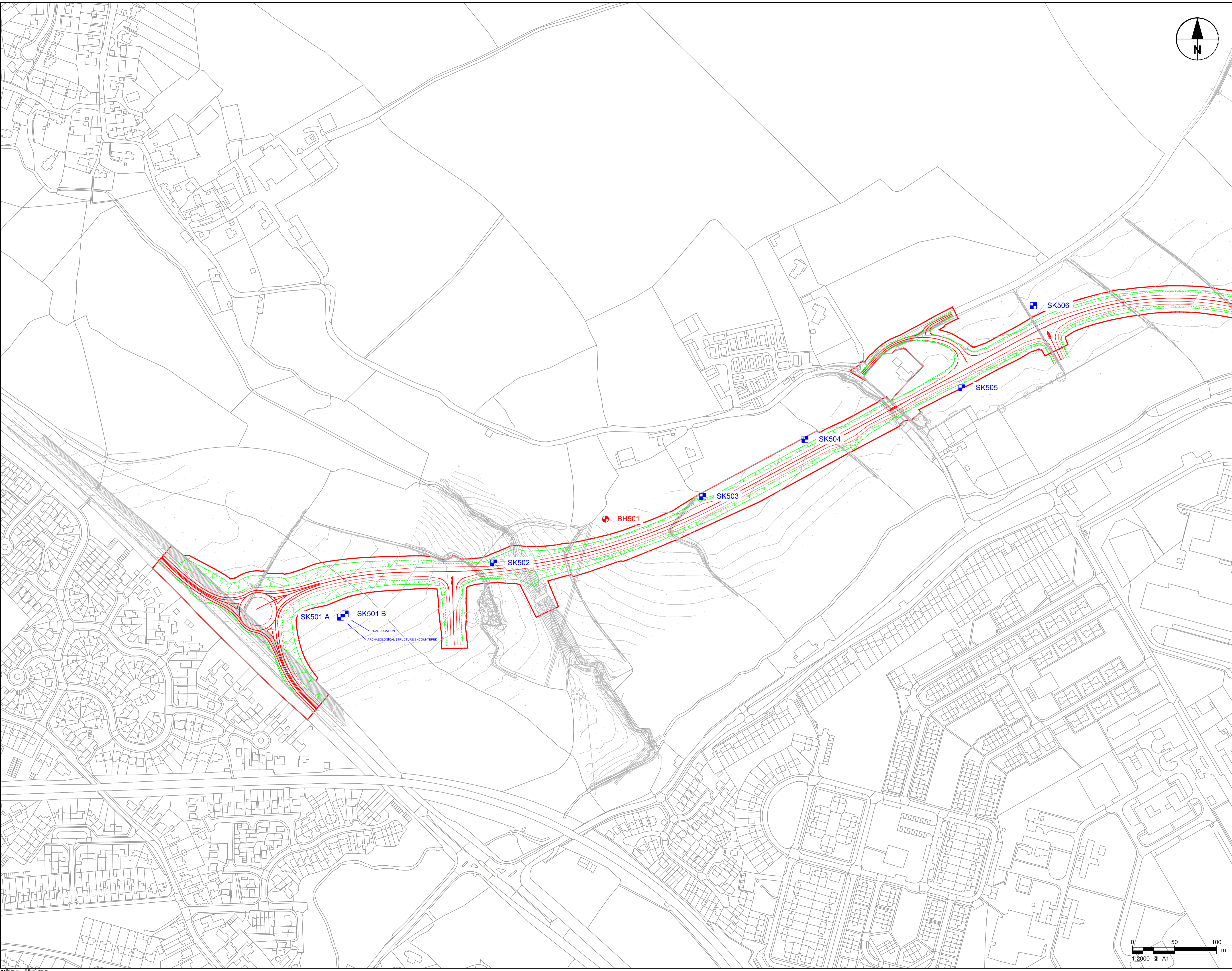
St. Athan Northern Access Road
FIGURE 1 - SITE LOCATION PLAN
 St. Athan Northern Access Road Ground Investigation
 Welsh Government



ISO A1 841mm x 610mm
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KEY

PROPOSED KEY INFORMATION

BOREHOLE		BH
TRIAL PIT		TP
SOAKAWAY TEST		SK

ISSUE/REVISION

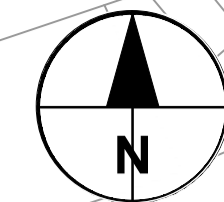
IR	DATE	DESCRIPTION
A	23/01/2017	FINAL VERSION



PROJECT NUMBER
60509148
SHEET TITLE
ST. ATHAN
EXPLORATORY HOLE LOCATION
PLAN
SHEET 1 OF 2
SHEET NUMBER
60509148-SHT-30-0000-CT-0652

0 50 100 m
1:2000 @ A1

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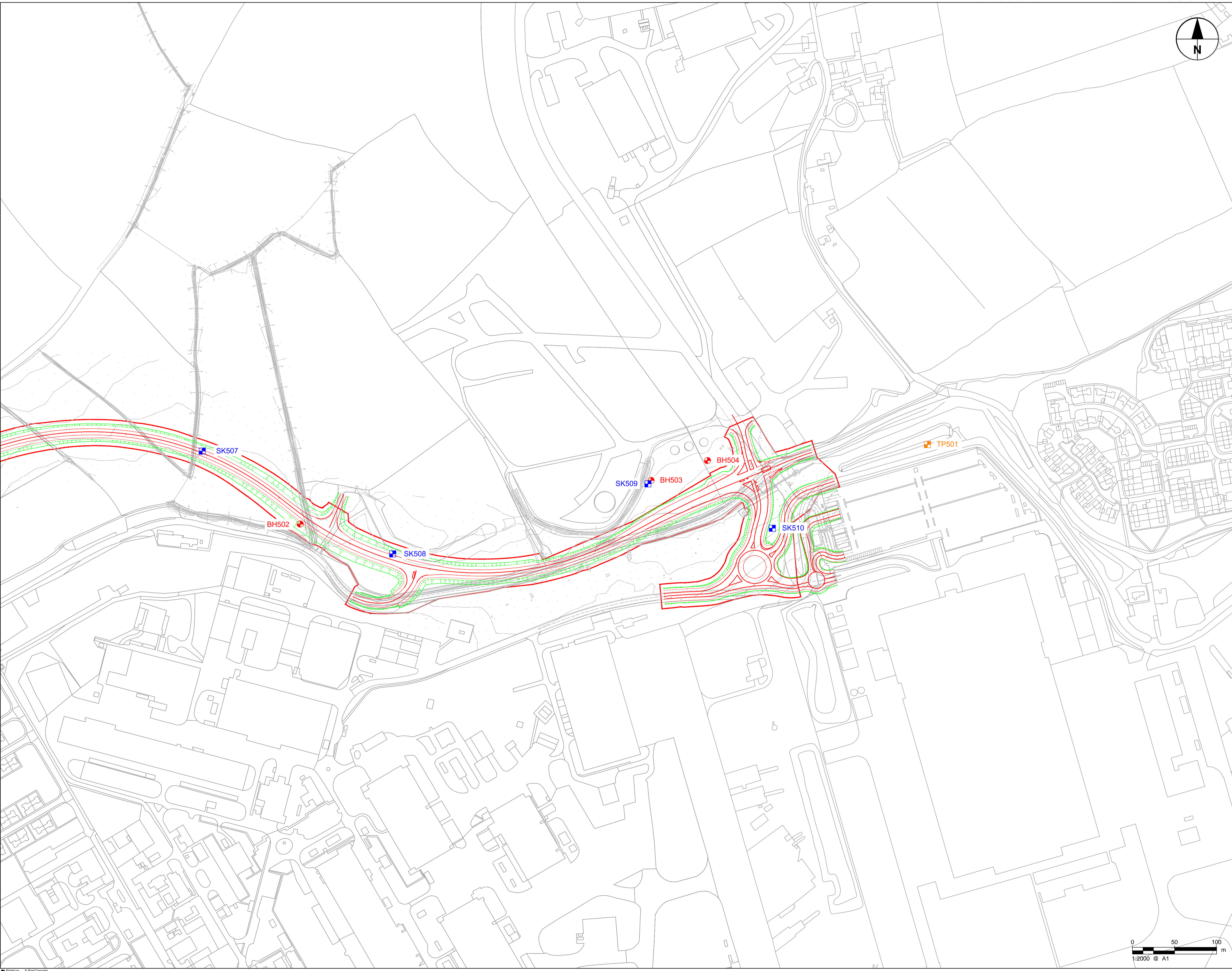


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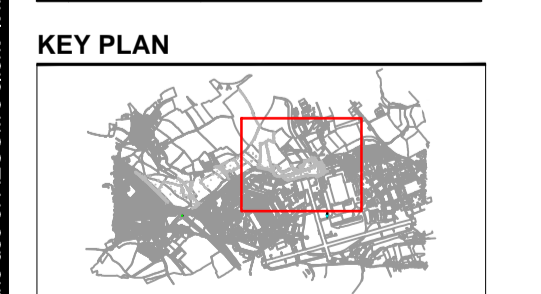
KEY
PROPOSED KEY INFORMATION

- BOREHOLE ● BH
- TRIAL PIT ■ TP
- SOAKAWAY TEST ■ SK



ISSUE/REVISION

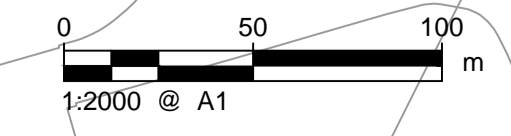
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A	23/01/2017	FINAL VERSION



PROJECT NUMBER
60509148

SHEET TITLE
ST. ATHAN
EXPLORATORY HOLE LOCATION
PLAN
SHEET 2 OF 2

SHEET NUMBER
60509148-SHT-30-0000-CT-0653



Appendix A Trial Pit Logs

KEY TO BOREHOLE, TRIAL PIT AND WINDOW SAMPLE LOGS

SOIL STRATA

SAMPLES

U100	Open Drive Tube Sample (100mm nominal diameter) - UNR denotes 'no recovery'.
UT100	Open Drive Thin Wall Tube Sample (100mm nominal diameter) - UNR denotes 'no recovery'.
U38	Open Drive Tube Sample (38mm nominal diameter)
P	Piston Sample (100mm nominal diameter unless noted otherwise) - PNR denotes 'no recovery'.
D	Small Disturbed Sample
B	Bulk Disturbed Sample
BLK	Block Sample
C	Rotary Core Sample (taken for laboratory testing)
G	Gas Sample
J	Jar Sample
TUB	Tub Sample
ES	Environmental Sample
W	Water Sample
SS	Split Spoon Sample
CSS	Cutting Shoe Sample
L	Liner Sample

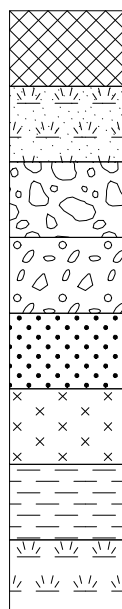
IN SITU TESTING

S	Standard Penetration Test using the Split Spoon Sampler.
C	Standard Penetration Test using a solid cone.

Where a test has been completed the type of test and the N-value will be reported. Where the full 300mm penetration of the main drive has not been completed, the number of blows (not an N-value) will be reported. The Field Records column on the log will show each set of blow counts per 75mm of penetration including seating blows and will also indicate the partial penetration achieved (mm) for incomplete tests.

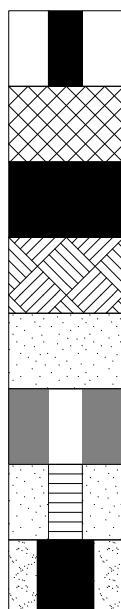
V	Field vane test, vane shear strength quoted for peak (P) and remoulded (R) tests in kPa.
PP	Pocket Penetrometer measurements (kN/m ²).
k	Field Permeability Test, R denotes Rising Head, F denotes Falling Head, C Constant Head.
So	Field Soakage Test in a borehole.
PID	Photo Ionisation Detector (PID) readings for volatile hydrocarbon screening (ppm).
cu	Undrained shear strength triaxial test result (kN/m ²)

STRATA



Made Ground / Fill
Topsoil
Cobbles and Boulders
Gravel
Sand
Silt
Clay
Peat

BACKFILL / INSTALLATIONS



Top Cap
Backfill With Arisings
Bentonite Seal
Cement
Filter
Grout
Slotted Pipe
Piezo Tip

WATER

Initial Level of Water Strike
Level of Water Strike Rise After 20 Mins

Composite soil types shown by combined symbols
(primary + secondary constituents)



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Equipment & Methods: JCB 3CX	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan		
	Client: Welsh Government		
	Co-ordinates: E: 298335.157 N: 168941.925	Ground Level (m): 44.96 AOD	Date Started: 23/11/2016 Date Completed: 23/11/2016

Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)
Depth (m)	No.	Type	Result					
0.30		ES V	38 kPa(P) 27 kPa(R)		TOPSOIL: Grass Over: Soft dark brown slightly gravelly sandy CLAY with frequent roots. Gravel is subangular to rounded fine to coarse of limestone. Sand is fine to coarse (TOPSOIL)	44.71		0.25
0.25-0.65		B			MADE GROUND: Soft becoming firm brown slightly gravelly silty CLAY with rare rootlets. Gravel is subrounded to rounded fine to medium brick and limestone (MADE GROUND)			0.40
0.50		ES V	36 kPa(P) 21 kPa(R)			44.31		0.65
0.75		ES			Medium strong to weak grey weathered crystalline LIMESTONE Recovered as: Grey angular to subangular cobbles with soft orangish brown silty clay infill (DISTINCTLY WEATHERED PORKERRY MEMBER)			
0.65-1.40		B				43.56		1.40
End of Trial Pit 1.40 m (Thickness of basal layer not proven)								

Groundwater Observations				Plan View	Remarks
Strike Depth	Post Mins	Post Depth	Flow		1. Machine-Excavated Trial Pit located within Third Party Land in Plot 17 Boverton Court Farm towards the west of the field. 2. Machine-Excavated Trial Pit completed to 1.40m bgl after encountering natural rock (Medium Strong Limestone). 3. Soakaway Test undertaken (see separate report sheet for results). 4. Topography: Level ground. 5. Groundwater not encountered. 6. No evidence of contamination. 7. Backfilled with arisings upon completion.

Report ID: STANDARD TRIAL PIT LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

Equipment & Methods: JCB 3CX	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan		
	Client: Welsh Government		
	Co-ordinates: E: 298511.703 N: 169002.432	Ground Level (m): 44.76 AOD	Date Started: 23/11/2016 Date Completed: 23/11/2016

Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)
Depth (m)	No.	Type	Result					
0.30		ES V	38 kPa(P) 31 kPa(R)		TOPSOIL: Grass Over: Soft dark brown slightly gravelly silty sandy CLAY with frequent roots. Gravel is subangular to rounded fine to medium of limestone, mudstone and rare brick. Sand is fine to medium (TOPSOIL)	44.51		(0.25)
0.35-0.70		B			Soft becoming firm orangish brown slightly gravelly silty CLAY. Gravel is angular to subrounded medium of limestone (PROBABLE ALLUVIUM)	44.41		(0.10) 0.35
					Medium strong to very weak grey weathered LIMESTONE with subhorizontal and subvertical closely spaced, planar rough, open fractures with orange surface staining and soft brown clay infill Recovered as: Grey very angular to subangular cobbles with soft brown clay infill (DISTINCTLY WEATHERED PORTHKERRY MEMBER)			(0.35)
					End of Trial Pit 0.70 m (Thickness of basal layer not proven)	44.06		0.70

Groundwater Observations				Plan View	Remarks
Strike Depth	Post Mins	Post Depth	Flow		1. Machine-Excavated Trial Pit located within Third Party Land in Plot 16 Tremains Field adjacent to the northern boundary fence. 2. Machine-Excavated Trial Pit completed to 0.70m bgl after encountering natural rock (Medium Strong Limestone). 3. Soakaway Test undertaken (see separate report sheet for results). 4. Topography: Gently sloping. 5. Groundwater not encountered. 6. No evidence of contamination. 7. Backfilled with arisings upon completion.

Report ID: STANDARD TRIAL PIT LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4_0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

Equipment & Methods: JCB 3CX	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan		
	Client: Welsh Government		
	Co-ordinates: E: 298759.892 N: 169081.211	Ground Level (m): 44.18 AOD	Date Started: 25/11/2016 Date Completed: 25/11/2016

Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)
Depth (m)	No.	Type	Result					
0.30		ES V	20 kPa(R)		TOPSOIL: Grass Over: Soft locally firm slightly sandy slightly gravelly silty CLAY with roots and rootlets. Gravel is subrounded medium of brick, limestone and mudstone. Sand is fine (TOPSOIL)	43.88		0.30
0.30-0.70 0.50		B ES			Firm locally soft dark brown slightly sandy silty CLAY with medium cobble content. Cobbles are subangular of limestone. Sand is fine (PROBABLE ALLUVIUM)			0.45
0.7 0.75		V ES	12 kPa(R)		Medium strong to weak grey weathered crystalline LIMESTONE with extremely closely spaced (~2-5mm), planar rough, open fractures infilled with orangish brown clay Recovered as: Grey angular to subangular cobbles of limestone (DISTINCTLY WEATHERED PORTHKERRY MEMBER)	43.43		0.75
						42.88		1.30
End of Trial Pit 1.30 m (Thickness of basal layer not proven)								

Groundwater Observations				Plan View	Remarks
Strike Depth	Post Mins	Post Depth	Flow		
1.30	20.00	1.20	Rising		1. Machine-Excavated Trial Pit located within Third Party Land in the central field of Plot 14 Millands Farm. 2. Machine-Excavated Trial Pit completed to 1.30m bgl after encountering natural rock (Medium Strong Limestone). 3. Soakaway Test undertaken (see separate report sheet for results). 4. Topography: Level ground. 5. Groundwater encountered at 1.30m bgl rising to 1.20m bgl after 20mins. 6. No visual or olfactory evidence of contamination. 7. Backfilled with arisings upon completion.

Report ID: STANDARD TRIAL PIT LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

Equipment & Methods: JCB 3CX	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan Client: Welsh Government		
Co-ordinates: E: 298881.314 N: 169149.165		Ground Level (m): 43.26 AOD	Date Started: 25/11/2016 Date Completed: 25/11/2016

Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)
Depth (m)	No.	Type	Result					
0.30 0.30-0.40		ES V B	8 kPa(R)		TOPSOIL: Grass Over: Very soft to soft dark brown slightly sandy silty CLAY with abundant rootlets and low cobble content. Cobbles are angular to rounded of limestone. Sand is fine (TOPSOIL)	42.86		(0.40)
0.50 0.50-0.75		ES V B	23 kPa(R)		Soft light yellowish brown slightly sandy silty CLAY with medium cobble content. Cobbles are angular to rounded of limestone (PROBABLE ALLUVIUM)	42.51 42.46		0.40 (0.35)
					Medium strong locally weak light grey locally yellowish orange weathered LIMESTONE (PARTIALLY WEATHERED PORTHERRY MEMBER)			0.75 (0.05) 0.80
End of Trial Pit 0.80 m (Thickness of basal layer not proven)								

Groundwater Observations				Plan View	Remarks
Strike Depth	Post Mins	Post Depth	Flow		
0.80	20.00	0.71	Rising		1. Machine-Excavated Trial Pit located within Third Party Land in the eastern field of Plot 14 Millands Farm. 2. Machine-Excavated Trial Pit completed to 0.80m bgl after encountering natural rock (Medium Strong Limestone). 3. Soakaway Test undertaken (see separate report sheet for results). 4. Topography: Level ground. 5. Groundwater encountered at 0.80m bgl rising to 0.71m bgl after 20mins. 6. No evidence of contamination. 7. Backfilled with arisings upon completion.

Report ID: STANDARD TRIAL PIT LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4_0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

Equipment & Methods: JCB 3CX	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan Client: Welsh Government		
Co-ordinates: E: 299067.672 N: 169210.291		Ground Level (m): 43.03 AOD	Date Started: 24/11/2016 Date Completed: 24/11/2016

Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)
Depth (m)	No.	Type	Result					
0.30		ES V	27 kPa(P) 15 kPa(R)		MADE GROUND: Grass Over: Very soft to soft dark brown slightly sandy silty CLAY with numerous roots. Sand is fine (TOPSOIL)	42.63		(0.40)
0.50		ES V	32 kPa(P) 19 kPa(R)		MADE GROUND: Soft light orangish brown slightly sandy silty CLAY with rare gravel and frequent rootlets. Gravel is rounded fine of brick and limestone (MADE GROUND)	42.38		(0.25)
0.65-0.90		B			Medium strong to weak light grey locally mottled yellowish orange weathered LIMESTONE with extremely closely spaced (~2-5mm), rough planar, open (~1-2mm) fractures infilled with soft dark brown slightly sandy silty clay (DISTINCTLY WEATHERED PORKHERRY MEMBER)	42.13		(0.25)
End of Trial Pit 0.90 m (Thickness of basal layer not proven)								

Groundwater Observations				Plan View	Remarks
Strike Depth	Post Mins	Post Depth	Flow		
					1. Machine-Excavated Trial Pit located within Third Party Land in the western field of Plot 12 Froglands Farm. 2. Machine-Excavated Trial Pit completed to 0.90m bgl after encountering natural rock (Medium Strong Limestone). 3. Soakaway Test undertaken (see separate report sheet for results). 4. Topography: Level ground. 5. Groundwater not encountered. 6. No evidence of contamination. 7. Backfilled with arisings upon completion.

Report ID: STANDARD TRIAL PIT LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4_0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

Equipment & Methods: JCB 3CX	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan		
	Client: Welsh Government		
	Co-ordinates: E: 299152.675 N: 169307.883	Ground Level (m): 42.97 AOD	Date Started: 24/11/2016 Date Completed: 24/11/2016

Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)
Depth (m)	No.	Type	Result					
0.30		ES	32 kPa(P) 18 kPa(R)		TOPSOIL: Grass Over: Very soft to soft slightly sandy silty CLAY with frequent roots. Sand is fine (TOPSOIL)	42.62		0.35
		V			Medium strong to extremely weak grey weathered LIMESTONE with subhorizontal and subvertical closely spaced, planar rough, open fractures with orangish brown surface staining and soft to firm orangish brown silty clay infill Recovered as: Grey angular to subangular cobbles of limestone with soft to firm orangish brown silty clay infill (DISTINCTLY WEATHERED PORKHERRY MEMBER)			0.35
0.50		ES						
0.35- 1.20		B						0.85
								1.20
End of Trial Pit 1.20 m (Thickness of basal layer not proven)								

Groundwater Observations				Plan View	Remarks
Strike Depth	Post Mins	Post Depth	Flow		1. Machine-Excavated Trial Pit located within Third Party Land in the eastern field of Plot 12 Froglands Farm. 2. Machine-Excavated Trial Pit completed to 1.20m bgl after encountering natural rock (Medium Strong Limestone). 3. Soakaway Test undertaken (see separate report sheet for results). 4. Topography: Level ground. 5. Groundwater not encountered. 6. No visual or olfactory evidence of contamination. 7. Backfilled with arisings upon completion.

Report ID: STANDARD TRIAL PIT LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4_0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

Equipment & Methods: JCB 3CX	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan		
Client: Welsh Government		Co-ordinates: E: 299452.038 N: 169293.941	Ground Level (m): 42.02 AOD
		Date Started: 23/11/2016	Date Completed: 23/11/2016

Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)
Depth (m)	No.	Type	Result					
0.30		ES			TOPSOIL: Grass Over: Soft dark brown slightly sandy CLAY with abundant roots (TOPSOIL)	41.77		(0.25)
0.35		V	30 kPa(P) 20 kPa(R)		Soft becoming firm light brown mottled light grey slightly gravelly sandy CLAY. Gravel is angular to subrounded fine to medium of limestone and mudstone (PROBABLE ALLUVIUM)			0.25
0.30-0.55		B						
0.50		ES			Firm light grey mottled light orangish brown CLAY (PROBABLE ALLUVIUM)	41.32		0.70
0.55		V	32 kPa(P) 20 kPa(R)					
0.70-0.80		B			Medium strong light grey weathered crystalline LIMESTONE (PARTIALLY WEATHERED PORTHKERRY MEMBER)	41.22		0.80
0.75		ES V	30 kPa(P) 10 kPa(R)					
						41.12		0.90
End of Trial Pit 0.90 m (Thickness of basal layer not proven)								

Groundwater Observations				Plan View	Remarks
Strike Depth	Post Mins	Post Depth	Flow		
0.80	20.00	0.80	Standing		1. Machine-Excavated Trial Pit located within Third Party Land in centre of Plot 6 Great House Farm adjacent to hedgerow. 2. Machine-Excavated Trial Pit completed to 0.90m bgl after encountering natural rock (Medium Strong Limestone). 3. Soakaway Test undertaken (see separate report sheet for results). 4. Topography: Level ground. 5. Groundwater encountered at 0.80m bgl rising to 0.70m after 20mins. 6. No evidence of contamination. 7. Backfilled with arisings upon completion.

Report ID: STANDARD TRIAL PIT LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4_0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

Equipment & Methods: JCB 3CX	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan		
	Client: Welsh Government		
	Co-ordinates: E: 299678.218 N: 169171.911	Ground Level (m): 41.97 AOD	Date Started: 22/11/2016 Date Completed: 23/11/2016

Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)
Depth (m)	No.	Type	Result					
0.30		ES			TOPSOIL: Grass Over: Soft brown slightly gravelly sandy CLAY with abundant roots. Gravel is angular to subangular firm to medium of limestone. Sand is fine to medium (TOPSOIL)	41.77		(0.20)
0.20-0.50		B V	56 kPa(P) 34 kPa(R)		Firm friable brown mottled light grey slightly sandy gravelly CLAY with very frequent roots. Gravel is subangular to subrounded firm to medium of limestone and mudstone. Sand is fine to medium (PROBABLE ALLUVIUM)			0.20 (0.30)
0.50		ES			Firm becoming stiff orangish brown mottled light grey slightly gravelly CLAY. Gravel is angular to subrounded firm to medium of mudstone and limestone (PROBABLE ALLUVIUM)	41.47		0.50
0.6		V	68 kPa(P) 34 kPa(R)					
0.50-0.95		B			Medium strong locally weak light grey locally yellowish orange weathered LIMESTONE (DISTINCTLY WEATHERED PORKHERRY MEMBER)	41.03 41.02		0.94 (0.01) 0.95
End of Trial Pit 0.95 m (Thickness of basal layer not proven)								

Groundwater Observations				Plan View	Remarks
Strike Depth	Post Mins	Post Depth	Flow		1. Machine-Excavated Trial Pit located within Third Party Land in Plot 9 Great House Farm adjacent to access road. 2. Machine-Excavated Trial Pit completed to 0.95m bgl after encountering natural rock (Medium Strong Mudstone). 3. Soakaway Test undertaken (see separate report sheet for results). 4. Topography: Level ground. 5. Groundwater encountered at 0.95m bgl rising to 0.60m bgl after 20mins. 6. No evidence of contamination. 7. Backfilled with arisings upon completion.
0.95	20.00	0.60	Rising		

Report ID: STANDARD TRIAL PIT LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

Equipment & Methods: JCB 3CX	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan		
	Client: Welsh Government		
	Co-ordinates: E: 299981.456 N: 169255.033	Ground Level (m): 41.71 AOD	Date Started: 22/11/2016 Date Completed: 23/11/2016

Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)
Depth (m)	No.	Type	Result					
0.00-0.30		B			TOPSOIL: Grass Over: Soft becoming firm dark brown slightly gravelly CLAY with frequent roots. Gravel is subangular medium of limestone and mudstone (TOPSOIL)			(0.35)
0.30		ES V	37 kPa(P) 22 kPa(R)			41.36		0.35
0.50		ES V B	34 kPa(P) 30 kPa(R)		Soft becoming firm light yellowish brown slightly gravelly CLAY. Gravel is subangular firm of limestone and mudstone (PROBABLE ALLUVIUM)			(0.45)
0.35-0.80								
0.75		ES				40.91		0.80
0.80-1.30		B			Firm becoming stiff greyish brown slightly gravelly CLAY. Gravel is subangular fine to medium of limestone and mudstone (PROBABLE ALLUVIUM)			(0.50)
					Medium strong locally weak brown weathered thinly laminated MUDSTONE interbedded with medium strong grey LIMESTONE Recovered as: Brown and grey medium to coarse angular to subangular gravel of mudstone and limestone with medium cobble content. Cobbles are subangular of mudstone and limestone (DISTINCTLY WEATHERED PORKHERRY MEMBER)	40.41 40.39		1.30 (0.02) 1.32
End of Trial Pit 1.32 m (Thickness of basal layer not proven)								

Groundwater Observations				Plan View	Remarks
Strike Depth	Post Mins	Post Depth	Flow		
1.20	20.00	1.10	Rising		1. Machine-Excavated Trial Pit located in the St. Athan Ministry of Defence (MoD) base north of the Eglwys Brewis Road. 2. Machine-Excavated Trial Pit completed to 1.32m bgl after encountering natural rock (Medium Strong Limestone). 3. Soakaway Test undertaken (see separate report sheet for results). 4. Topography: Level ground. 5. Groundwater encountered at 1.20m bgl rising to 1.10m bgl after 20mins. 6. No evidence of contamination. 7. Backfilled with arisings upon completion.

Report ID: STANDARD TRIAL PIT LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

Equipment & Methods: JCB 3CX		Project Name: St. Athan Northern Access Road		Job No: 60509148	
		Project Location: St. Athan			
		Client: Welsh Government			
Co-ordinates: E: 300129.129 N: 169202.376		Ground Level (m): 41.53 AOD		Date Started: 22/11/2016 Date Completed: 22/11/2016	

Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)
Depth (m)	No.	Type	Result					
0.00-0.30		B			TOPSOIL: Grass Over: Firm greyish brown sandy very gravelly CLAY with frequent roots. Gravel is fine to coarse angular to subangular of crystalline limestone. Sand is fine to medium (TOPSOIL)			(0.35)
0.30		ES V	76 kPa(P) 32 kPa(R)			41.18		0.35
0.35-0.60		B ES			Medium strong to weak grey weathered crystalline LIMESTONE with subhorizontal and subvertical closely spaced, planar rough, partly open with firm orangish brown clay infill Recovered as: Grey clayey fine to coarse angular to subangular gravel of limestone with high cobble content. Cobbles are angular to subangular of limestone			(1.05)
0.6		V	82 kPa(P) 31 kPa(R)		(DISTINCTLY WEATHERED PORKHERRY MEMBER)			
					At 1.40m bgl hard layer of strong grey limestone present.			
					End of Trial Pit 1.40 m (Thickness of basal layer not proven)			
						40.13		1.40

Report ID: STANDARD TRIAL PIT LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

Groundwater Observations				Plan View	Remarks
Strike Depth	Post Mins	Post Depth	Flow		1. Machine-Excavated Trial Pit located in the St. Athan Ministry of Defence (MoD) base south of the Eglwys Brewis Road. 2. Machine-Excavated Trial Pit completed to 1.40m bgl after encountering natural rock (Medium Strong Limestone). 3. Soakaway Test undertaken (see separate report sheet for results). 4. Topography: Level ground. 5. Groundwater not encountered. 6. No evidence of contamination. 7. Backfilled with arisings upon completion.
Notes: For explanation of symbols and abbreviations, see Key Sheet.				Scale: 1:12.5	Logged By: MC Checked By: MB

Equipment & Methods: JCB 3CX	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan Client: Welsh Government		
Co-ordinates: E: 300313.446 N: 169301.712		Ground Level (m): 41.66 AOD	Date Started: 22/11/2016 Date Completed: 22/11/2016

Samples and In situ Testing				Field Records	DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)
Depth (m)	No.	Type	Result					
0.30		ES V	35 kPa(P) 32 kPa(R)		TOPSOIL: Grass Over: Soft brown gravelly sandy CLAY with frequent roots (TOPSOIL)	41.46		0.20
0.20-0.65		B			Firm brown slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse gravel of limestone. Sand is fine to coarse (PROBABLE ALLUVIUM)			0.45
0.6		V	69 kPa(P) 37 kPa(R)		Medium strong to weak grey weathered crystalline LIMESTONE with fossil fragments (~2-5mm Ø) and subhorizontal and subvertical extremely closely spaced, planar rough, partly open fractures with orange surface staining Recovered as: Grey subangular cobbles of limestone with firm orangish brown clay infill (DISTINCTLY WEATHERED PORTHKERRY MEMBER)	41.01		0.65
0.65-1.40		B						0.75
End of Trial Pit 1.40 m (Thickness of basal layer not proven)								

Groundwater Observations				Plan View	Remarks
Strike Depth	Post Mins	Post Depth	Flow		1. Machine-Excavated Trial Pit located in the St. Athan Ministry of Defence (MoD) base south of the Eglwys Brewis Road. 2. Machine-Excavated Trial Pit completed to 1.40m bgl after encountering natural rock (Medium Strong Limestone). 3. Topography: Level ground. 4. Groundwater not encountered. 5. No evidence of contamination. 6. Backfilled with arisings upon completion.

Report ID: STANDARD TRIAL PIT LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

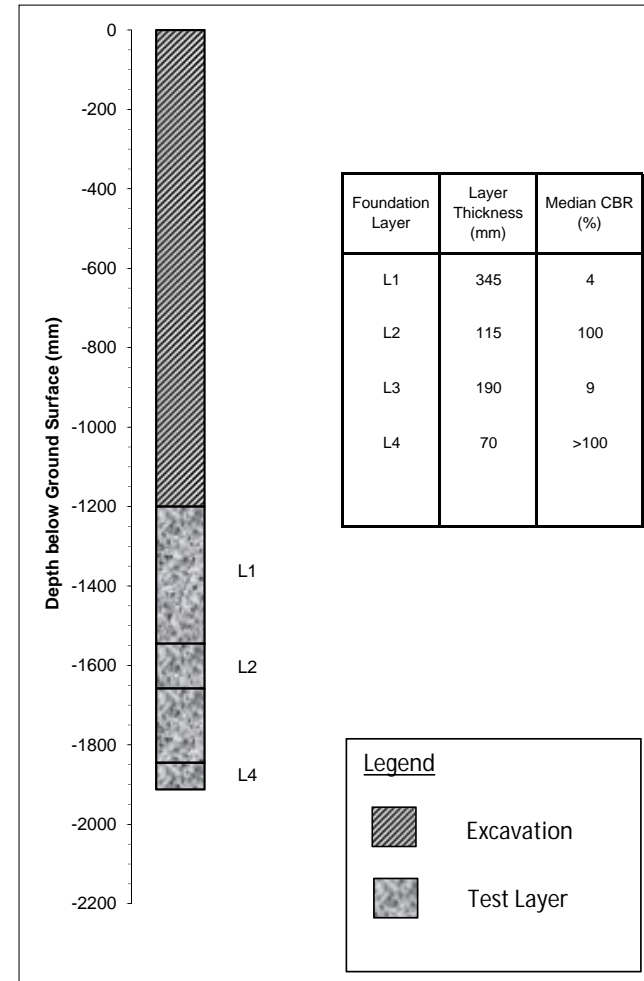
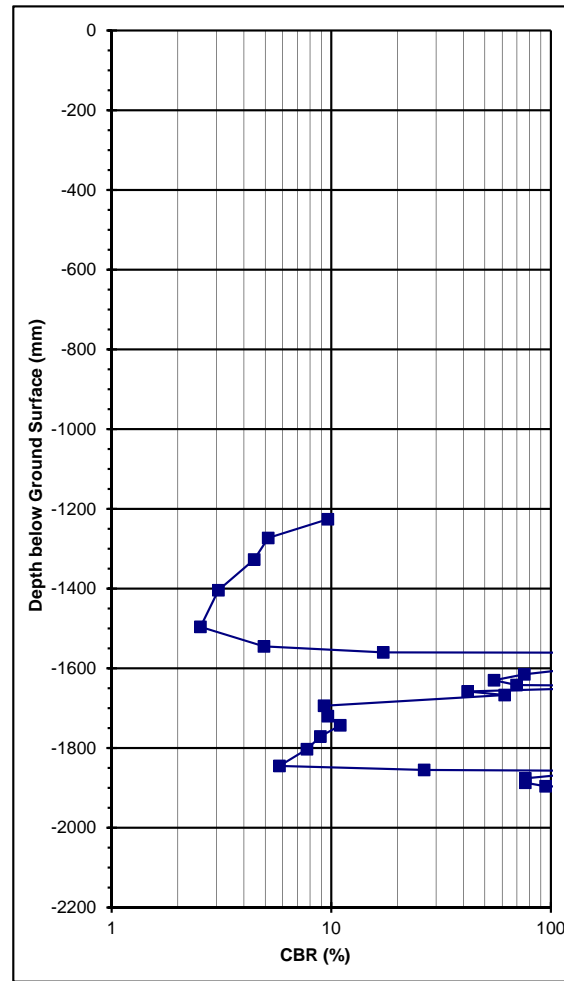
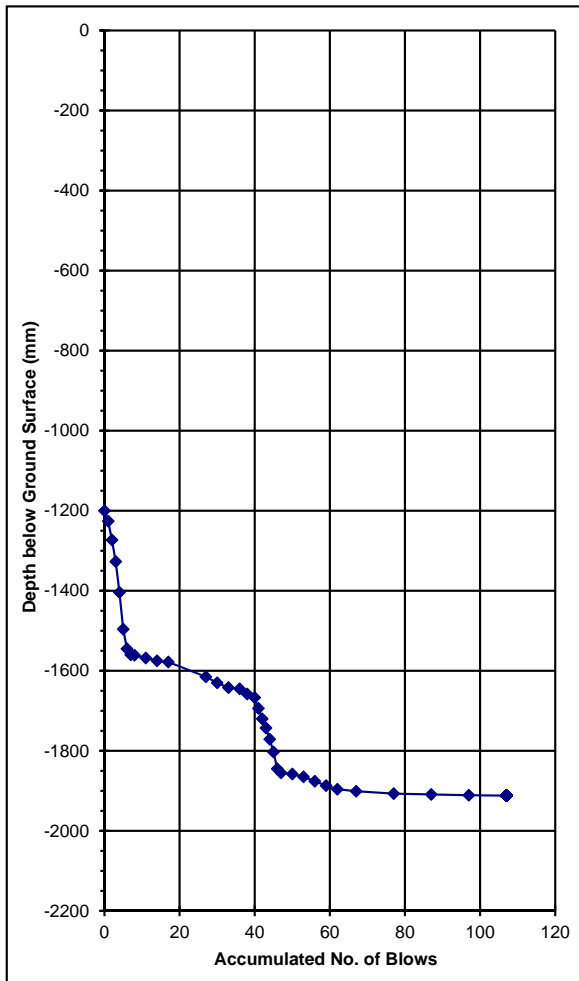
Appendix B TRL Probe Results

Job Number : 60509148
 DCP/Core Number : SK501
 DCP Operator : CC/WH
 Date Tested : 23/11/16
 Plot Prepared By : LT
 Plot Checked By : MB
 Date Prepared : 05/12/16

Location : St. Athan Northern Access Road

OSGR: 298335.157, 168941.925

Notes: Test commenced from the base of top soil in SK501 machine-excavated trial pit

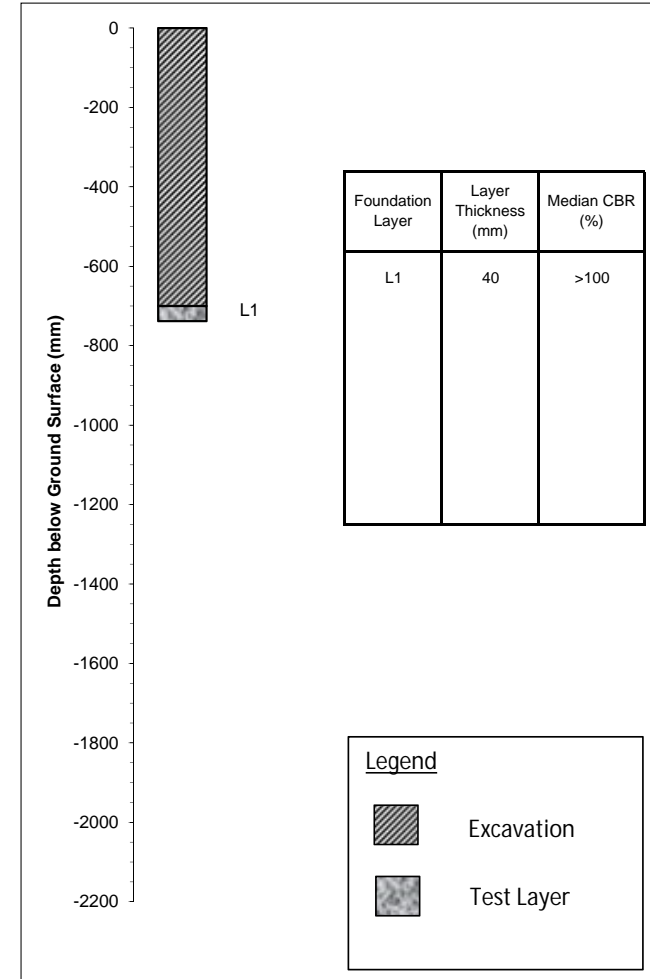
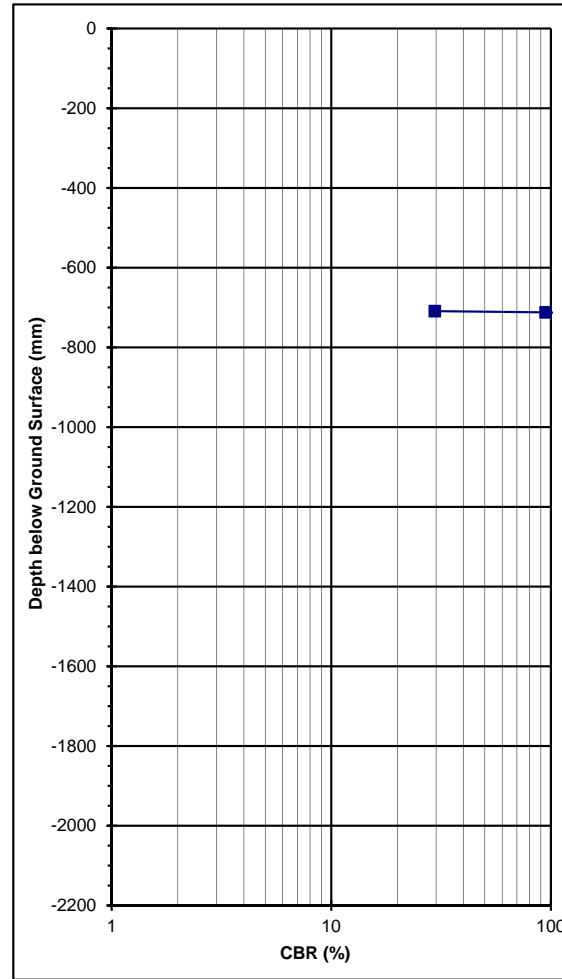
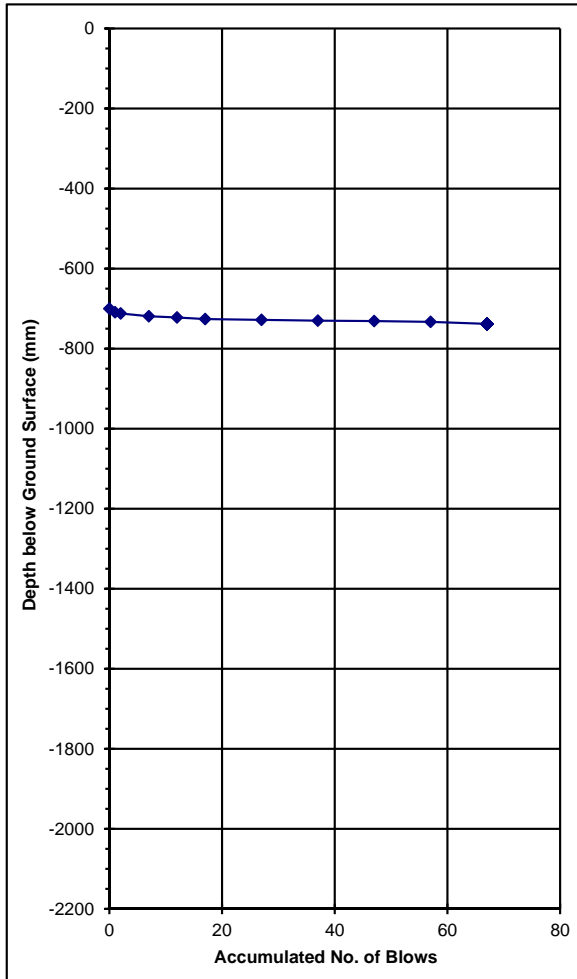


Job Number : 60509148
 DCP/Core Number : SK502
 DCP Operator : CC/WH
 Date Tested : 23/11/16
 Plot Prepared By : LT
 Plot Checked By : MB
 Date Prepared : 05/12/16

Location : St. Athan Northern Access Road

OSGR: 298511.703, 169002.432

Notes: Test commenced from the base of top soil in SK502 machine-excavated trial pit

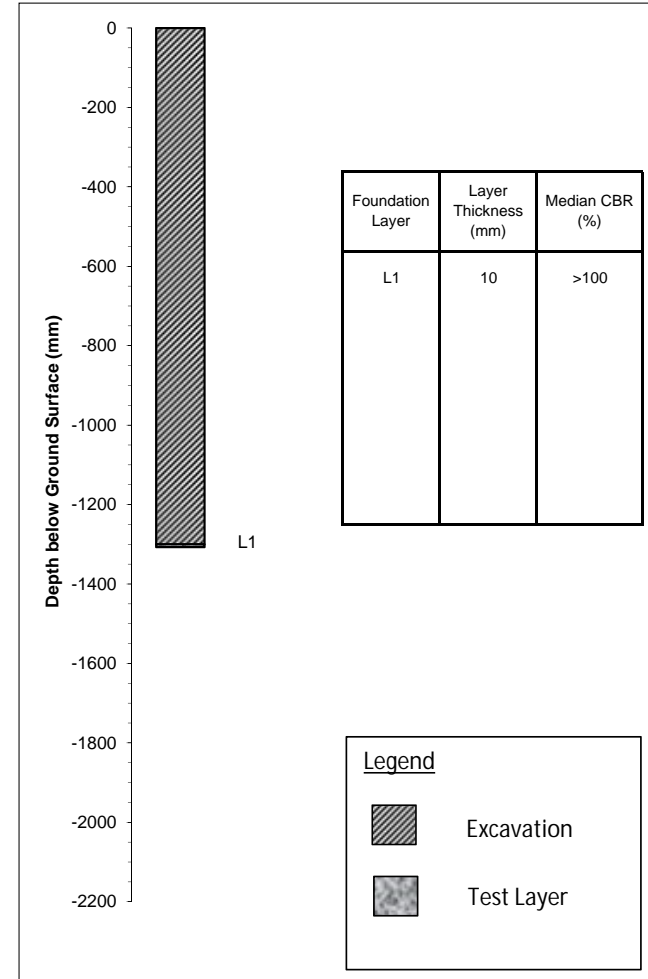
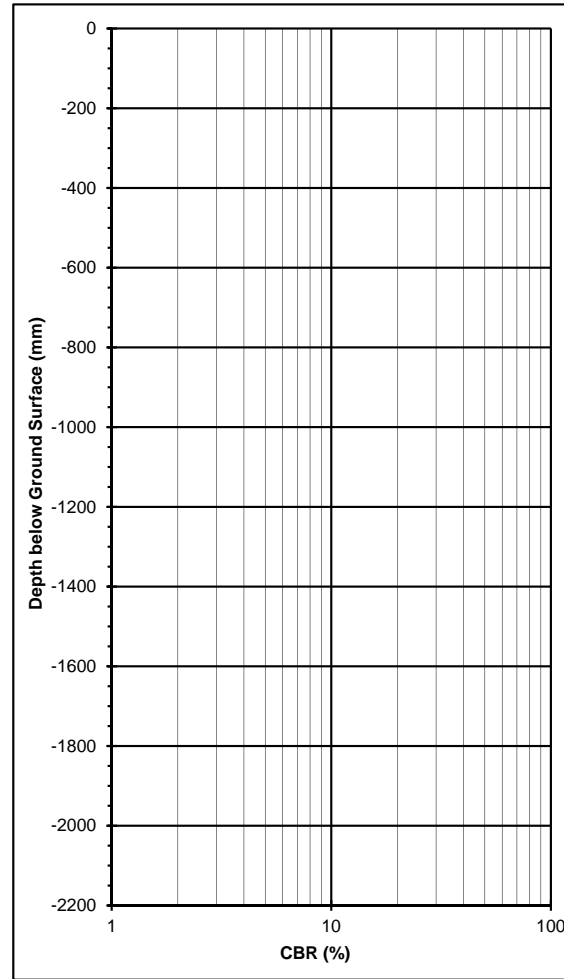
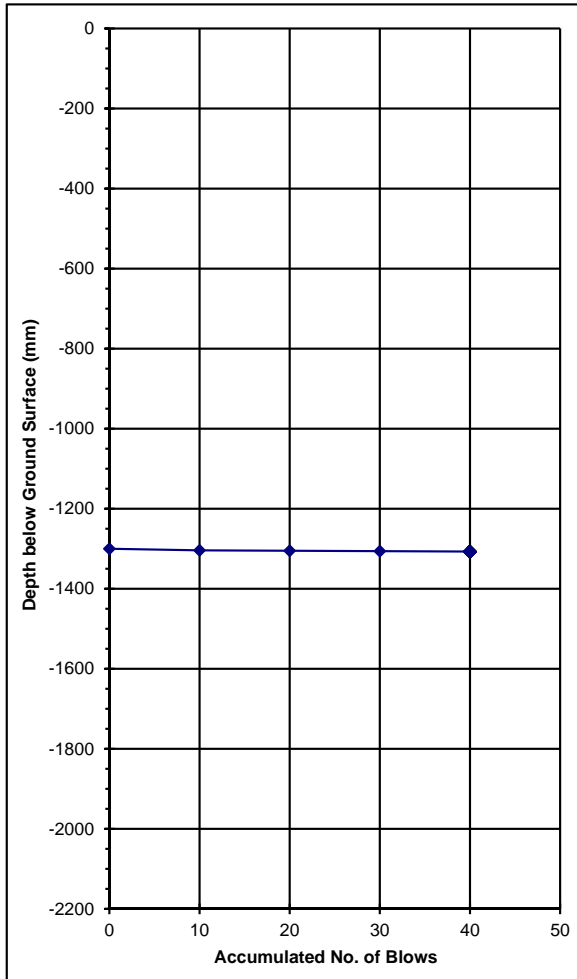


Job Number : 60509148
 DCP/Core Number : SK503
 DCP Operator : CC/WH
 Date Tested : 25/11/16
 Plot Prepared By : LT
 Plot Checked By : MB
 Date Prepared : 05/12/16

Location : St. Athan Northern Access Road

OSGR: 298759.892, 169081.211

Notes: Test commenced from the base of top soil in SK503 machine-excavated trial pit

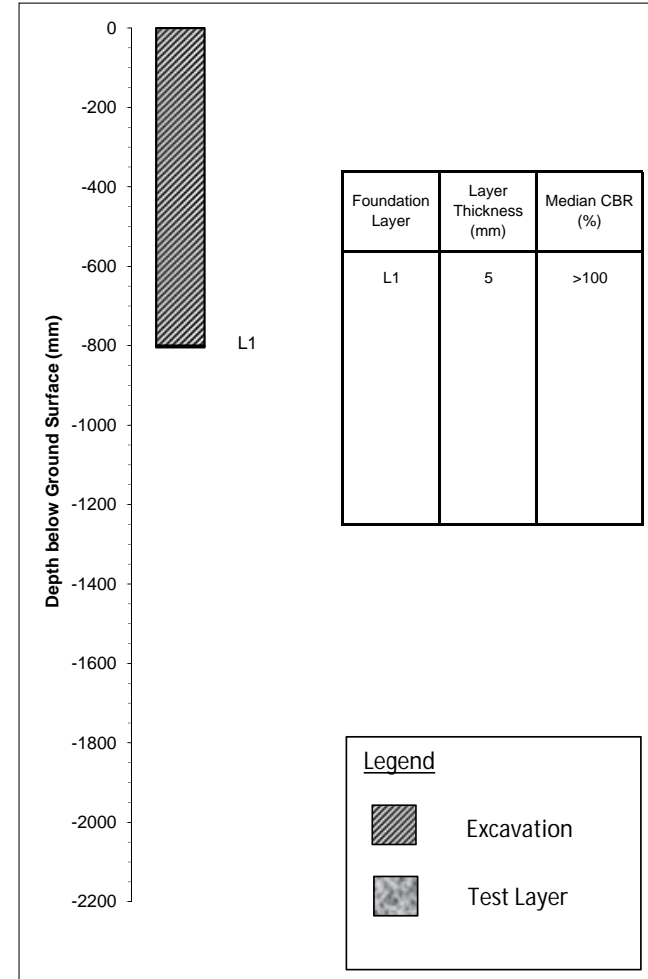
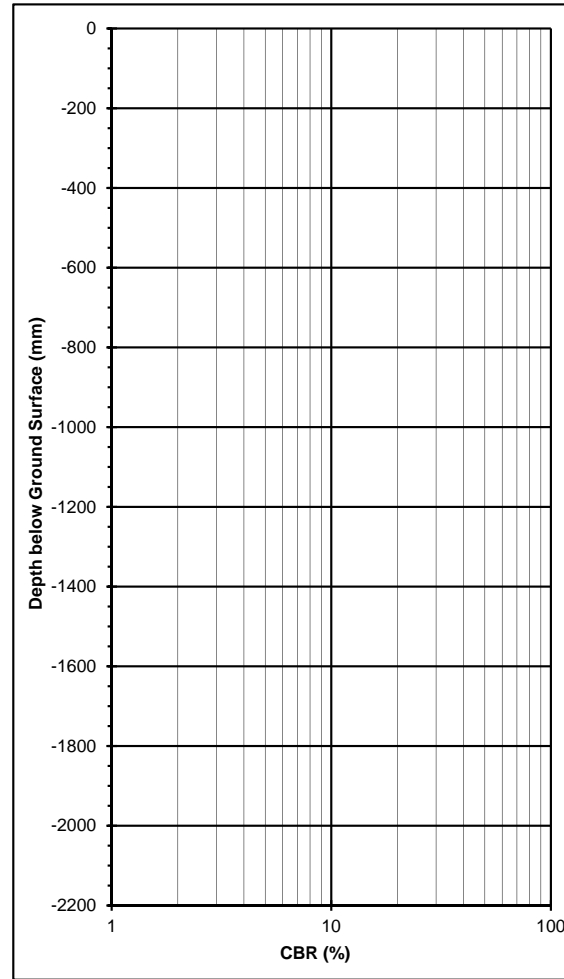
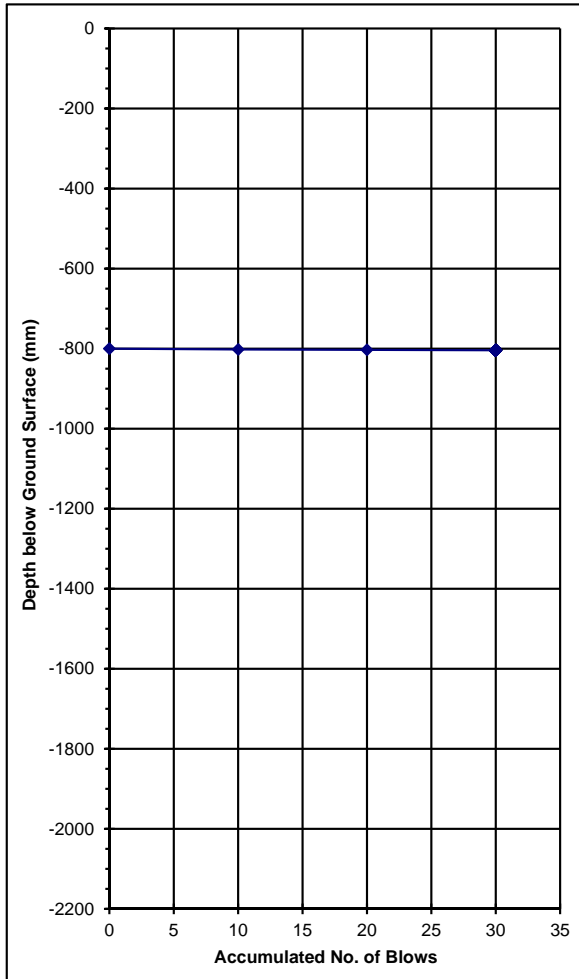


Job Number : 60509148
 DCP/Core Number : SK504
 DCP Operator : CC/WH
 Date Tested : 25/11/16
 Plot Prepared By : LT
 Plot Checked By : MB
 Date Prepared : 05/12/16

Location : St. Athan Northern Access Road

OSGR: 298881.314, 169149.165

Notes: Test commenced from the base of top soil in SK504 machine-excavated trial pit

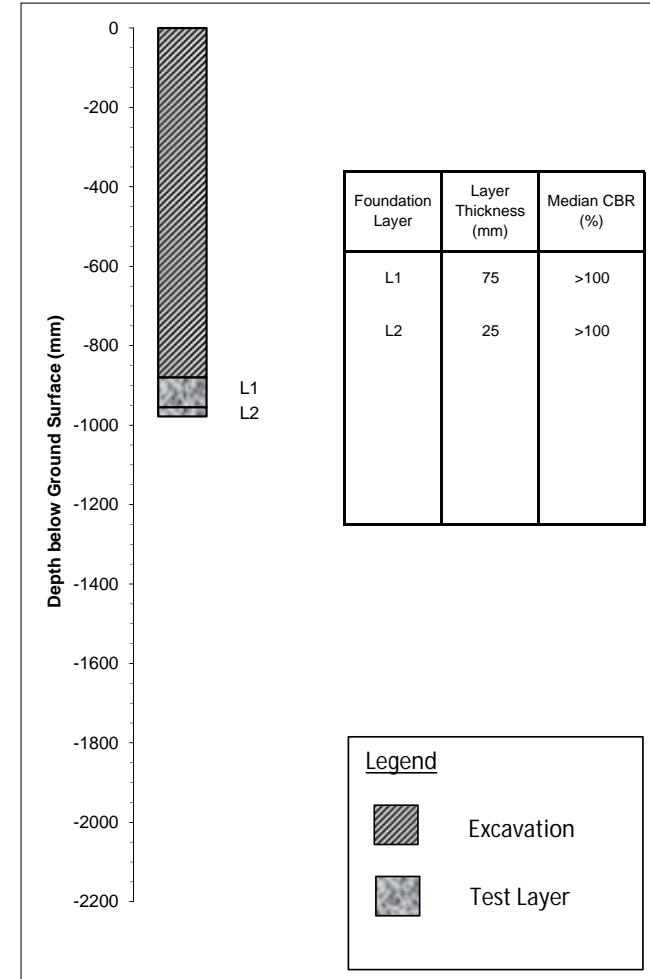
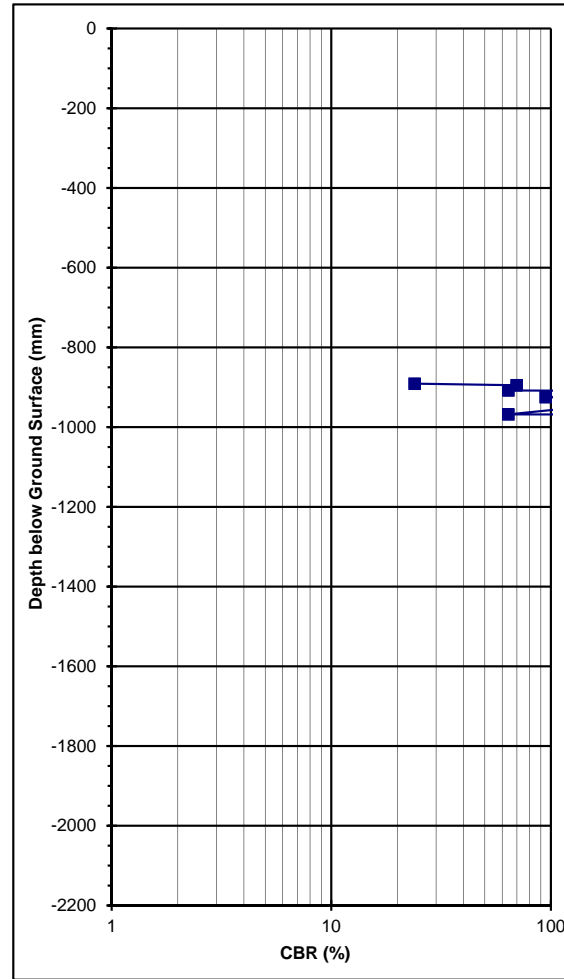
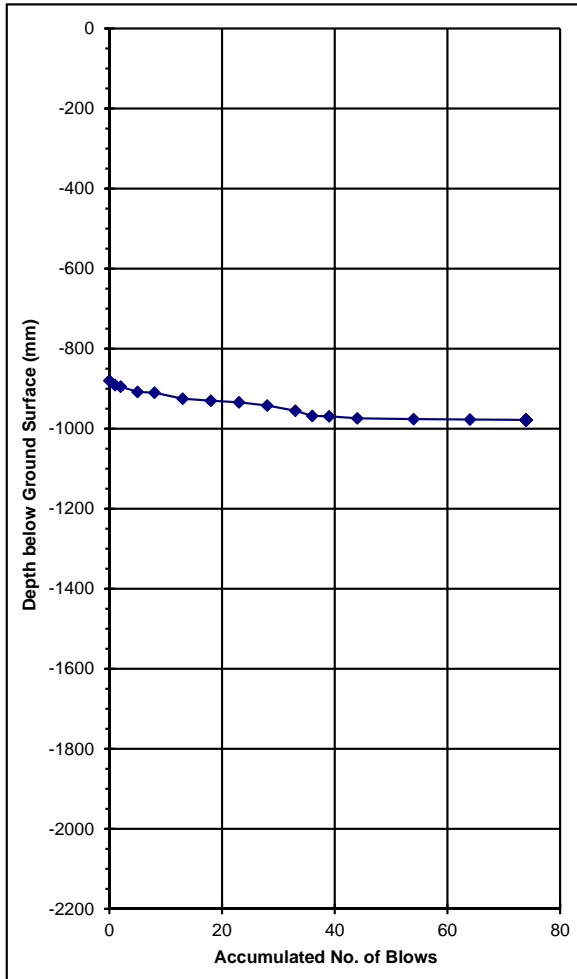


Job Number : 60509148
 DCP/Core Number : SK505
 DCP Operator : CC/WH
 Date Tested : 24/11/16
 Plot Prepared By : LT
 Plot Checked By : MB
 Date Prepared : 05/12/16

Location : St. Athan Northern Access Road

OSGR: 299067.672, 169210.291

Notes: Test commenced from the base of top soil in SK505 machine-excavated trial pit

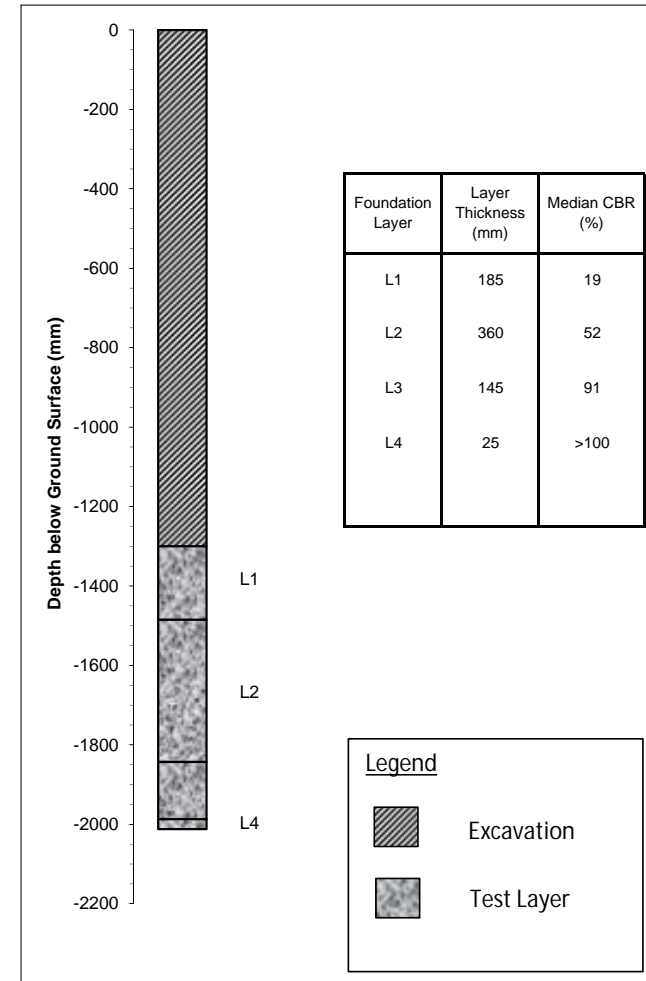
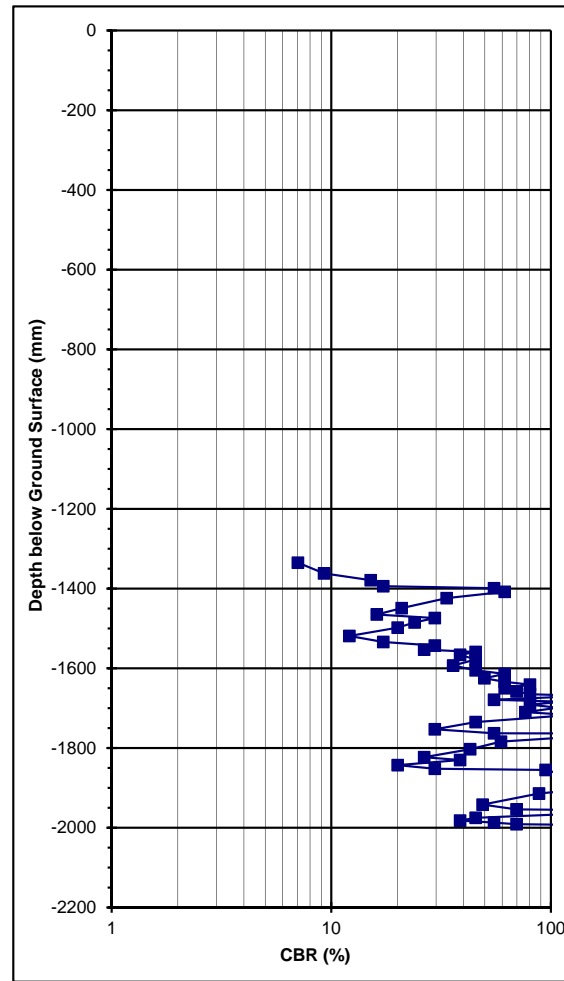
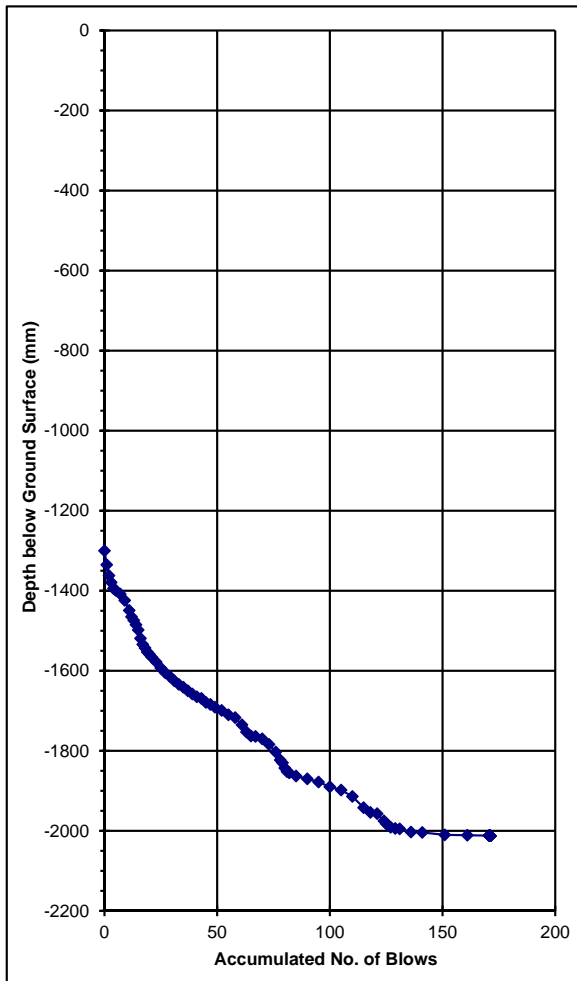


Job Number : 60509148
 DCP/Core Number : SK506
 DCP Operator : CC/WH
 Date Tested : 24/11/16
 Plot Prepared By : LT
 Plot Checked By : MB
 Date Prepared : 05/12/16

Location : St. Athan Northern Access Road

OSGR: 299152.675, 169307.883

Notes: Test commenced from the base of top soil in SK506 machine-excavated trial pit

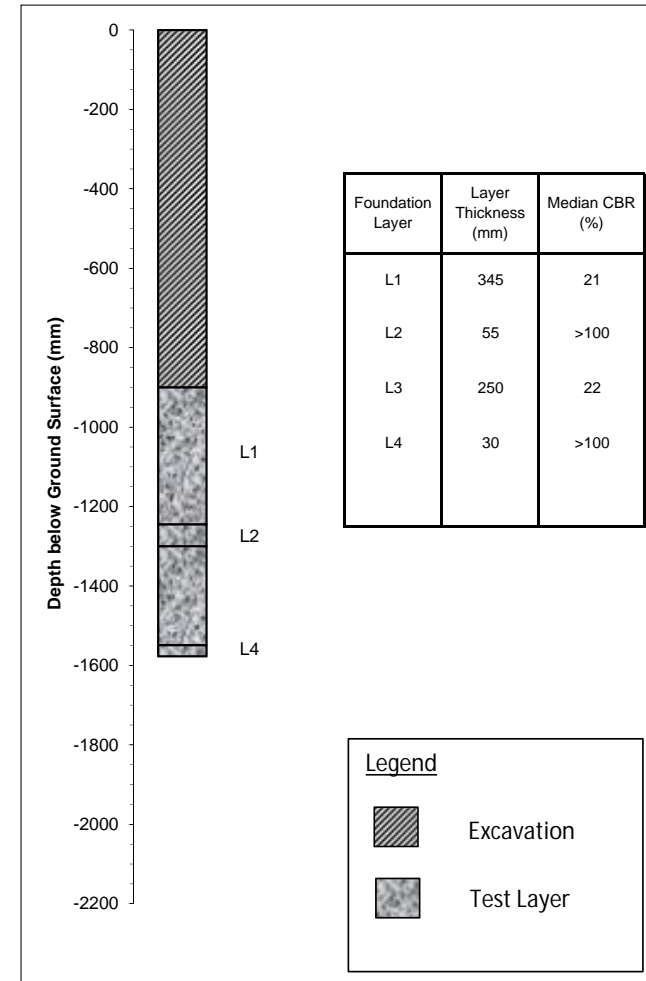
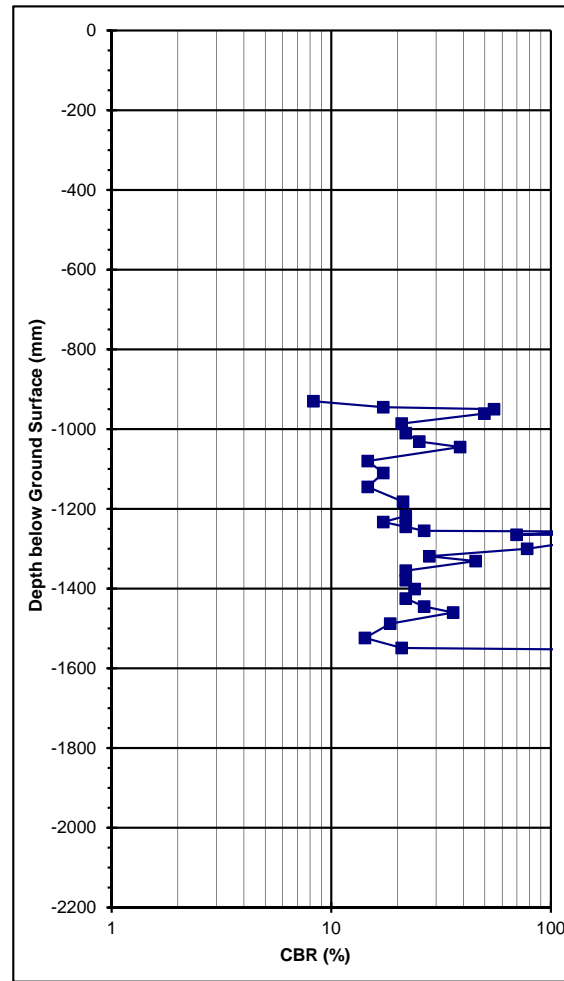
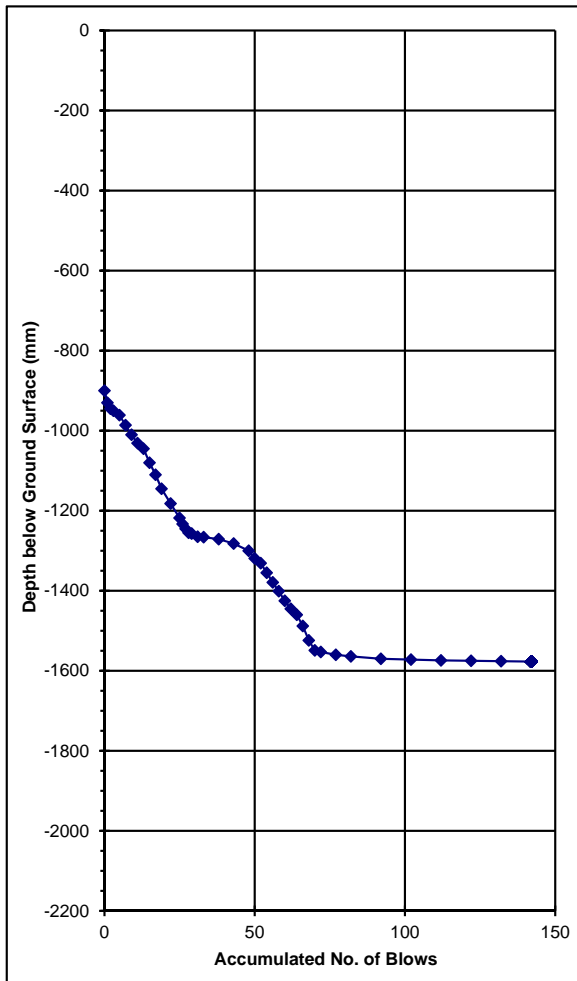


Job Number : 60509148
 DCP/Core Number : SK507
 DCP Operator : CC/WH
 Date Tested : 23/11/16
 Plot Prepared By : LT
 Plot Checked By : MB
 Date Prepared : 05/12/16

Location : St. Athan Northern Access Road

OSGR: 299452.038, 169293.941

Notes: Test commenced from the base of top soil in SK507 machine-excavated trial pit

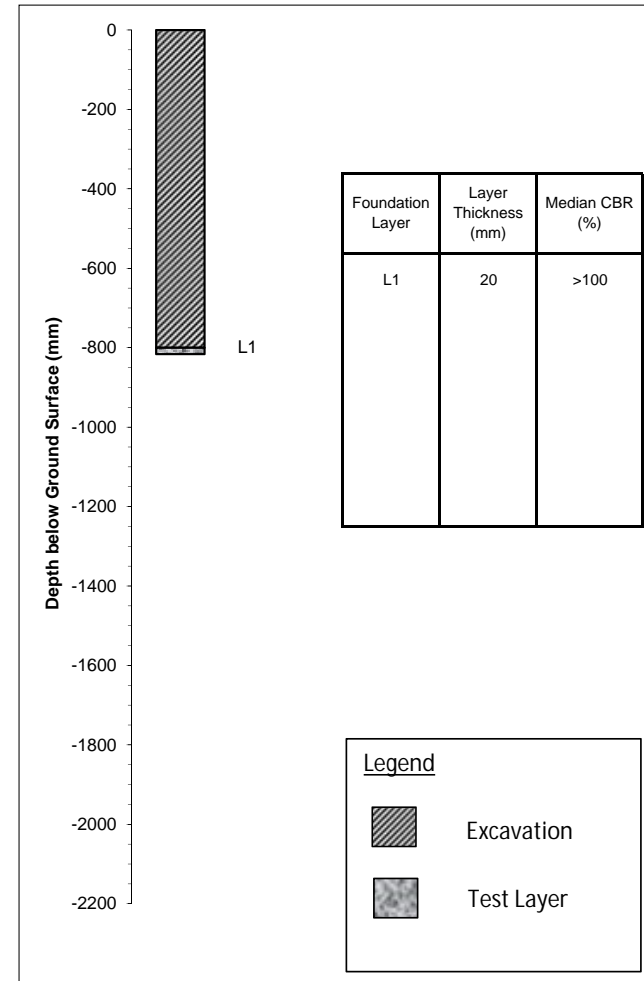
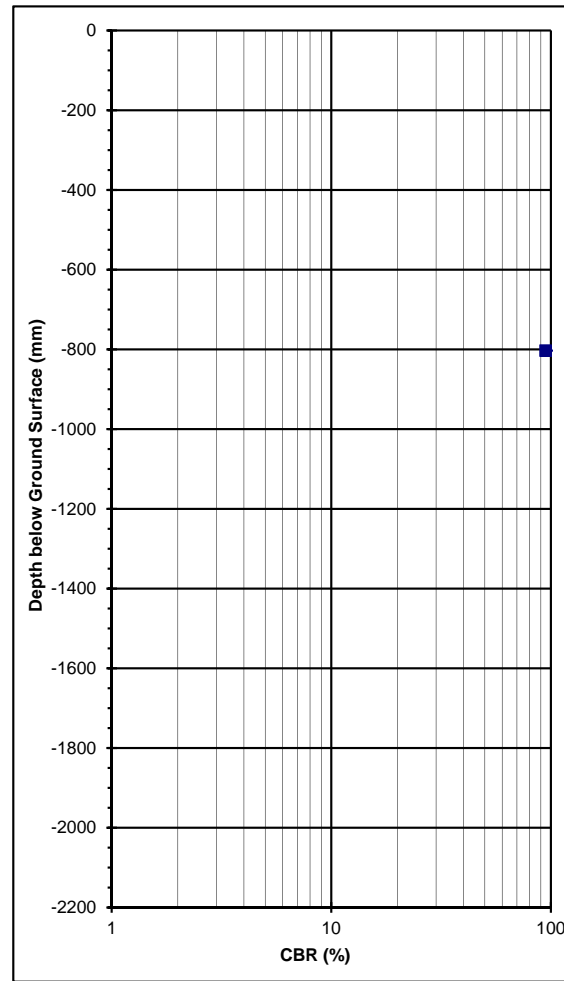
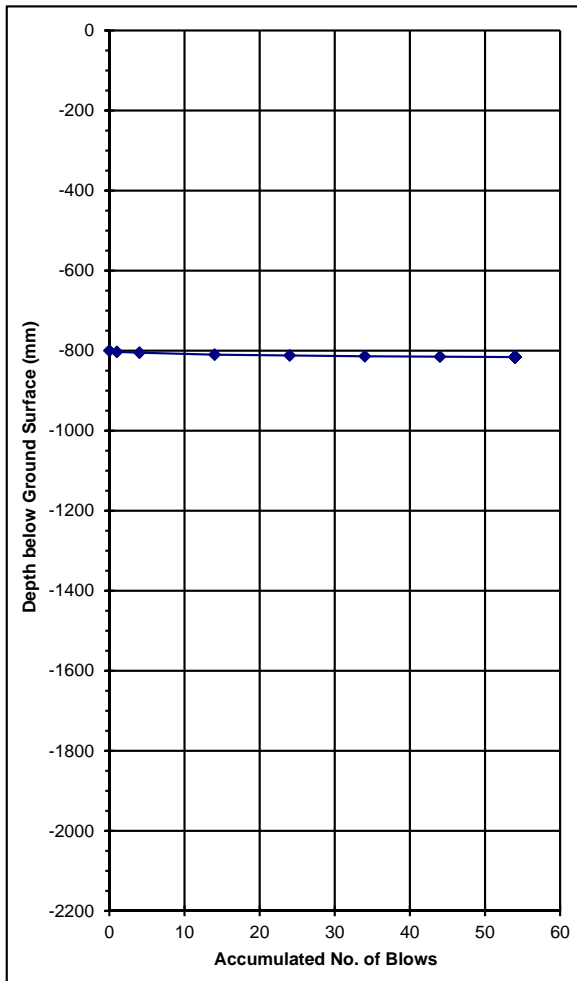


Job Number : 60509148
 DCP/Core Number : SK508
 DCP Operator : CC/WH
 Date Tested : 22/11/16
 Plot Prepared By : LT
 Plot Checked By : MB
 Date Prepared : 05/12/16

Location : St. Athan Northern Access Road

OSGR: 299678.218, 169171.911

Notes: Test commenced from the base of top soil in SK508 machine-excavated trial pit

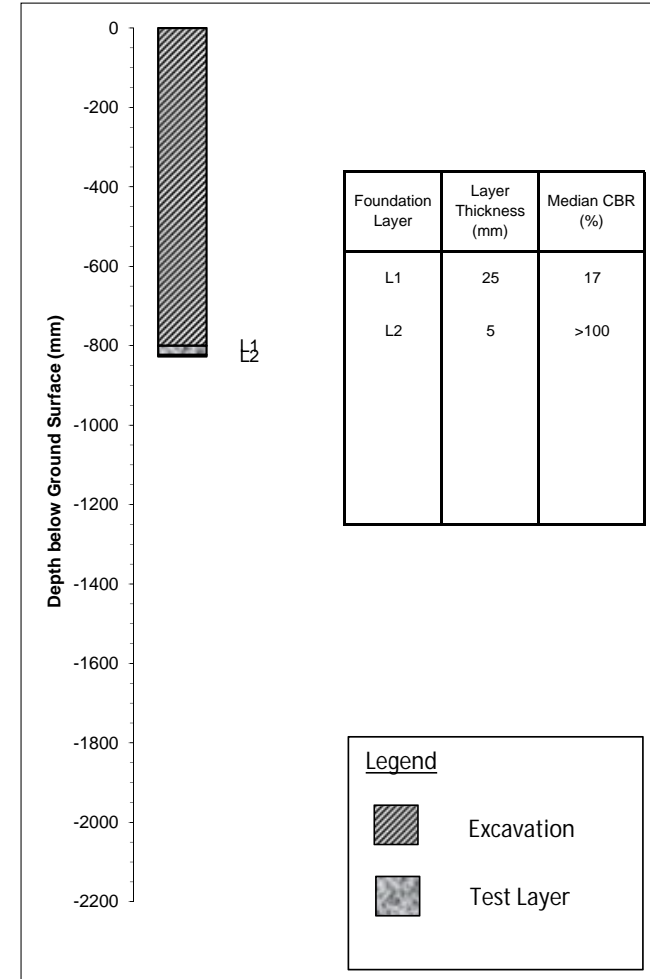
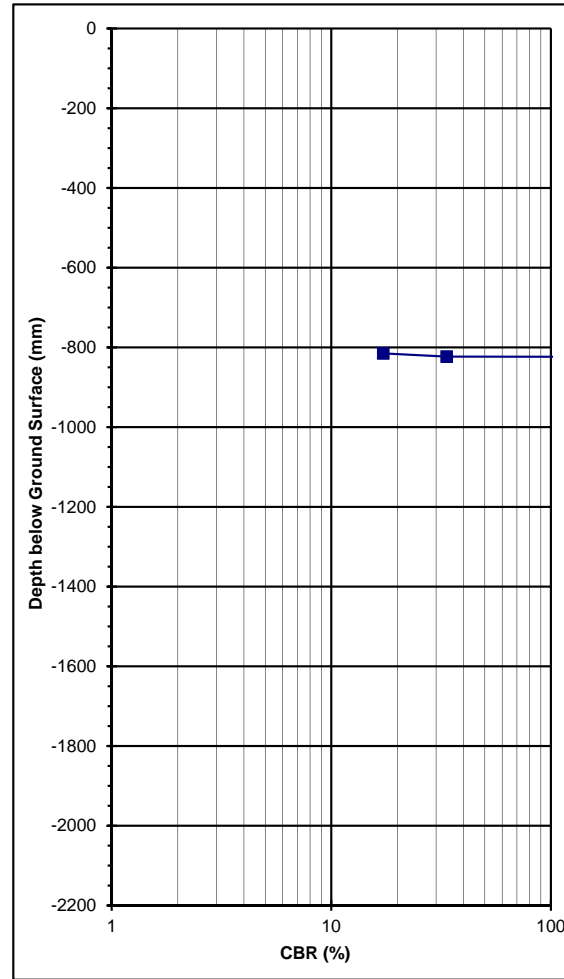
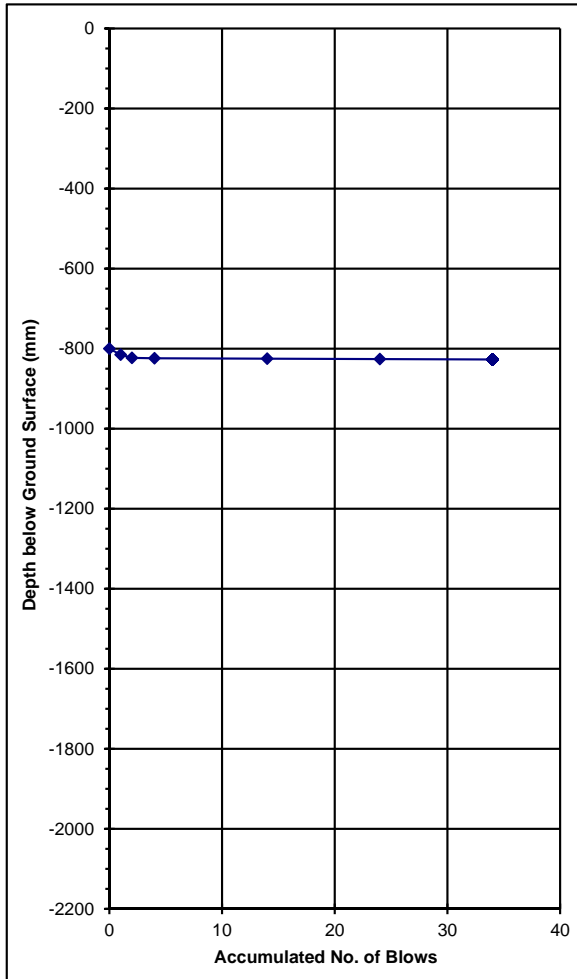


Job Number : 60509148
 DCP/Core Number : SK509
 DCP Operator : CC/WH
 Date Tested : 22/11/16
 Plot Prepared By : LT
 Plot Checked By : MB
 Date Prepared : 05/12/16

Location : St. Athan Northern Access Road

OSGR: 299981.456, 169255.033

Notes: Test commenced from the base of top soil in SK509 machine-excavated trial pit

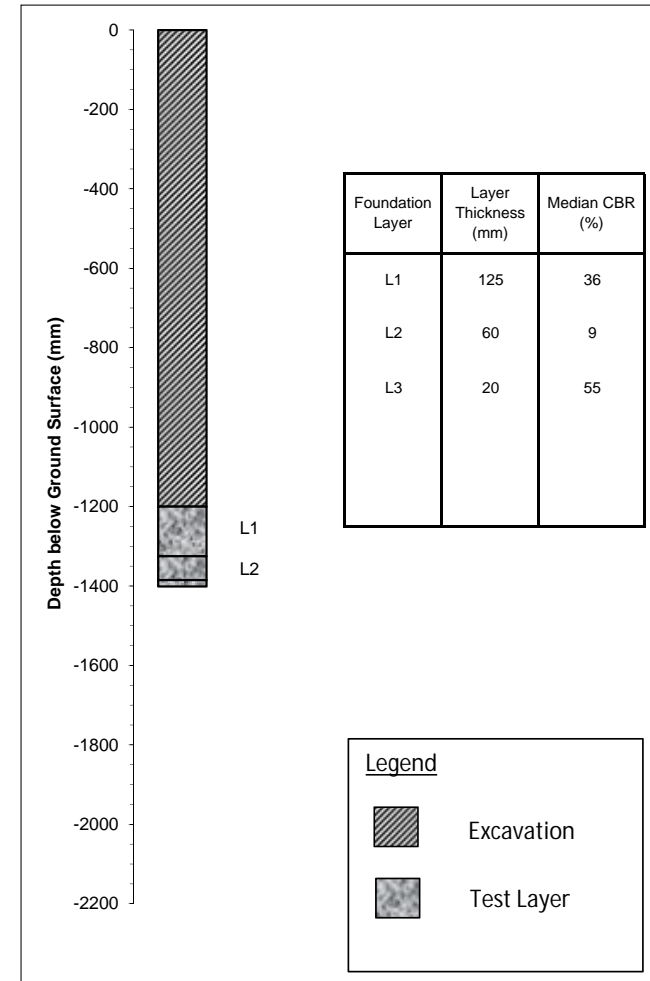
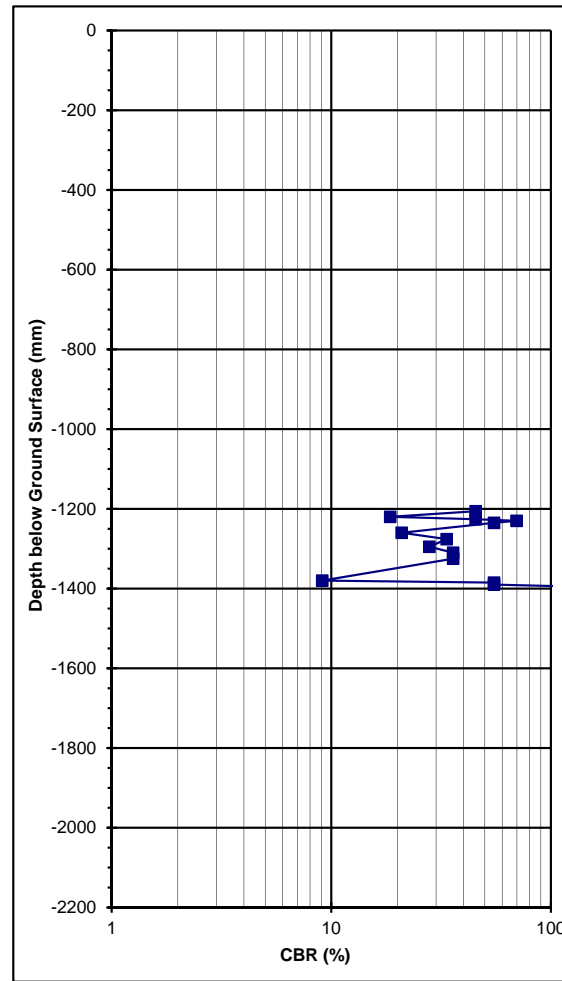
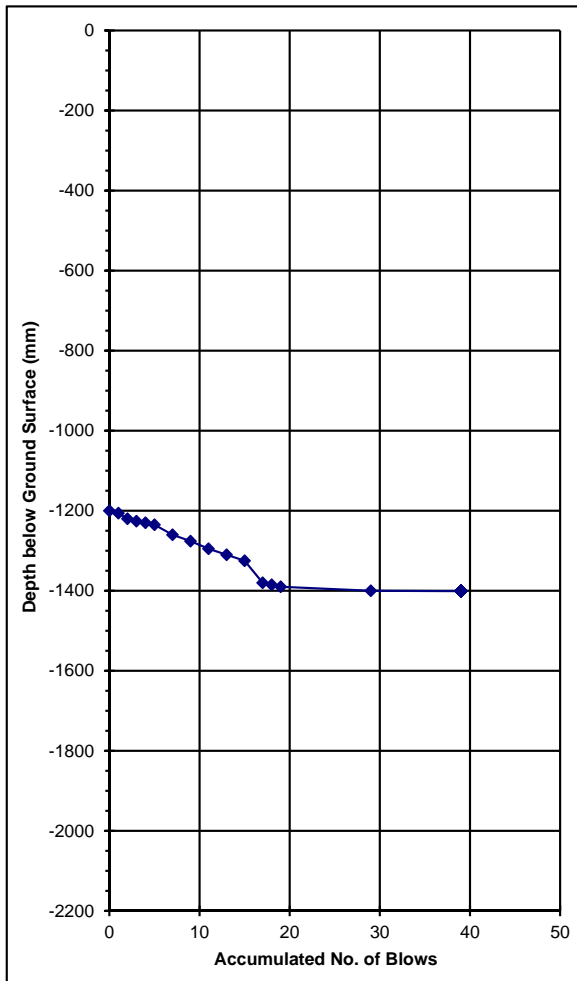


Job Number : 60509148
 DCP/Core Number : SK510
 DCP Operator : CC/WH
 Date Tested : 22/11/16
 Plot Prepared By : LT
 Plot Checked By : MB
 Date Prepared : 05/12/16

Location : St. Athan Northern Access Road

OSGR: 300129.129, 169202.376

Notes: Test commenced from the base of top soil in SK510 machine-excavated trial pit

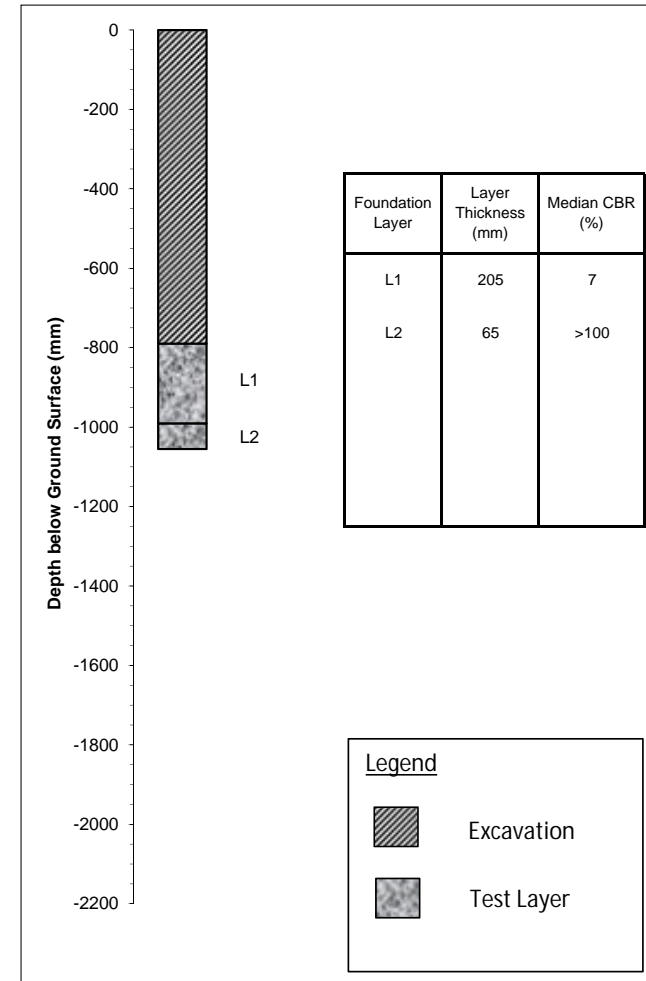
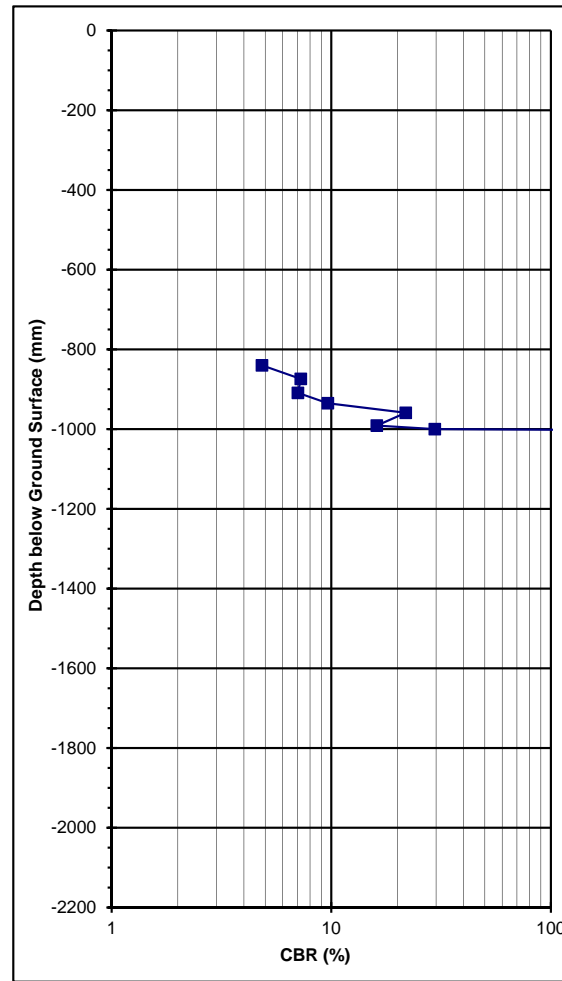
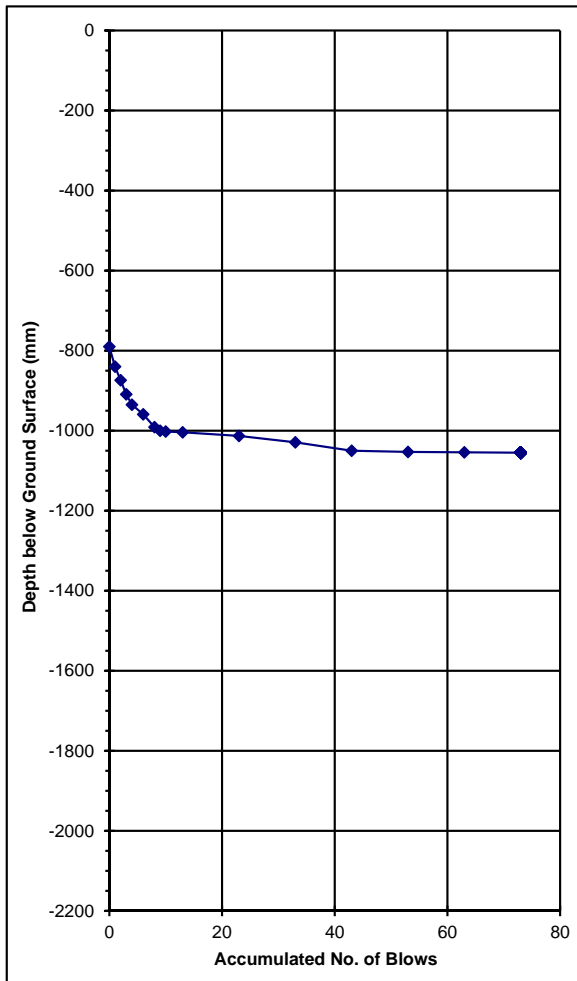


Job Number : 60509148
 DCP/Core Number : TP501
 DCP Operator : CC/WH
 Date Tested : 22/11/16
 Plot Prepared By : LT
 Plot Checked By : MB
 Date Prepared : 05/12/16

Location : St. Athan Northern Access Road

OSGR: 300313.446, 169301.712

Notes: Test commenced from the base of top soil in TP501



Appendix C Soakaway Test Results

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

Test Location ID:	SK501	Test No:	1 of 1
Weather Conditions:	Dry	Test Date:	23-Nov-16

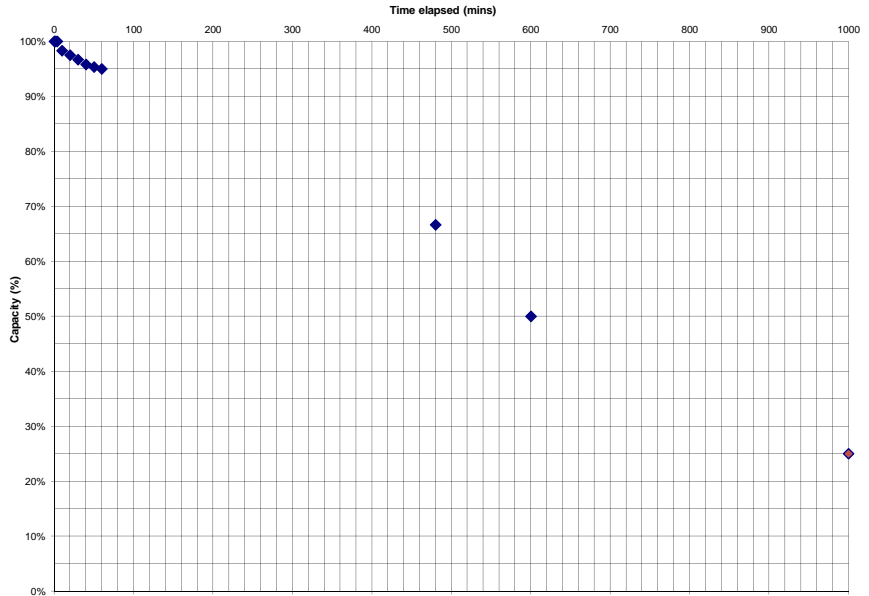
TRIAL PIT DIMENSIONS:

Width (m):	0.70	Length (m):	1.80
Depth (m bgl):	1.40	Start level (m bgl):	0.80

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
0.800	100.00%	0
0.800	100.00%	2
0.800	100.00%	4
0.810	98.33%	10
0.815	97.50%	20
0.820	96.67%	30
0.825	95.83%	40
0.828	95.33%	50
0.830	95.00%	60
1.000	66.67%	480
1.100	50.00%	600
1.250	25.00%	1000*

*Extrapolated 25% value



Test duration (mins): 600

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	0.378000	m ³ **	Soil Infiltration Rate, <i>f</i> =	$\frac{Vp75-25}{aP50 \times Tp75-25}$
aP50	=	2.7600	m ²		
Tp75-25	=	680.00	mins		

Test depth range (m bgl)	Soil Infiltration Rate, <i>f</i> (m/s) ***
0.800 to 1.100	3.36E-06

** Trial Pit stable - granular fill not required

*** Indicative unfaored infiltration rate (75% - 25%).

Departures from BRE365 test method:	Only 1no. Test was undetaken due to length of time taken for drainage.
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Remarks:	<ol style="list-style-type: none"> 1. Trial Pit dry during excavation and preparation of the Soakaway Test. 2. Water level brought to 0.80m bgl using water from towed bowser. 3. Water level recorded using tape measure (measured in m bgl). 4. Soakaway Test incomplete due to drainage time exceeding 8 hours. 5. Trial Pit backfilled with arisings upon completion.
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Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

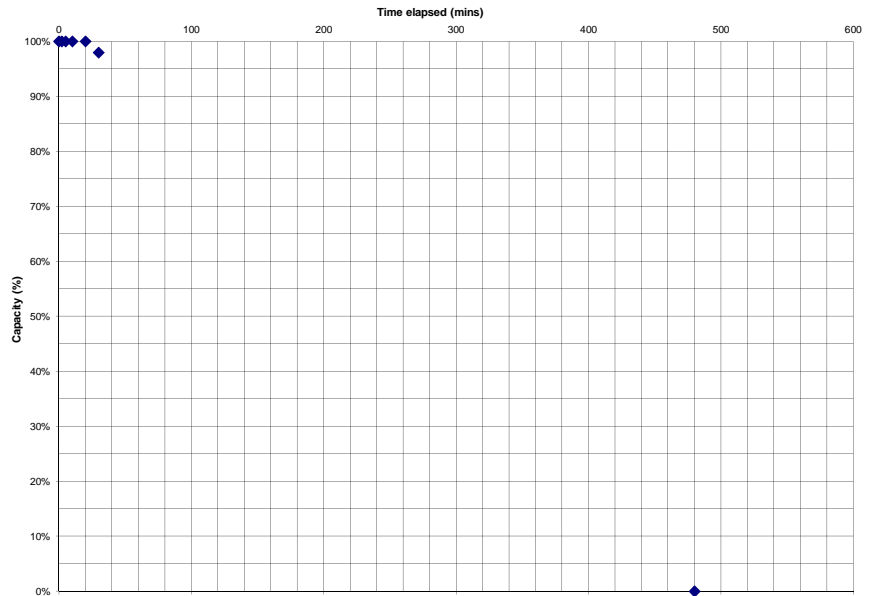
Test Location ID:	SK502	Test No:	1 of 2
Weather Conditions:	Dry	Test Date:	23-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.70	Length (m):	1.40
Depth (m bgl):	0.70	Start level (m bgl):	0.20

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
0.200	100.00%	0
0.200	100.00%	2
0.200	100.00%	5
0.200	100.00%	10
0.200	100.00%	20
0.210	98.00%	30
0.700	0.00%	480



Test drainage time (mins): 480

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	0.245000	m ³ *	Soil Infiltration Rate, <i>f</i> =	$\frac{Vp75-25}{aP50 \times Tp75-25}$
aP50	=	2.0300	m ²		
Tp75-25	=	230.00	mins		

Test depth range (m bgl)	Soil Infiltration Rate, <i>f</i> (m/s) **
0.200 to 0.700	8.75E-06

* Trial Pit stable - granular fill not required
 ** Indicative unfactored infiltration rate (75% - 25%).

Departures from BRE365 test method:	1. Test commenced late PM, run for 30 mins, then left open over night. Pit dry AM 2. Approximate 25% and 75% points determined from graph.
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Remarks:	1. Trial Pit dry during excavation and preparation of the Soakaway Test. 2. Water level recorded using tape measure (measured in m bgl). 3. Water level in trial pit raised rapidly to 0.20m bgl using water from towed bowser. 4. Soakaway Test ran overnight - dry AM.
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Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

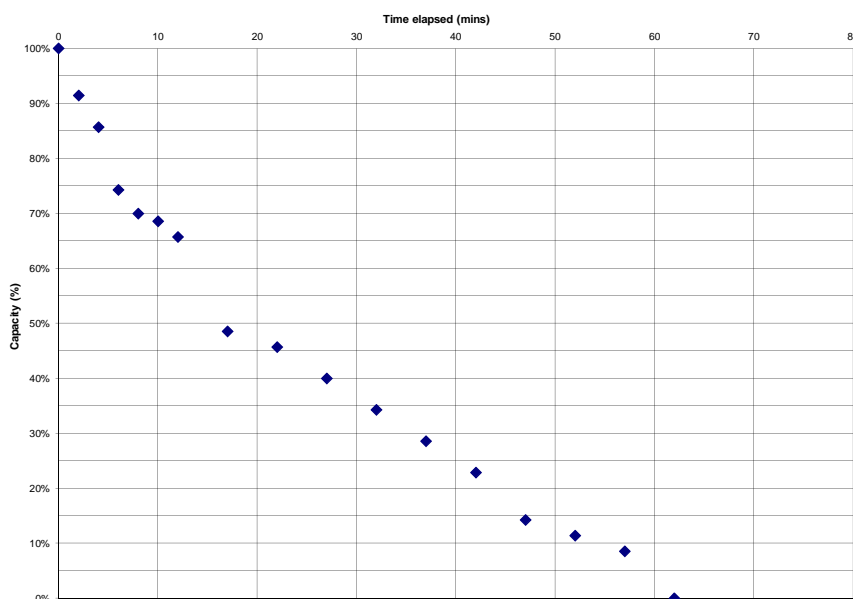
Test Location ID:	SK502	Test No:	2 of 2
Weather Conditions:	Dry	Test Date:	24-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.70	Length (m):	1.40
Depth (m bgl):	0.70	Start level (m bgl):	0.35

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
0.350	100.00%	0
0.380	91.43%	2
0.400	85.71%	4
0.440	74.29%	6
0.455	70.00%	8
0.460	68.57%	10
0.470	65.71%	12
0.530	48.57%	17
0.540	45.71%	22
0.560	40.00%	27
0.580	34.29%	32
0.600	28.57%	37
0.620	22.86%	42
0.650	14.29%	47
0.660	11.43%	52
0.670	8.57%	57
0.700	0.00%	62



Test drainage time (mins): 62

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	0.171500	m ³ *	Soil Infiltration Rate, <i>f</i> =	$\frac{Vp75-25}{aP50 \times Tp75-25}$
aP50	=	1.7150	m ²		
Tp75-25	=	34.25	mins		

Test depth range (m bgl)	Soil Infiltration Rate, <i>f</i> (m/s)
0.350 to 0.700	4.87E-05

* Trial Pit stable - granular fill not required

Departures from BRE365 test method:	Test 3 not undertaken due to time taken for initial test runs.
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Remarks:	<ol style="list-style-type: none"> 1. Trial Pit dry during excavation and preparation of the Soakaway Test. 2. Water level in trial pit raised rapidly to 0.35m bgl using water from towed bowser. 3. Water level recorded using tape measure (measured in m bgl). 4. Soakaway Test complete after 62mins. 5. Trial Pit backfilled with arisings upon completion.
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Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

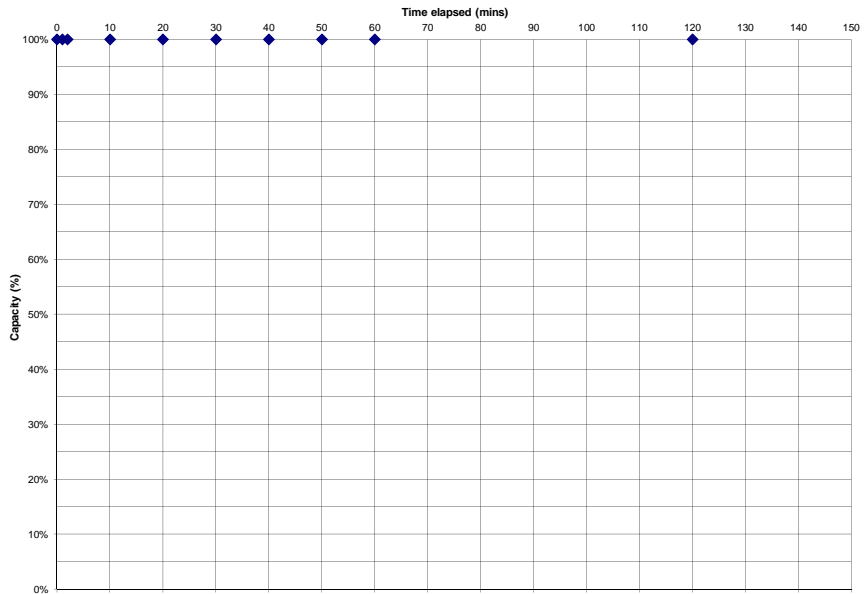
Test Location ID:	SK503	Test No:	1 of 1
Weather Conditions:	Dry	Test Date:	25-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.70	Length (m):	1.40
Depth (m bgl):	1.30	Start level (m bgl):	0.50

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
0.500	100.00%	0
0.500	100.00%	1
0.500	100.00%	2
0.500	100.00%	10
0.500	100.00%	20
0.500	100.00%	30
0.500	100.00%	40
0.500	100.00%	50
0.500	100.00%	60
0.500	100.00%	120



Test duration (mins): 120

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	N/A	m ³ *	Soil Infiltration Rate, <i>f</i> =	$\frac{Vp75-25}{aP50 \times Tp75-25}$
aP50	=	N/A	m ²		
Tp75-25	=	N/A	mins		

Test depth range (m bgl)	Soil Infiltration Rate, <i>f</i> (m/s) **
0.500 to 0.500	N/A

* Trial Pit stable - granular fill not required
 ** No infiltration recorded during test - possibly rising groundwater level

Departures from BRE365 test method: Only 1no. Test was undertaken due to negligible infiltration rate.

- Remarks:**
1. Ground water strike in trial pit at 1.30m bgl, rising to 1.10m bgl after 30 mins.
 2. Water level brought to 0.50m bgl using water from towed bowser.
 3. Water level recorded using tape measure (measured in m bgl).
 4. Soakaway Test terminated after 120 mins due to static water level.
 5. Trial Pit backfilled with arisings upon completion.

Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

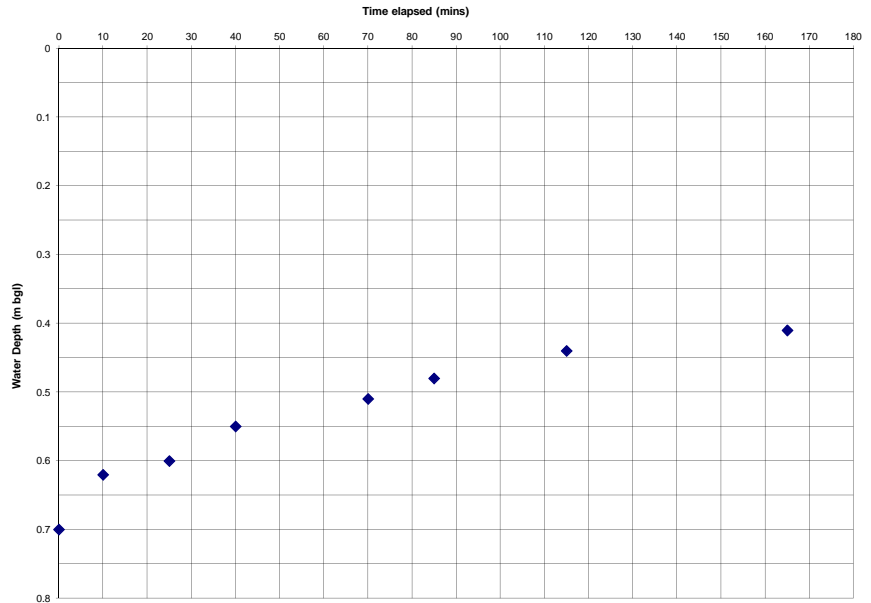
Test Location ID:	SK504	Test No:	1 of 1
Weather Conditions:	Dry	Test Date:	25-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.70	Length (m):	1.50
Depth (m bgl):	0.80	Start level (m bgl):	0.70

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
0.700	100.00%	0
0.620	180.00%	10
0.600	200.00%	25
0.550	250.00%	40
0.510	290.00%	70
0.480	320.00%	85
0.440	360.00%	115
0.410	390.00%	165



Test duration (mins): 165

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	N/A	m^3 *	Soil Infiltration Rate, f =	$\frac{Vp75-25}{aP50 \times Tp75-25}$
aP50	=	N/A	m^2		
Tp75-25	=	N/A	mins		

Test depth range (m bgl)	Soil Infiltration Rate, f (m/s)
0.700 to 0.410	N/A**

* Trial Pit stable - granular fill not required
 ** Ground water level rising - no infiltration

Departures from BRE365 test method: No infiltration test undertaken due to rising ground water level.

Remarks:

1. Ground water strike in trial pit at 0.80m bgl, steadily rising to 0.41m bgl after 165 mins.
2. No water added to test pit as water level was rising.
3. Water level monitored using tape measure for 165mins (measured in m bgl).
4. Soakaway Test terminated due to rising ground water.
5. Trial Pit backfilled with arisings upon completion.

Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

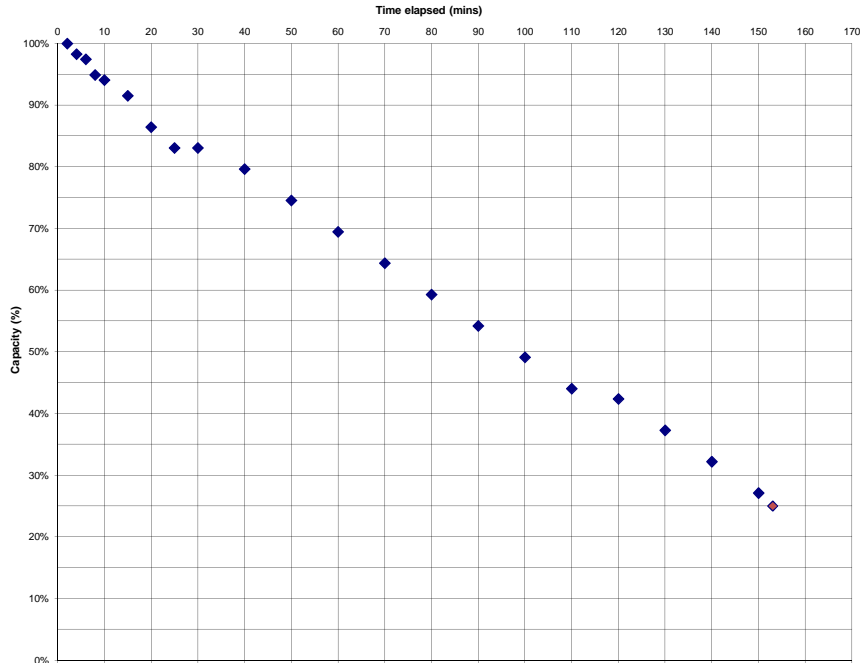
Test Location ID:	SK505	Test No:	1 of 1
Weather Conditions:	Dry	Test Date:	25-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.65	Length (m):	1.50
Depth (m bgl):	0.90	Start level (m bgl):	0.31

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
0.310	100.00%	2
0.320	98.31%	4
0.325	97.46%	6
0.340	94.92%	8
0.345	94.07%	10
0.360	91.53%	15
0.390	86.44%	20
0.410	83.05%	25
0.410	83.05%	30
0.430	79.66%	40
0.460	74.58%	50
0.490	69.49%	60
0.520	64.41%	70
0.550	59.32%	80
0.580	54.24%	90
0.610	49.15%	100
0.640	44.07%	110
0.650	42.37%	120
0.680	37.29%	130
0.710	32.20%	140
0.740	27.12%	150
0.753	25.00%	153*



*Extrapolated 25% value

Test duration (mins): 150

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	0.287625	m ³ **	Soil Infiltration Rate, f =	$\frac{Vp75-25}{aP50 \times Tp75-25}$
aP50	=	2.2435	m ²		
Tp75-25	=	102.82	mins		

Test depth range (m bgl)	Soil Infiltration Rate, f (m/s) ***
0.310 to 0.740	2.08E-05

** Trial Pit stable - granular fill not required

*** Indicative unfactored infiltration rate (75% - 25%).

Departures from BRE365 test method:	<ol style="list-style-type: none"> 1. Only 1no. Test undertaken due to low infiltration rate in 1st test. 2. 25% point extrapolated from graph.
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Remarks:	<ol style="list-style-type: none"> 1. Trial Pit was dry during excavation and preparation of the soakaway test. 2. Water level in trial pit raised rapidly to 0.31m bgl using water from bowser. 3. Water level monitored using tape measure (measured in m bgl). 4. Trial Pit backfilled with arisings upon completion.
-----------------	--

Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

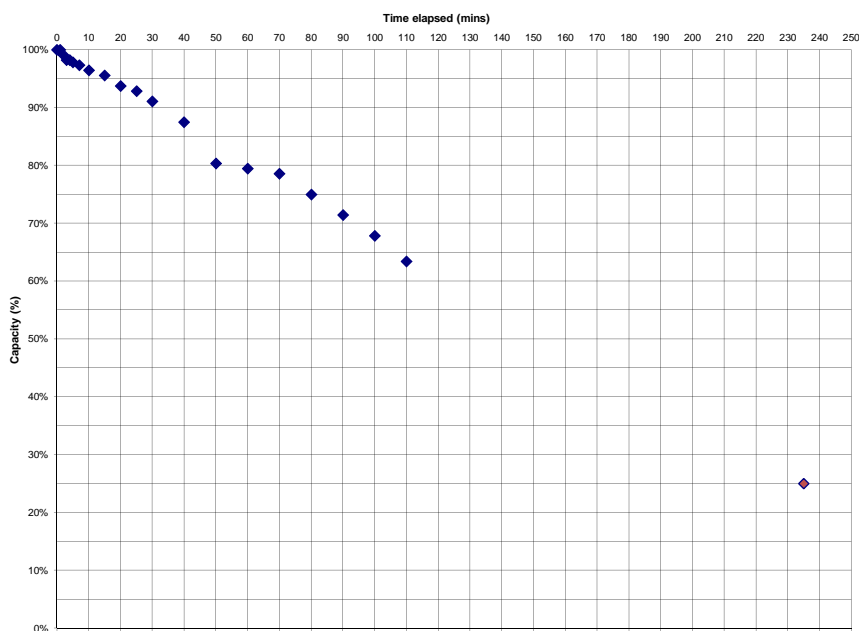
Test Location ID:	SK506	Test No:	1 of 1
Weather Conditions:	Dry	Test Date:	24-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.76	Length (m):	1.60
Depth (m bgl):	1.20	Start level (m bgl):	0.64

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
0.640	100.00%	0
0.640	100.00%	1
0.645	99.11%	2
0.650	98.21%	3
0.650	98.21%	4
0.652	97.86%	5
0.655	97.32%	7
0.660	96.43%	10
0.665	95.54%	15
0.675	93.75%	20
0.680	92.86%	25
0.690	91.07%	30
0.710	87.50%	40
0.750	80.36%	50
0.755	79.46%	60
0.760	78.57%	70
0.780	75.00%	80
0.800	71.43%	90
0.820	67.86%	100
0.845	63.39%	110
1.060	25.00%	235*



Test duration (mins): 110

*Extrapolated 25% value

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	0.340480	m ³ **	Soil Infiltration Rate, f =	
aP50	=	2.5376	m ²	$\frac{Vp75-25}{aP50 \times Tp75-25}$	
Tp75-25	=	155.00	mins		

Test depth range (m bgl)	Soil Infiltration Rate, f (m/s) ***
0.640 to 0.845	1.44E-05

** Trial Pit stable - granular fill not required

*** Indicative unfactored infiltration rate (75% - 25%).

Departures from BRE365 test method:	<ol style="list-style-type: none"> 1. Only 1no. Test undertaken due to low infiltration rate in 1st test. 2. 25% point extrapolated from graph.
--	---

Remarks:	<ol style="list-style-type: none"> 1. Trial Pit was dry during excavation and preparation of the soakaway test. 2. Water level in trial pit raised rapidly to 0.64m bgl using water from towed bowser. 3. Water level monitored using a dipmeter (measured in m bgl). 4. Trial Pit backfilled with arisings upon completion.
-----------------	--

Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

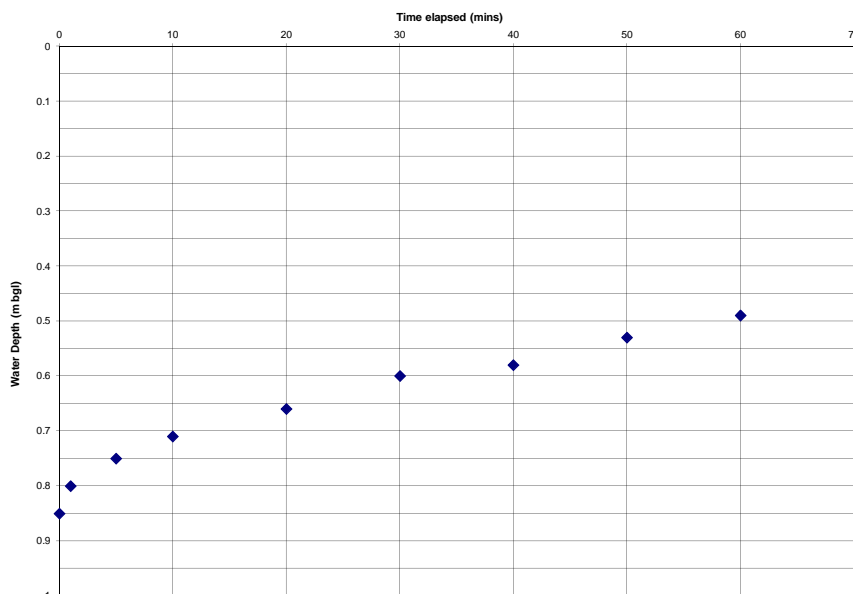
Test Location ID:	SK507	Test No:	1 of 1
Weather Conditions:	Dry	Test Date:	23-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.60	Length (m):	2.10
Depth (m bgl):	0.90	Start level (m bgl):	0.85

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
0.850	100.00%	0
0.800	200.00%	1
0.750	300.00%	5
0.710	380.00%	10
0.660	480.00%	20
0.600	600.00%	30
0.580	640.00%	40
0.530	740.00%	50
0.490	820.00%	60



Test duration (mins): 60

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	N/A	m ³	Soil Infiltration Rate, <i>f</i> =	$\frac{Vp75-25}{aP50 \times Tp75-25}$
aP50	=	N/A	m ²		
Tp75-25	=	N/A	mins		

Test depth range (m bgl)	Soil Infiltration Rate, <i>f</i> (m/s)
0.850 to 0.490	N/A**

* Trial Pit stable - granular fill not required

** Ground water level rising - no infiltration

Departures from BRE365 test method:	No infiltration test undertaken due to ground water level rising.
--	---

Remarks:	<ol style="list-style-type: none"> 1. Ground water strike in trial pit at 0.85m bgl, rising to 0.49m bgl after 60 mins. 2. No water added to test pit as water level was rising. 3. Water level monitored using tape measure for 60mins (measured in m bgl). 4. Soakaway Test terminated due to rising ground water. 5. Trial Pit backfilled with arisings upon completion.
-----------------	--

Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

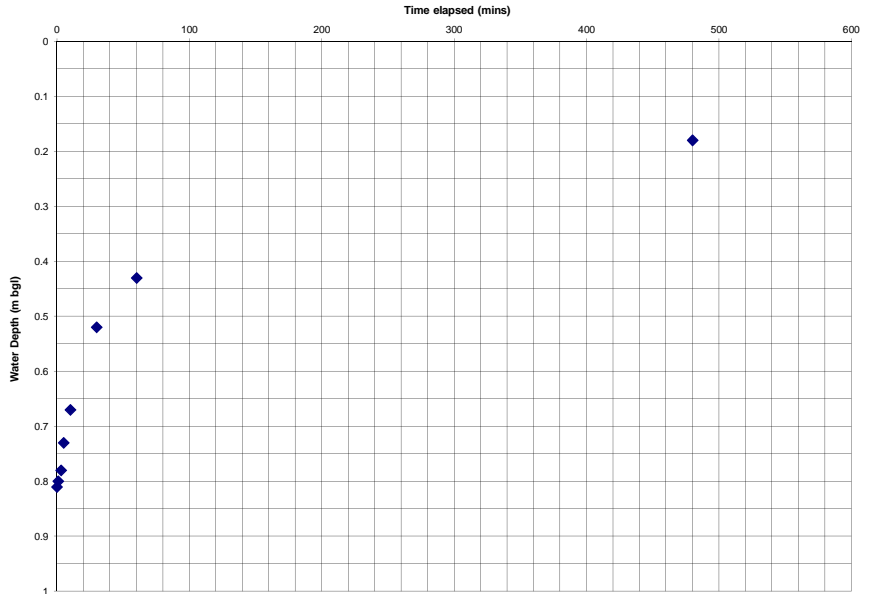
Test Location ID:	SK508	Test No:	1 of 1
Weather Conditions:	Dry	Test Date:	23-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.80	Length (m):	1.60
Depth (m bgl):	0.95	Start level (m bgl):	0.81

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
0.810	100.00%	0
0.800	107.14%	1
0.780	121.43%	3
0.730	157.14%	5
0.670	200.00%	10
0.520	307.14%	30
0.430	371.43%	60
0.180	550.00%	480



Test drainage time (mins): 480

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	N/A	m ³ *	Soil Infiltration Rate, <i>f</i> =	$\frac{Vp75-25}{aP50 \times Tp75-25}$
aP50	=	N/A	m ²		
Tp75-25	=	N/A	mins		

Test depth range (m bgl)	Soil Infiltration Rate, <i>f</i> (m/s)
0.810 to 0.180	N/A

* Trial Pit stable - granular fill not required
 ** Water level rising - no infiltration

Departures from BRE365 test method:	No infiltration test undertaken due to ground water level rising.
--	---

Remarks:	<ol style="list-style-type: none"> 1. Ground water strike in trial pit at 0.95m bgl, rising to 0.18m bgl after 480 mins. 2. No water added to test pit as water level was naturally rising steadily. 3. Water level monitored using tape measure for 60mins (measured in m bgl). 4. Soakaway Test terminated due to rising ground water. 5. Trial Pit backfilled with arisings upon completion.
-----------------	--

Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

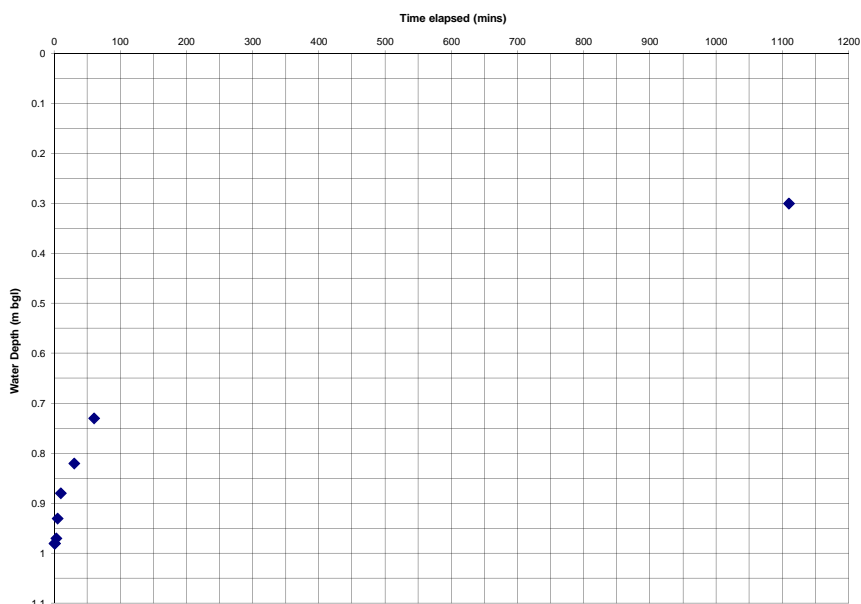
Test Location ID:	SK509	Test No:	1 of 1
Weather Conditions:	Dry	Test Date:	23-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.80	Length (m):	2.00
Depth (m bgl):	1.32	Start level (m bgl):	0.98

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
0.980	100.00%	0
0.980	100.00%	1
0.970	102.94%	3
0.930	114.71%	5
0.880	129.41%	10
0.820	147.06%	30
0.730	173.53%	60
0.300	300.00%	1110



Test duration (mins): 1110

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	N/A	m^3		Soil Infiltration Rate, f =		$\frac{Vp75-25}{aP50 \times Tp75-25}$
aP50	=	N/A	m^2				
Tp75-25	=	N/A	mins				

Test depth range (m bgl)	Soil Infiltration Rate, f (m/s)
0.980 to 0.300	N/A**

* Trial Pit stable - granular fill not required

** Ground water level rising - no infiltration

Departures from BRE365 test method:	No infiltration test undertaken due to ground water level rising.
--	---

Remarks:	<ol style="list-style-type: none"> 1. Ground water strike in trial pit at 1.20m bgl, rising to 1.10m bgl after 20 mins, and continuing to rise after 1110 mins. 2. No water added to test pit as water level was naturally rising steadily. 3. Water level monitored using tape measure for 60mins and after 1110 mins (measured in m bgl). 4. Soakaway Test terminated due to rising ground water. 5. Trial Pit backfilled with arisings upon completion.
-----------------	---

Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

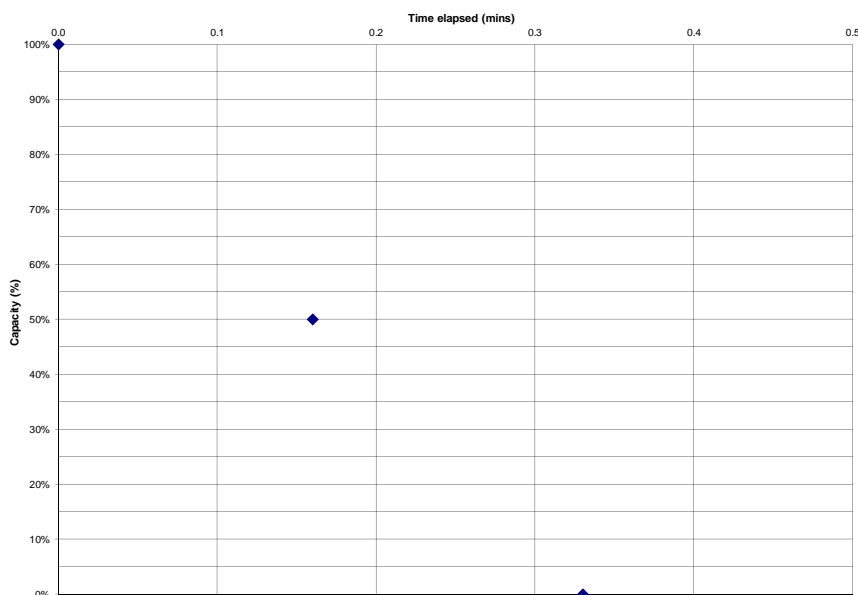
Test Location ID:	SK510	Test No:	1 of 3
Weather Conditions:	Dry	Test Date:	22-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.80	Length (m):	1.60
Depth (m bgl):	1.40	Water level (m bgl):	1.30

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
1.300	100.00%	0
1.350	50.00%	0.16
1.400	0.00%	0.33



Test drainage time (mins): 0.33

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	0.064000	m ³ *	Soil Infiltration Rate, <i>f</i> =	$\frac{\text{Vp75-25}}{\text{aP50} \times \text{Tp75-25}}$
aP50	=	1.5200	m ²		
Tp75-25	=	0.10	mins		

Test depth range (m bgl)	Soil Infiltration Rate, <i>f</i> (m/s) **
1.300 to 1.400	7.02E-03

* Trial Pit stable - granular fill not required

Departures from BRE365 test method:	None
-------------------------------------	------

Remarks:	<ol style="list-style-type: none"> 1. Trial Pit dry during excavation and preparation of the Soakaway Test. 2. Water level in trial pit raised rapidly to 1.30m bgl using water from towed bowser. 3. Water level recorded using tape measure (measured in m bgl). 4. Soakaway Test complete after 20 seconds - rapid infiltration rate observed. 5. Trial Pit backfilled with arisings upon completion.
----------	---

Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

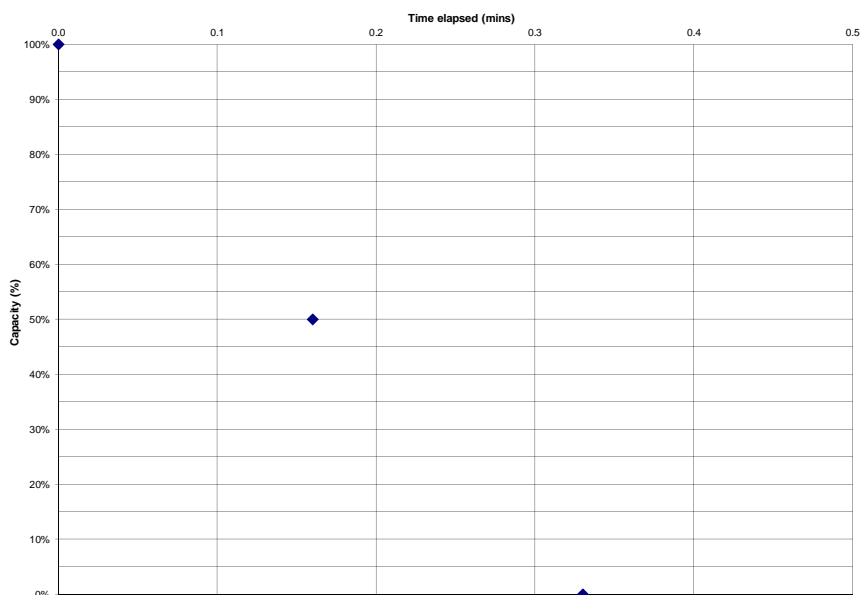
Test Location ID:	SK510	Test No:	2 of 3
Weather Conditions:	Dry	Test Date:	22-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.80	Length (m):	1.60
Depth (m bgl):	1.40	Water level (m bgl):	1.30

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
1.300	100.00%	0
1.350	50.00%	0.16
1.400	0.00%	0.33



Test drainage time (mins): 0.33

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	0.064000	m ³ *	Soil Infiltration Rate, <i>f</i> =	$\frac{Vp75-25}{aP50 \times Tp75-25}$
aP50	=	1.5200	m ²		
Tp75-25	=	0.10	mins		

Test depth range (m bgl)	Soil Infiltration Rate, <i>f</i> (m/s) **
1.300 to 1.400	7.02E-03

* Trial Pit stable - granular fill not required

Departures from BRE365 test method:	None
-------------------------------------	------

Remarks:	<ol style="list-style-type: none"> 1. Trial Pit dry during excavation and preparation of the Soakaway Test. 2. Water level in trial pit raised rapidly to 1.30m bgl using water from towed bowser. 3. Water level recorded using tape measure (measured in m bgl). 4. Soakaway Test complete after 20 seconds - rapid infiltration rate observed. 5. Trial Pit backfilled with arisings upon completion.
----------	---

Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

INFILTRATION TEST RESULTS

Project Name:	St. Athan Northern Access Road		
Site Location:	St. Athan		
Client:	Welsh Government		

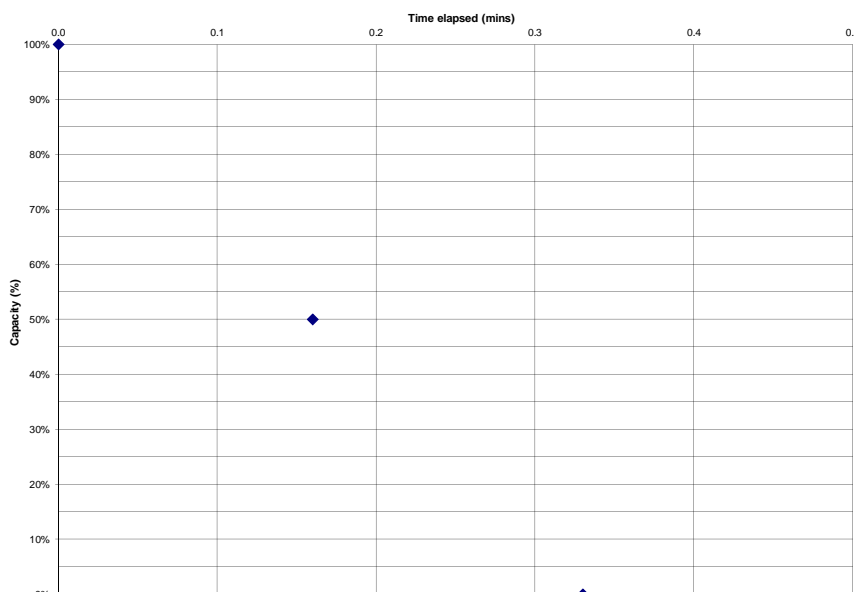
Test Location ID:	SK510	Test No:	3 of 3
Weather Conditions:	Dry	Test Date:	22-Nov-16

TRIAL PIT DIMENSIONS:

Width (m):	0.80	Length (m):	1.60
Depth (m bgl):	1.40	Water level (m bgl):	1.30

SOAKAGE RESULTS:

Depth to Water (m bgl)	Capacity (%)	Time elapsed (min)
1.300	100.00%	0
1.350	50.00%	0.16
1.400	0.00%	0.33



Test drainage time (mins): 0.33

INFILTRATION RATE CALCULATIONS:

Vp75-25	=	0.064000	m ³ *	Soil Infiltration Rate, <i>f</i> =	$\frac{Vp75-25}{aP50 \times Tp75-25}$
aP50	=	1.5200	m ²		
Tp75-25	=	0.10	mins		

Test depth range (m bgl)	Soil Infiltration Rate, <i>f</i> (m/s) **
1.300 to 1.400	7.02E-03

* Trial Pit stable - granular fill not required

Departures from BRE365 test method:	None
-------------------------------------	------

Remarks:	<ol style="list-style-type: none"> 1. Trial Pit dry during excavation and preparation of the Soakaway Test. 2. Water level in trial pit raised rapidly to 1.30m bgl using water from towed bowser. 3. Water level recorded using tape measure (measured in m bgl). 4. Soakaway Test complete after 20 seconds - rapid infiltration rate observed. 5. Trial Pit backfilled with arisings upon completion.
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Prepared	MC	INFILTRATION TEST RESULTS St. Athan Northern Access Road Welsh Government	
Checked	AEL		
Job No.	60509148		
Date	Jan-17		

Appendix D Borehole Logs

KEY TO BOREHOLE, TRIAL PIT AND WINDOW SAMPLE LOGS

SOIL STRATA

SAMPLES

U100	Open Drive Tube Sample (100mm nominal diameter) - UNR denotes 'no recovery'.
UT100	Open Drive Thin Wall Tube Sample (100mm nominal diameter) - UNR denotes 'no recovery'.
U38	Open Drive Tube Sample (38mm nominal diameter)
P	Piston Sample (100mm nominal diameter unless noted otherwise) - PNR denotes 'no recovery'.
D	Small Disturbed Sample
B	Bulk Disturbed Sample
BLK	Block Sample
C	Rotary Core Sample (taken for laboratory testing)
G	Gas Sample
J	Jar Sample
TUB	Tub Sample
ES	Environmental Sample
W	Water Sample
SS	Split Spoon Sample
CSS	Cutting Shoe Sample
L	Liner Sample

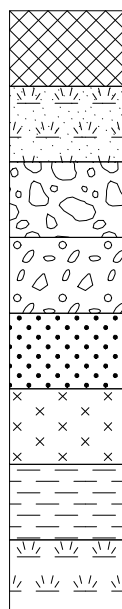
IN SITU TESTING

S	Standard Penetration Test using the Split Spoon Sampler.
C	Standard Penetration Test using a solid cone.

Where a test has been completed the type of test and the N-value will be reported. Where the full 300mm penetration of the main drive has not been completed, the number of blows (not an N-value) will be reported. The Field Records column on the log will show each set of blow counts per 75mm of penetration including seating blows and will also indicate the partial penetration achieved (mm) for incomplete tests.

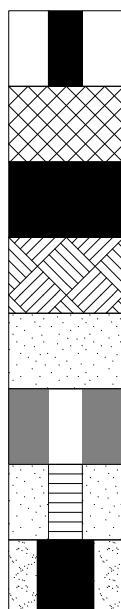
V	Field vane test, vane shear strength quoted for peak (P) and remoulded (R) tests in kPa.
PP	Pocket Penetrometer measurements (kN/m ²).
k	Field Permeability Test, R denotes Rising Head, F denotes Falling Head, C Constant Head.
So	Field Soakage Test in a borehole.
PID	Photo Ionisation Detector (PID) readings for volatile hydrocarbon screening (ppm).
cu	Undrained shear strength triaxial test result (kN/m ²)

STRATA



Made Ground / Fill
Topsoil
Cobbles and Boulders
Gravel
Sand
Silt
Clay
Peat

BACKFILL / INSTALLATIONS



Top Cap
Backfill With Arisings
Bentonite Seal
Cement
Filter
Grout
Slotted Pipe
Piezo Tip

WATER

Initial Level of Water Strike
 Level of Water Strike Rise After 20 Mins

Composite soil types shown by combined symbols
(primary + secondary constituents)



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Borehole No. BH501

Sheet: 1 of 2

Equipment & Methods: 0.00 - 8.50 Hand Tools - Comacchio 205	Project Name: St. Athan Northern Access Road	Job No: 60509148
	Project Location: St. Athan	
	Client: Welsh Government	
Co-ordinates: E: 298644.305 N: 169054.476	Ground Level (m): 43.01 AOD	Date Started: 30/11/2016 Date Completed: 30/11/2016

In Situ Testing			Coring Information			DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)	Backfill/ Instrument
Depth (m)	Type	Result	TCR SCR RQD	FI	Core Run					
0.00-0.35	B					TOPSOIL: Grass Over: Soft slightly reddish brown slightly gravelly sandy CLAY with abundant roots. Gravel is subangular to rounded fine of limestone and rare brick. Sand is fine to medium (TOPSOIL)	42.66		(0.35)	
0.30	ES								0.35	
0.50	ES					Soft locally firm slightly reddish brown silty CLAY with occasional roots and low cobble content. Cobbles are subangular of limestone (PROBABLE ALLUVIUM)	42.31		(0.35)	
0.35-0.70	B								0.70	
0.70	SPT (C)	N>50 8,17 for 40mm/35,15 for 40mm				Strong grey partially weathered medium bedded LIMESTONE with occasional shell fragments and two sets of irregular fractures infilled with firm clay. First set: Subhorizontal, closely spaced, planar rough, open infilled with firm greenish yellowish brown silty clay. Second set: Subvertical (~50°), closely spaced, planar rough, tight with orange surface staining (PARTIALLY WEATHERED PORTHERRY MEMBER)				
					1.00					
1.00-2.50	C		93 57 57	6		At 2.00m bgl: Soft orangish brown clay fracture infill (~6cm thick) present.				
					2.50	At 2.50m bgl: Soft orangish brown clay fracture infill (~4cm thick) present. At 2.60m bgl: Assumed clay fracture infill washed out (~10cm thick). At 3.00m bgl: Assumed clay fracture infill washed out (~10cm thick).				
2.50-4.00	C		86 65 65	7		At 4.00m bgl: Infill of soft to firm greenish greyish brown clay (~10cm thick) present. From 4.00m bgl: Subvertical (~80°) calcite veins present (~2mm thin).				
					4.00					
4.00-5.50	C		100 93 86	5					(7.80)	

Water Strikes		Hole Diameter		Progress				Remarks	
Strike Depth	Flow Remarks	Hole Dia (mm)	Depth of Hole (m)	Date	Time	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	
1.30	Standing	300	0.70	30-11-2016	14:30	8.50	1.00	1.30	1. Borehole located in third party field north of the Eglwys Brewis Road. 2. Buried services inspection pit excavated by hand refused at 0.70m bgl on natural rock. 3. Borehole advanced by Rotary Coring with water recirculation: 0.70m - 8.50m bgl. 4. Borehole completed to 8.50m bgl. 5. Topography: Gently sloping. 6. Standing water encountered at 1.30m bgl. 7. No visual or olfactory evidence of contamination. 8. 50mm standpipe installed to 4.00m bgl and backfilled with bentonite from 4.00m to 8.50m bgl upon completion, as instructed by the engineer.
		140	1.00	01-12-2016	15:30	8.50		1.37	

Report ID: STANDARD COREHOLE LOG - SWINDON | Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ | Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB | Date: 10 January 2017



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Borehole No. BH501

Sheet: 2 of 2

Equipment & Methods: 0.00 - 8.50 Hand Tools - Comacchio 205	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan		
	Client: Welsh Government		
Co-ordinates: E: 298644.305 N: 169054.476		Ground Level (m): 43.01 AOD	Date Started: 30/11/2016 Date Completed: 30/11/2016

In Situ Testing			Coring Information			DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)	Backfill/ Instrument
Depth (m)	Type	Result	TCR SCR RQD	FI	Core Run					
5.50-7.00	C		100 93 87	5	5.50					
7.00-8.50	C		87 87 76	6	7.00					
8.50	SPT (C)	N>50 25 for 25mm/50 for 5mm				At 8.10m bgl: Assumed clay fracture infill washed out. At 8.30m bgl: Assumed clay fracture infill washed out.	34.51		8.50	
End of Borehole 8.50 m (Thickness of basal layer not proven)										

Water Strikes		Hole Diameter		Progress				Remarks		
Strike Depth	Flow Remarks	Hole Dia (mm)	Depth of Hole (m)	Date	Time	Hole Depth (m)	Casing Depth (m)	Water Depth (m)		
		120	8.50	30-11-2016	14:30	8.50	1.00	1.30	1. Borehole located in third party field north of the Eglwys Brewis Road. 2. Buried services inspection pit excavated by hand refused at 0.70m bgl on natural rock. 3. Borehole advanced by Rotary Coring with water recirculation: 0.70m - 8.50m bgl. 4. Borehole completed to 8.50m bgl. 5. Topography: Gently sloping. 6. Standing water encountered at 1.30m bgl. 7. No visual or olfactory evidence of contamination. 8. 50mm standpipe installed to 4.00m bgl and backfilled with bentonite from 4.00m to 8.50m bgl upon completion, as instructed by the engineer.	
				01-12-2016	15:30	8.50		1.37		

Report ID: STANDARD COREHOLE LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB || Date: 10 January 2017



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Borehole No. BH502

Sheet: 1 of 2

Equipment & Methods: 0.00 - 8.00 Hand Tools - Comacchio205		Project Name: St. Athan Northern Access Road			Job No: 60509148	
		Project Location: St. Athan				
		Client: Welsh Government				
		Co-ordinates: E: 299568.328 N: 169207.301		Ground Level (m): 41.89 AOD		Date Started: 23/11/2016
						Date Completed: 01/12/2016

In Situ Testing			Coring Information			DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)	Backfill/ Instrument
Depth (m)	Type	Result	TCR SCR RQD	FI	Core Run					
0.30	ES					TOPSOIL: Grass Over: Soft to firm dark brown slightly gravelly CLAY with frequent roots. Gravel is subangular medium of limestone (TOPSOIL)	41.69		(0.20) 0.20	
0.50	ES					Firm brown slightly gravelly sandy CLAY. Gravel is angular to rounded fine to medium of limestone. Sand is fine to medium (PROBABLE ALLUVIUM)	41.29		(0.40) 0.60	
0.75 0.60-0.95	ES B					Firm light grey mottled yellowish orange silty CLAY (PROBABLE ALLUVIUM)				
0.95-1.20	D					At 1.00m bgl: Becomes stiff.				
1.20	SPT (C)	N=10 2,2/ 2,3,2,3							(1.80)	
1.40-2.00	D					From 1.50m bgl: Becomes very stiff.				
2.00-2.40	D									
2.40	SPT (C)	N>50 16,9/50 for 35mm			2.50	Strong dark grey medium bedded shelly LIMESTONE with calcite veins and subvertical (~45°) closely spaced, planar rough, partly open with orange surface stained fractures. Interbedded with hard very dark grey CLAY with shell fragments and Gryphaea fossil (~30mm) (PORTHERRY MEMBER)	39.49		2.40	
2.50-4.00	C		100 56 56	6						
				8						
4.00-5.50	C		87 50 44	6	4.00	From 4.00m to 4.20m bgl: Clay washed out (core loss).				
						From 4.65m to 4.77m bgl: Fractured zone present. Recovered as angular medium to coarse gravel.				

Water Strikes		Hole Diameter		Progress				Remarks	
Strike Depth	Flow Remarks	Hole Dia (mm)	Depth of Hole (m)	Date	Time	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	
0.70	Falling to 1.20m bgl after 20 mins	300 140	0.95 2.50	23-11-2016 01-12-2016	16:00 16:00	0.95 8.00	2.50	0.70	1. Borehole located in third party field north of the Eglwys Brewis Road. 2. Buried services inspection pit excavated by hand refused at 0.95m bgl on natural rock. 3. Borehole advanced by dynamic sampling: 0.95m-2.40m bgl; Rotary Coring with water recirculation: 2.40m-8.00m bgl. 4. Borehole completed at 8.00m bgl. 5. Topography: Level ground. 6. Groundwater encountered at 0.70m bgl falling to 1.20m bgl after 20mins. 7. No visual or olfactory evidence of contamination. 8. 50mm standpipe installed to 2.30m bgl and backfilled with bentonite from 2.30m to 8.00m bgl upon completion, as instructed by the engineer.

Report ID: STANDARD COREHOLE LOG - SWINDON | Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ | Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB | Date: 10 January 2017



AECOM

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Borehole No. BH502

Sheet: 2 of 2

Equipment & Methods: 0.00 - 8.00 Hand Tools - Comacchio205	Project Name: St. Athan Northern Access Road Project Location: St. Athan Client: Welsh Government	Job No: 60509148
Co-ordinates: E: 299568.328 N: 169207.301	Ground Level (m): 41.89 AOD	Date Started: 23/11/2016 Date Completed: 01/12/2016

In Situ Testing			Coring Information			DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)	Backfill/ Instrument
Depth (m)	Type	Result	TCR SCR RQD	FI	Core Run					
5.50-7.00	C		100 100 100	2	5.50	From 5.50m bgl: Becomes thickly bedded interbedded with extremely weak black thinly laminated mudstone.	33.89	[Brick pattern legend]	(5.60)	[Redacted]
7.00-8.00	C		100 73 56	3	7.00					
8.00	SPT (C)	N>50 25 for 25mm/50 for 5mm				End of Borehole 8.00 m (Thickness of basal layer not proven)				

Water Strikes		Hole Diameter		Progress				Remarks	
Strike Depth	Flow Remarks	Hole Dia (mm)	Depth of Hole (m)	Date	Time	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	
		120	8.00	23-11-2016 01-12-2016	16:00 16:00	0.95 8.00	2.50	0.70	1. Borehole located in third party field north of the Eglwys Brewis Road. 2. Buried services inspection pit excavated by hand refused at 0.95m bgl on natural rock. 3. Borehole advanced by dynamic sampling: 0.95m-2.40m bgl; Rotary Coring with water recirculation: 2.40m-8.00m bgl. 4. Borehole completed at 8.00m bgl. 5. Topography: Level ground. 6. Groundwater encountered at 0.70m bgl falling to 1.20m bgl after 20mins. 7. No visual or olfactory evidence of contamination. 8. 50mm standpipe installed to 2.30m bgl and backfilled with bentonite from 2.30m to 8.00m bgl upon completion, as instructed by the engineer.

Report ID: STANDARD COREHOLE LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB || Date: 10 January 2017



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Borehole No. BH503

Sheet: 1 of 2

Equipment & Methods: 0.00 - 0.80 Hand Tools	Project Name: St. Athan Northern Access Road	Job No: 60509148
	Project Location: St. Athan	
	Client: Welsh Government	
Co-ordinates: E: 299985.073 N: 169259.091	Ground Level (m): 41.83 AOD	Date Started: 21/11/2016 Date Completed: 29/11/2016

In Situ Testing			Coring Information			DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)	Backfill/ Instrument
Depth (m)	Type	Result	TCR SCR RQD	FI	Core Run					
0.00-0.35	D					TOPSOIL: Grass Over: Soft to firm dark brown slightly gravelly CLAY with frequent roots. Gravel is subangular medium of limestone (TOPSOIL)	41.48		(0.35)	
0.30	ES					Soft becoming firm light yellowish brown slightly gravelly CLAY. Gravel is subangular fine of limestone (PROBABLE ALLUVIUM)			0.35	
0.50	ES								(0.45)	
0.35-0.80	D						41.03		0.80	
0.80	SPT (C)	N>50 25 for 40mm/50 for 10mm				Medium strong locally weak light grey weathered medium bedded LIMESTONE with occasional calcite-replaced shell fragments, calcite veins and two fracture sets. First fracture set: Subvertical (~45°), closely spaced, planar rough, open with orange surface straining. Second fracture set: Horizontal, closely to very closely spaced, planar rough, open with firm dark greenish brown clay infill (PARTIALLY WEATHERED PORTHKERRY MEMBER)				
0.80-1.00	D				1.00	At 1.20m bgl: Layer of weathered stiff dark greenish brown clay (~10cm thick) present.				
1.00-2.50	C		91 59 49	11		From 1.45m to 1.65m bgl: Layer of weathered stiff dark greenish brown clay present.				
2.50-4.00	C		87 79 67	6		From 2.96m to 3.04m bgl: Layer of weathered stiff dark greenish brown clay present.				
4.00-5.50	C		100 90 77	6					(7.70)	

Water Strikes		Hole Diameter		Progress				Remarks	
Strike Depth	Flow Remarks	Hole Dia (mm)	Depth of Hole (m)	Date	Time	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	
1.20	Standing	300	0.80	21-11-2016	13:00	0.80			1. Borehole located in the St. Athan Ministry of Defence (MoD) base north of the Eglwys Brewis Road. 2. Buried services inspection pit excavated by hand refused at 0.80m bgl on natural rock. 3. Borehole advanced by Rotary Coring with water recirculation: 0.80m - 8.50m bgl. 4. Borehole completed at 8.50m bgl. 5. Topography: Level ground. 6. Standing water encountered at 1.20m bgl. 7. No visual or olfactory evidence of contamination. 8. 50mm standpipe installed to 3.80m and backfilled with bentonite from 3.80m to 8.50m bgl upon completion, as instructed by the engineer.
		140	1.00	29-11-2016	16:00	8.50	1.00	1.20	
				30-11-2016	14:45	8.50		1.35	

Report ID: STANDARD COREHOLE LOG - SWINDON | Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ | Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB | Date: 10 January 2017



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Borehole No. BH503

Sheet: 2 of 2

Equipment & Methods: 0.00 - 0.80 Hand Tools	Project Name: St. Athan Northern Access Road	Job No: 60509148
	Project Location: St. Athan	
	Client: Welsh Government	
Co-ordinates: E: 299985.073 N: 169259.091	Ground Level (m): 41.83 AOD	Date Started: 21/11/2016 Date Completed: 29/11/2016

In Situ Testing			Coring Information			DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)	Backfill/ Instrument
Depth (m)	Type	Result	TCR SCR RQD	FI	Core Run					
5.50-7.00	C		100 82 65	6	5.50	At 5.10m bgl: Layer of weathered stiff dark greenish brown clay (~5cm thick) present. At 5.45m bgl: Layer of very stiff dark grey clay (~10cm thick) present.				
7.00-8.50	C		100 95 95	4	7.00					
8.50	SPT (C)	N>50 25 for 25mm/50 for 15mm				End of Borehole 8.50 m (Thickness of basal layer not proven)	33.33		8.50	

Water Strikes		Hole Diameter		Progress				Remarks	
Strike Depth	Flow Remarks	Hole Dia (mm)	Depth of Hole (m)	Date	Time	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	
		120	8.50	21-11-2016	13:00	0.80			1. Borehole located in the St. Athan Ministry of Defence (MoD) base north of the Eglwys Brewis Road. 2. Buried services inspection pit excavated by hand refused at 0.80m bgl on natural rock. 3. Borehole advanced by Rotary Coring with water recirculation: 0.80m - 8.50m bgl. 4. Borehole completed at 8.50m bgl. 5. Topography: Level ground. 6. Standing water encountered at 1.20m bgl. 7. No visual or olfactory evidence of contamination. 8. 50mm standpipe installed to 3.80m and backfilled with bentonite from 3.80m to 8.50m bgl upon completion, as instructed by the engineer.
				29-11-2016	16:00	8.50	1.00	1.20	
				30-11-2016	14:45	8.50		1.35	

Report ID: STANDARD COREHOLE LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB || Date: 10 January 2017



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Borehole No. BH504

Sheet: 1 of 2

Equipment & Methods: 0.00 - 8.30 Hand Tools - Comacchio 205	Project Name: St. Athan Northern Access Road	Job No: 60509148
	Project Location: St. Athan	
	Client: Welsh Government	
	Co-ordinates: E: 300052.146 N: 169282.685	Ground Level (m): 41.91 AOD
		Date Started: 21/11/2016 Date Completed: 28/11/2016

In Situ Testing			Coring Information			DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)	Backfill/ Instrument
Depth (m)	Type	Result	TCR SCR RQD	FI	Core Run					
0.00-0.45 0.30	D ES					TOPSOIL: Grass Over: Soft to firm dark brown slightly gravelly CLAY with frequent roots. Gravel is subangular medium of limestone (TOPSOIL)	41.46		0.45	
0.45-0.80	D					Soft becoming firm orangish brown slightly gravelly CLAY. Gravel is subangular fine of limestone (PROBABLE ALLUVIUM)	41.11		0.35	
1.00-2.50	C		100 73 49	15	1.00	Medium strong to weak grey weathered thinly to thickly laminated LIMESTONE with orangish brown staining and closely spaced, planar rough, open with orange surface stained fractures (DISTINCTLY WEATHERED PORTHKERRY MEMBER)			0.80	
2.50-4.00	C		100 84 62	86	2.50	Strong locally medium strong grey partially weathered LIMESTONE with occasional shell fragments and two fracture sets. First fracture set: subhorizontal, closely spaced, planar rough, open with orange surface staining. Second fracture set: subvertical (~85°), undulating rough, tight with orange surface staining (PARTIALLY WEATHERED PORTHKERRY MEMBER)	39.41		2.50	
4.00-5.30	C		100 55 51	10	4.00	From 4.00m bgl: Becomes dark grey less weathered with very low persistent calcite veins and subvertical fractures become very close, rough stepped, partly open with pyrite and calcite mineralisation.				

Water Strikes		Hole Diameter		Progress				Remarks	
Strike Depth	Flow Remarks	Hole Dia (mm)	Depth of Hole (m)	Date	Time	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	
0.80	Falling to 1.35m bgl after 20 mins	300	0.80	21-11-2016	15:00	0.80			1. Borehole located in the St. Athan Ministry of Defence (MoD) base north of the Eglwys Brewis Road. 2. Buried services inspection pit excavated by hand refused at 0.80m bgl on natural rock. 3. Borehole advanced by Rotary Coring with water recirculation: 0.80m-8.30m bgl. 4. Borehole completed at 8.30m bgl. 5. Topography: Level ground. 6. Surface water at location. Groundwater encountered at 0.80m bgl falling to 1.35m bgl after 20 mins. 7. No visual or olfactory evidence of contamination. 8. 50mm standpipe installed to 8.30m bgl upon completion as instructed by the engineer.
		140	1.00	28-11-2016	16:00	8.30	1.00	1.30	
				29-11-2016	15:30	8.30		1.47	

Report ID: STANDARD COREHOLE LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB || Date: 10 January 2017



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Borehole No. BH504

Sheet: 2 of 2

Equipment & Methods: 0.00 - 8.30 Hand Tools - Comacchio 205	Project Name: St. Athan Northern Access Road		Job No: 60509148
	Project Location: St. Athan		
	Client: Welsh Government		
Co-ordinates: E: 300052.146 N: 169282.685		Ground Level (m): 41.91 AOD	Date Started: 21/11/2016 Date Completed: 28/11/2016

In Situ Testing			Coring Information			DESCRIPTION	Reduced Level (m)	Legend	Depth (Thick) (m)	Backfill/ Instrument
Depth (m)	Type	Result	TCR SCR RQD	FI	Core Run					
5.30-6.80	C		90 72 68	7	5.30	From 6.00m bgl: Fractures (~70°) are very closely and planar smooth with orange surface staining.			(5.80)	
6.80-8.30	C		100 100 91	6	6.80	From 6.80m to 6.87m bgl: Very weak thinly laminated black weathered orange mudstone present. At 7.45m to 7.52m bgl: Very weak thinly laminated black weathered orange mudstone present.				
						End of Borehole 8.30 m (Thickness of basal layer not proven)	33.61		8.30	

Water Strikes		Hole Diameter		Progress				Remarks	
Strike Depth	Flow Remarks	Hole Dia (mm)	Depth of Hole (m)	Date	Time	Hole Depth (m)	Casing Depth (m)	Water Depth (m)	
		120	8.30	21-11-2016	15:00	0.80			1. Borehole located in the St. Athan Ministry of Defence (MoD) base north of the Eglwys Brewis Road. 2. Buried services inspection pit excavated by hand refused at 0.80m bgl on natural rock. 3. Borehole advanced by Rotary Coring with water recirculation: 0.80m-8.30m bgl. 4. Borehole completed at 8.30m bgl. 5. Topography: Level ground. 6. Surface water at location. Groundwater encountered at 0.80m bgl falling to 1.35m bgl after 20 mins. 7. No visual or olfactory evidence of contamination. 8. 50mm standpipe installed to 8.30m bgl upon completion as instructed by the engineer.
				28-11-2016	16:00	8.30	1.00	1.30	
				29-11-2016	15:30	8.30		1.47	

Report ID: STANDARD COREHOLE LOG - SWINDON || Project: ST. ATHAN ACCESS ROAD 10.01.2017 MC.GPJ || Library: AECOM AGS 4.0 LIBRARY V6_25102016.GLB || Date: 10 January 2017

Appendix E Geotechnical Laboratory Results



Laboratory Report



GEO Site & Testing Services Ltd

Contract Number: 33562

Client's Reference: **60509148**

Report Date: **24-01-2017**

Client **AECOM**
12 Regan Way
Chetwynd Business Park
NG9 6RZ

Contract Title: **St Athan Northern Access Road GI**
For the attention of: **Michael Corlett**

Date Received: **19-12-2016**
Date Commenced: **19-12-2016**
Date Completed: **12-01-2017**

Test Description	Qty
Moisture Content 1377 : 1990 Part 2 : 3.2 - * UKAS	7
4 Point Liquid & Plastic Limit (LL/PL) 1377 : 1990 Part 2 : 4.3 & 5.3 - * UKAS	7
PSD Wet Sieve method 1377 : 1990 Part 2 : 9.2 - * UKAS	5
BRE Suite D Ph Total Sulphate, Aqueous Sulphate, Total Sulphur, Aqueous Nitrate, Aqueous Mag, Chloride, - @ Non Accredited Test	4
Dry Den/MC (2.5kg Rammer Method 1 Litre Mould) 1377 : 1990 Part 4 : 3.3 - * UKAS	2
CBR Remoulded BS1377 Part 4 - * UKAS	5
Natural Shear Strength by Hand Vane (3 measurements) - @ Non Accredited Test	3

Notes: Observations and Interpretations are outside the UKAS Accreditation
* - denotes test included in laboratory scope of accreditation
- denotes test carried out by approved contractor
@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved Signatories:

Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - Emma Sharp (Office Manager)
Paul Evans (Quality/Technical Manager) - Vaughan Edwards (Managing Director)



2788

Laboratory Report

GSTL

GEO Site & Testing Services Ltd

Contract Number: 33562

Test Description	Qty
Point load strength index test 10 Determinations. ISRM / BS 1377/2/3.3 Brock & Franklin 1972. - * UKAS	4
Part 1 - SM for Determination of the Uniaxial Compressive Strength of Rock Materials - @ Non Accredited Test	2
Determination of the slake durability index, two cycles. ISRM / BS 1377/2/3.3 2/2 - @ Non Accredited Test	4
Extra Over Items - Specimen Preparation. - @ Non Accredited Test	2
Disposal of Samples on Project	1

Notes: Observations and Interpretations are outside the UKAS Accreditation

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- denotes test carried out by approved contractor

@ - denotes non accredited tests

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Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - Emma Sharp (Office Manager)

Paul Evans (Quality/Technical Manager) - Vaughan Edwards (Managing Director)

GEO Site & Testing Services Ltd

Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

Client ref: 60509148 - M001.002.003
 Location: St Athan Northern Access Road GI
 Contract Number: 33562-

Hole Number	Sample Number	Type	Depth (m)	Description of Sample*
SK503		B	0.30 - 0.70	Brown fine to coarse gravelly silty CLAY.
SK504		B	0.50 - 0.75	Brown fine to coarse gravelly clayey SILT.
SK507		B	0.30 - 0.55	Brown fine to coarse gravelly silty CLAY.
SK508		B	0.50 - 0.95	Brown fine to coarse gravelly clayey SILT.
BH501		B	0.35 - 0.70	Brown fine to coarse gravelly clayey SILT.
BH502		D	2.00 - 2.40	Brown fine to coarse gravelly silty CLAY.
BH503		D	0.35 - 0.80	Brown fine to coarse gravelly silty CLAY.

Note: Results on this table are in summary format and may not meet the requirements of the relevant standards, additional information is held by the laboratory



For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 11.1.17



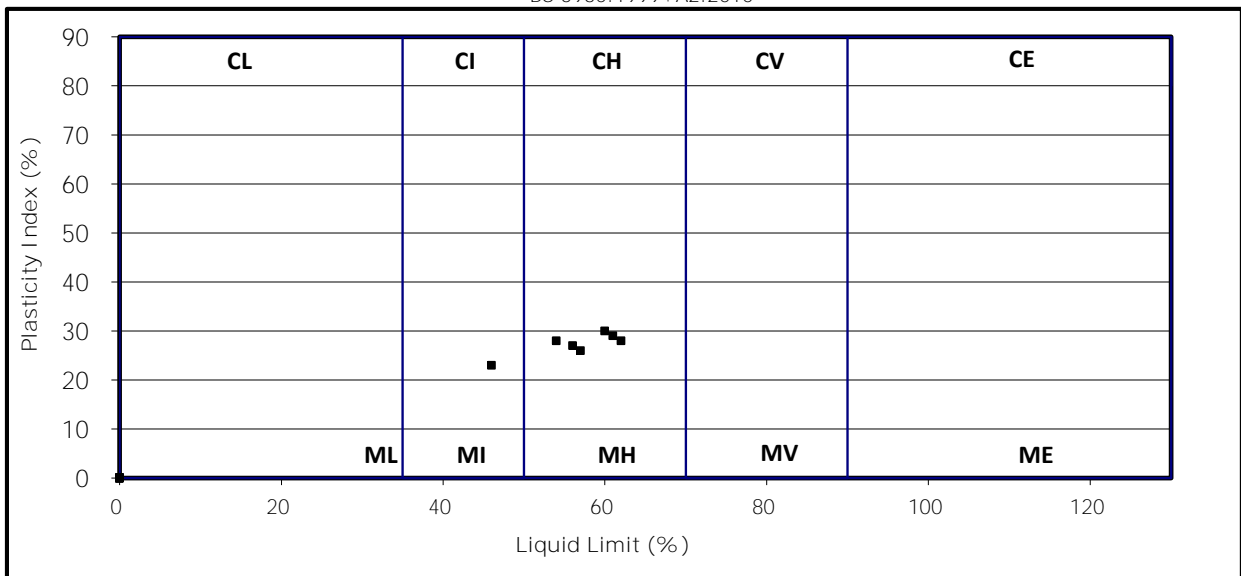
Test Report: Method of the Determination of the plastic limit and plasticity index
BS 1377 : Part 2 : 1990 Method 5

Client ref: 60509148 - M001.002.003
Location: St Athan Northern Access Road GI
Contract Number: 33562-

Hole/ Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
SK503	B	0.30 - 0.70	31	56	29	27	80	CH High Plasticity
SK504	B	0.50 - 0.75	33	61	32	29	70	MH High Plasticity
SK507	B	0.30 - 0.55	30	54	26	28	78	CH High Plasticity
SK508	B	0.50 - 0.95	39	62	34	28	70	MH High Plasticity
BH501	B	0.35 - 0.70	33	57	31	26	75	MH High Plasticity
BH502	D	2.00 - 2.40	19	46	23	23	100	CI Intermediate Plasticity
BH503	D	0.35 - 0.80	36	60	30	30	100	CH High Plasticity

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

BS 5930:1999+A2:2010



For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Emma Sharp (Office Manager)

Date: 11.1.17



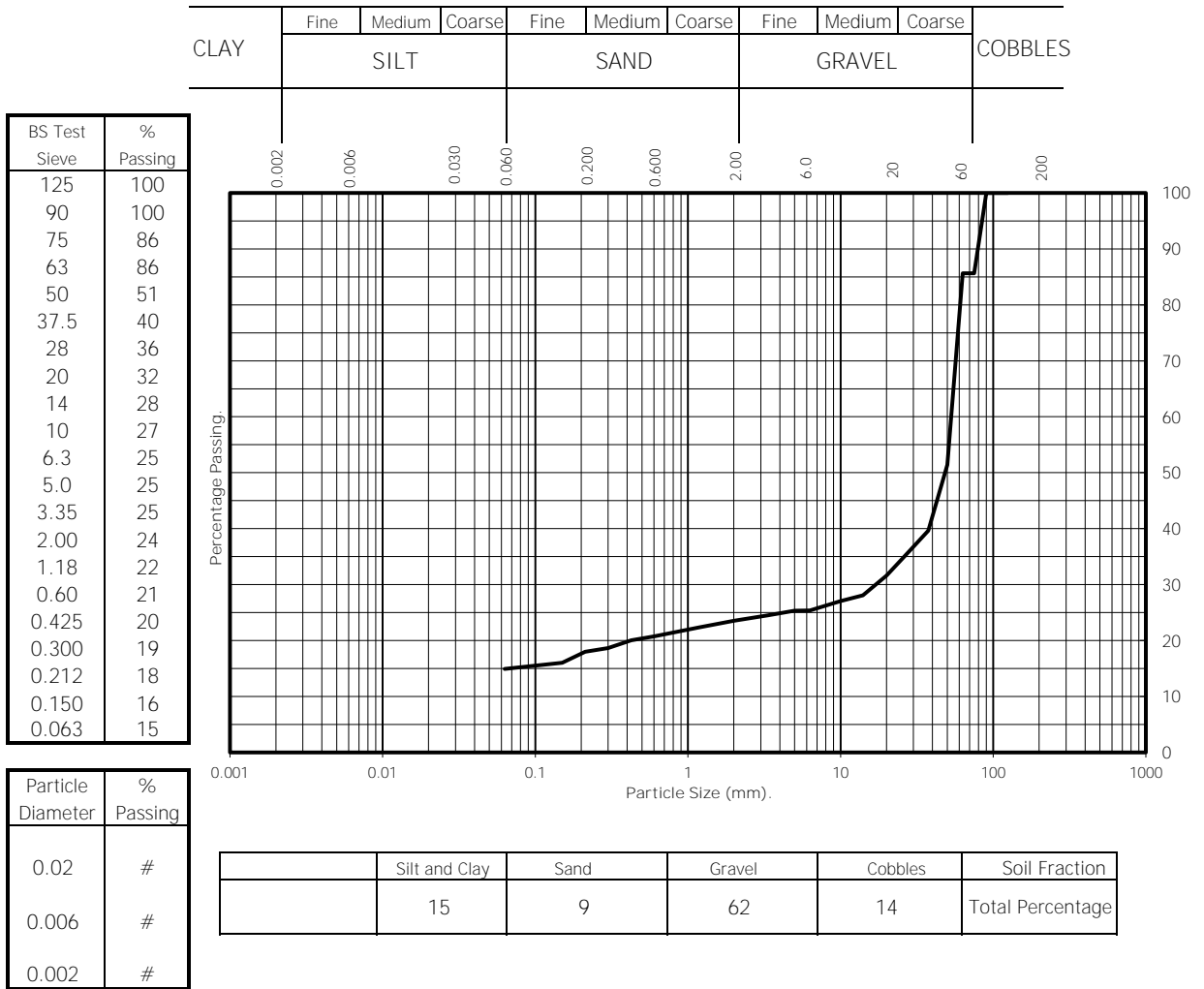
2788

Test Report:

Particle Size Distribution Test
 BS 1377 Part 2:1990.
 Wet Sieve, Clause 9.2

Client ref: 60509418 Sample Number: N/A
 Contract Number: 33562- Depth from (m): 0.65
 Hole Number: SK501 Depth to (m): 1.40
 Sample Type: B

Location: St Athan Northern Access Road GI
 Description: Brown fine to coarse sandy silty clayey GRAVEL with many cobbles.



Remarks:
 # - not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
 Emma Sharp (Office Manager)

Date: 12.1.17

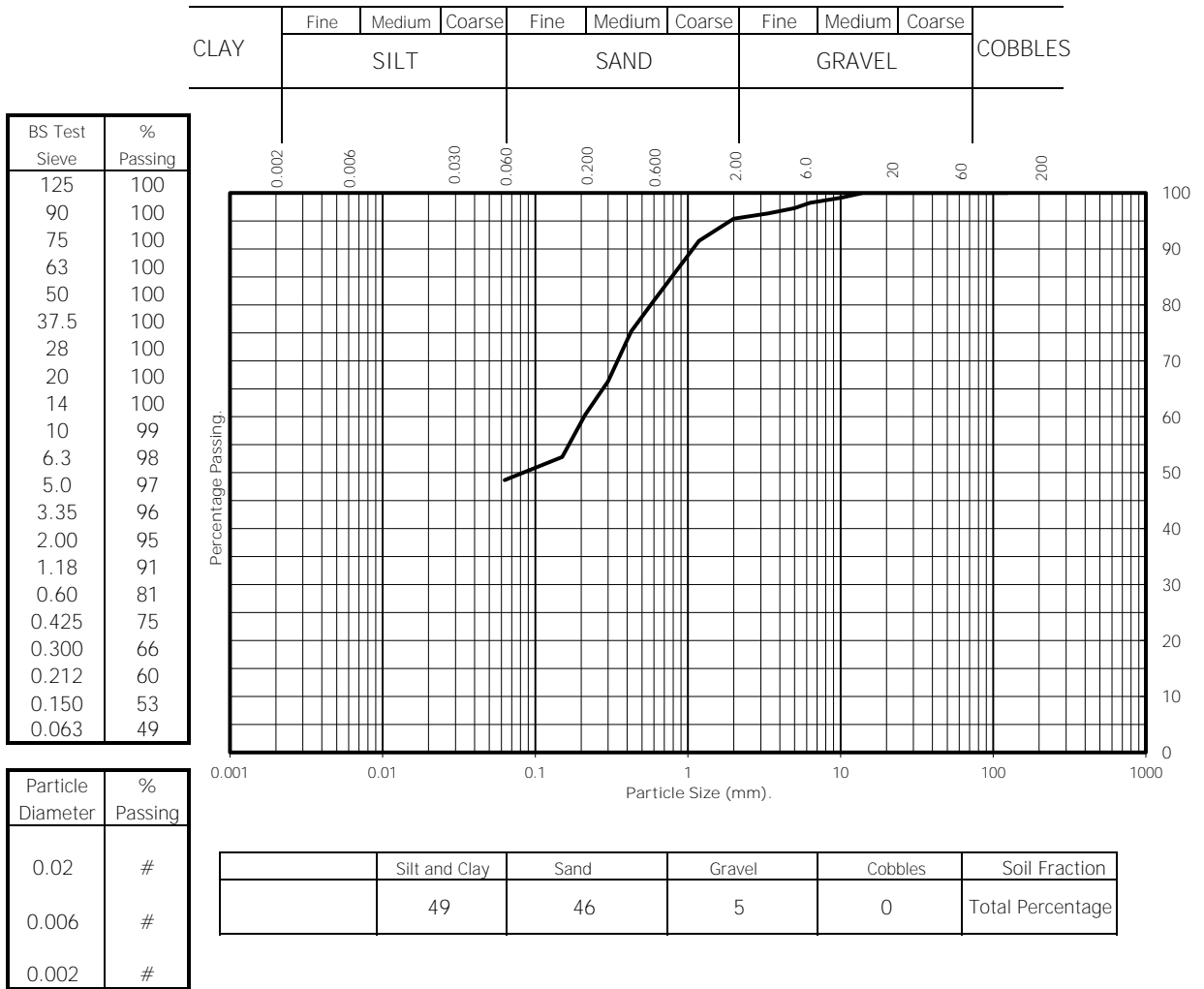


Test Report:

Particle Size Distribution Test
 BS 1377 Part 2:1990.
 Wet Sieve, Clause 9.2

Client ref: 60509418 Sample Number: N/A
 Contract Number: 33562- Depth from (m): 0.30
 Hole Number: SK503 Depth to (m): 0.70
 Sample Type: B

Location: St Athan Northern Access Road GI
 Description: Brown fine to medium gravelly sandy silty CLAY.



Remarks:
 # - not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
 Emma Sharp (Office Manager)

Date: 12.1.17

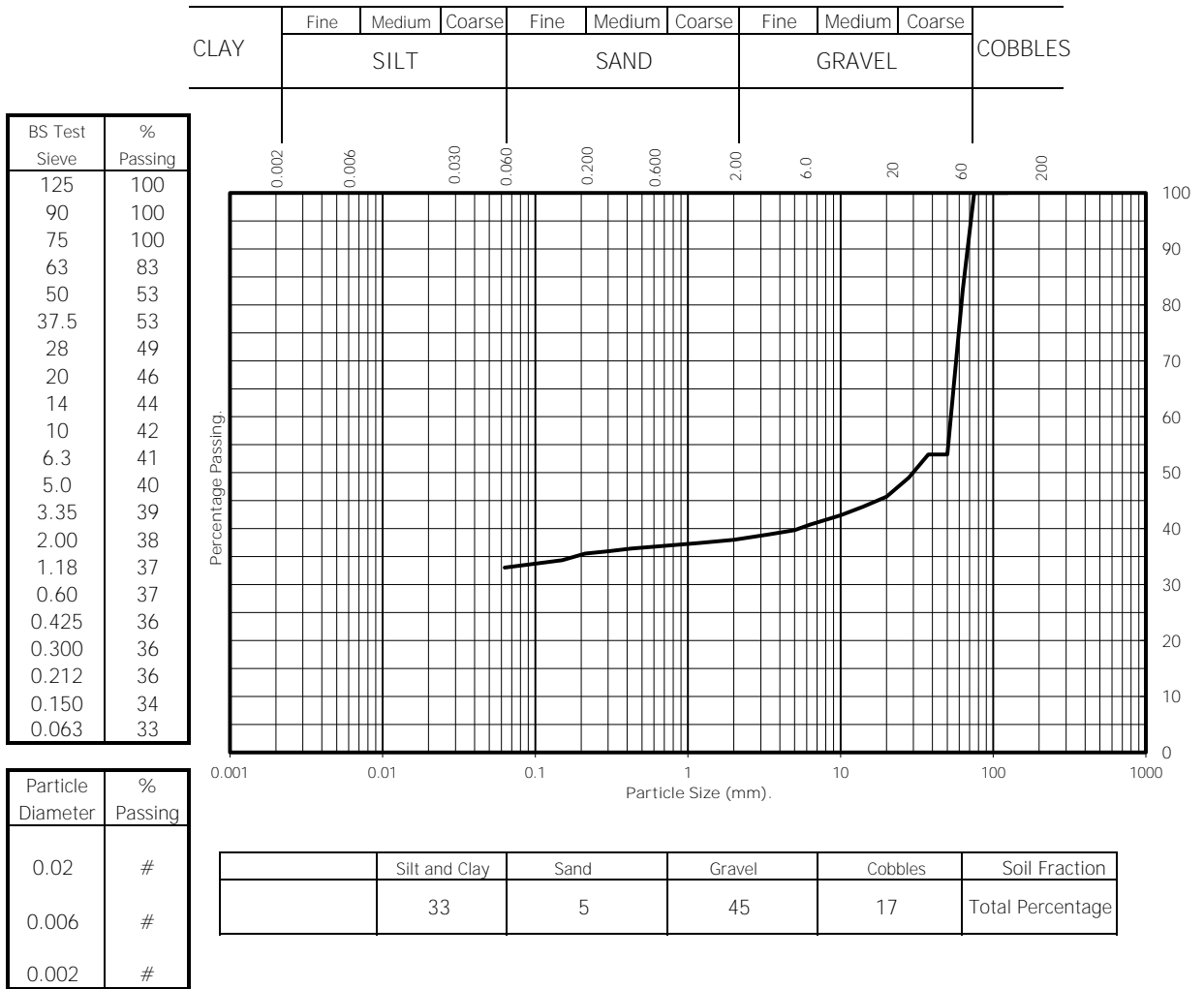


Test Report:

Particle Size Distribution Test
 BS 1377 Part 2:1990.
 Wet Sieve, Clause 9.2

Client ref: 60509418 Sample Number: N/A
 Contract Number: 33562- Depth from (m): 0.50
 Hole Number: SK504 Depth to (m): 0.75
 Sample Type: B

Location: St Athan Northern Access Road GI
 Description: Brown fine to coarse sandy silty clayey GRAVEL with many cobbles.



Remarks:
 # - not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
 Emma Sharp (Office Manager)

Date: 12.1.17

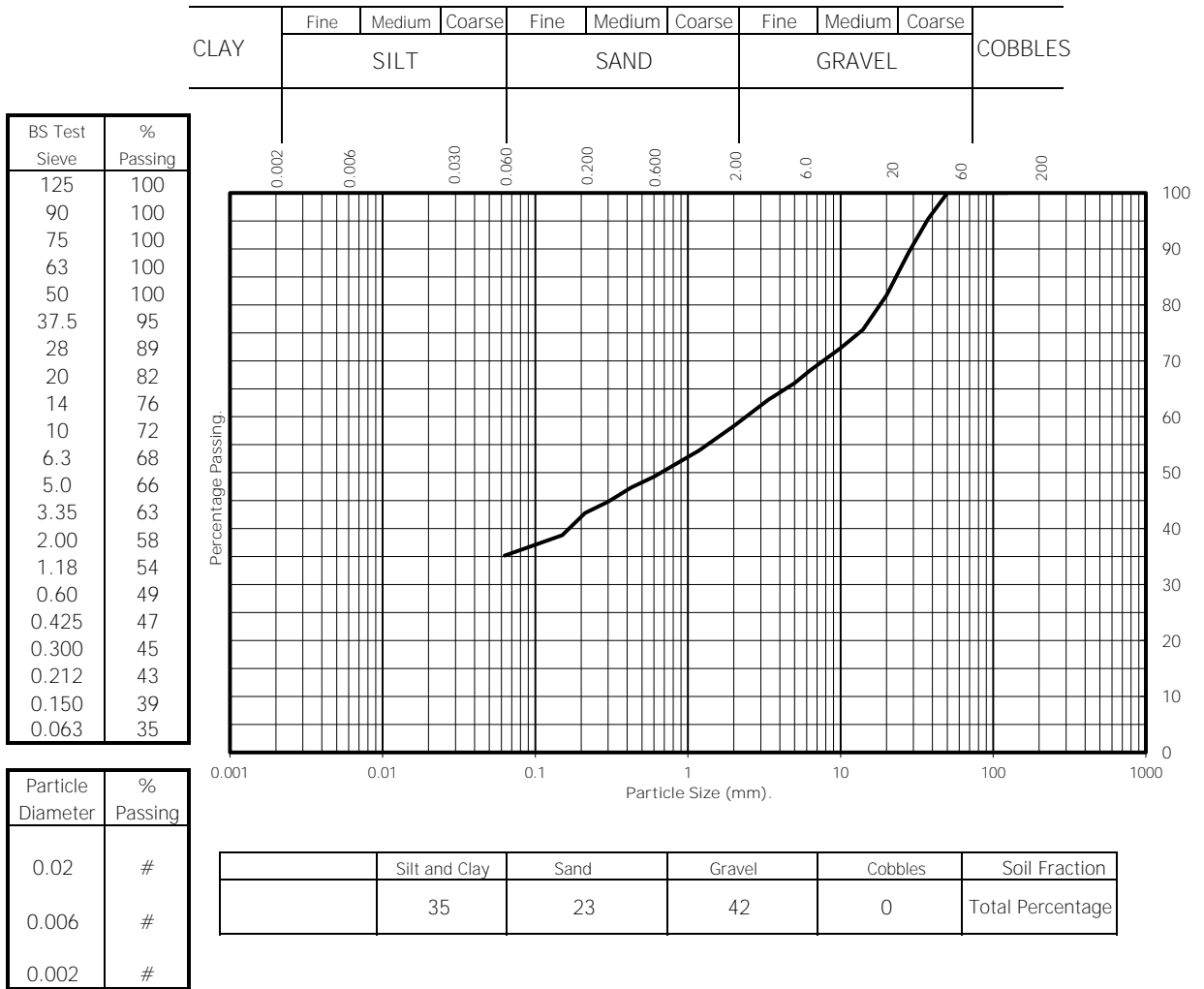


Test Report:

Particle Size Distribution Test
 BS 1377 Part 2:1990.
 Wet Sieve, Clause 9.2

Client ref: 60509418 Sample Number: N/A
 Contract Number: 33562- Depth from (m): 0.80
 Hole Number: SK509 Depth to (m): 1.30
 Sample Type: B

Location: St Athan Northern Access Road GI
 Description: Brown fine to coarse sandy silty clayey GRAVEL.



Remarks:

- not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
 Emma Sharp (Office Manager)

Date: 12.1.17



Test Report:

Particle Size Distribution Test

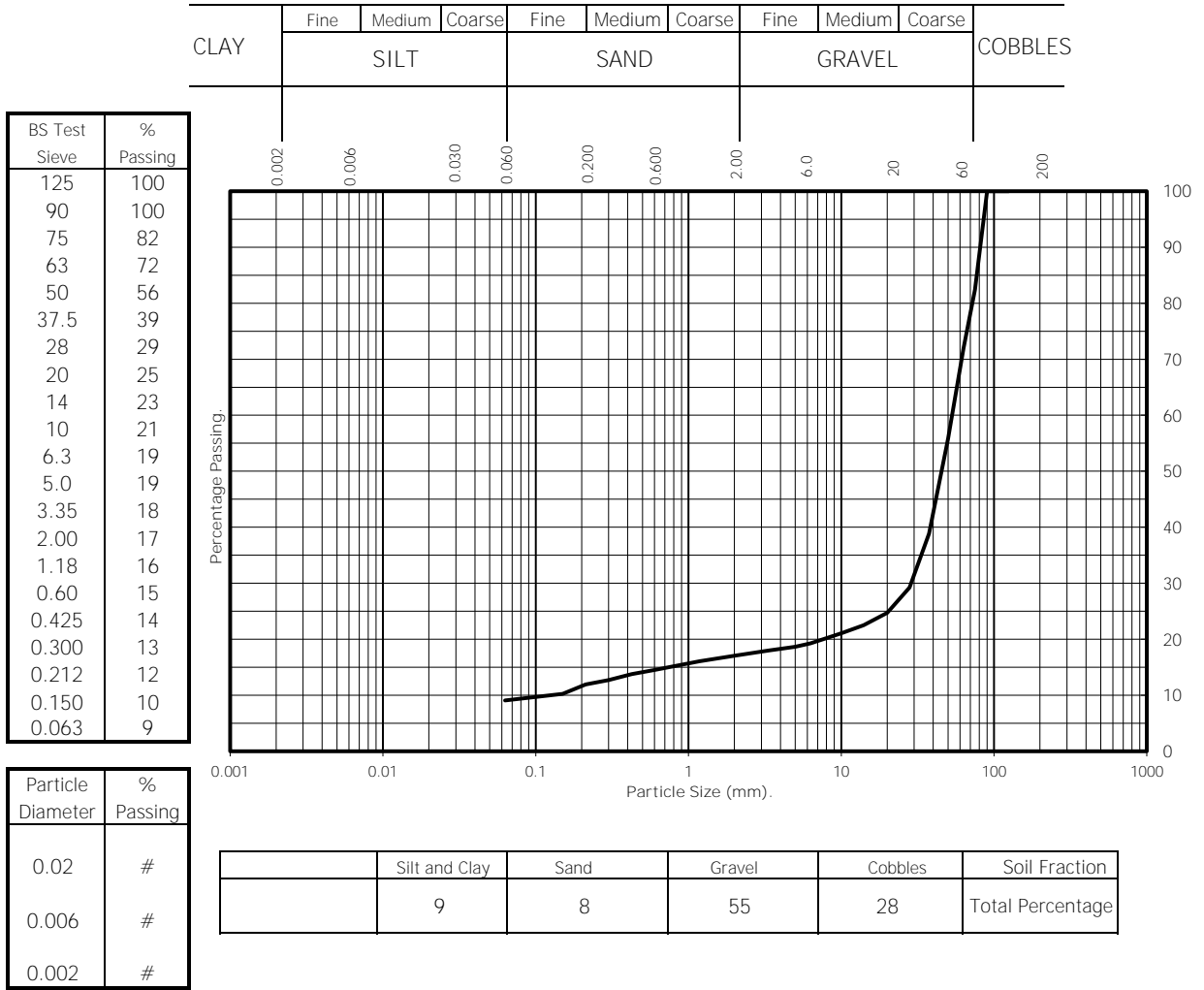
BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref: 60509418
 Contract Number: 33562-
 Hole Number: SK510

Sample Number: N/A
 Depth from (m): 0.35
 Depth to (m): 0.60
 Sample Type: B

Location: St Athan Northern Access Road G1
 Description: Brown fine to coarse sandy silty clayey GRAVEL with many cobbles.



Remarks:
 # - not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
 Emma Sharp (Office Manager)

Date: 12.1.17





Unit 4
Heol Aur
Dafen Ind EstateDafen
Carmarthenshire
SA14 8QN
Tel: 01554 784040
01554 750752
Fax: 01554 770529
01554 784041
Web: www.geo.uk.com

Certificate of Analysis

Date: 06-01-17

Client: Aecom

Our Reference: 33562

Client Reference:

Contract Title: ST.Athan

Description: (Total Samples) 4

Date Received:

Date Started: 04-01-17

Date Completed: 06-01-17

Test Procedures: (BRE BR 279)

Notes:

Solid samples will be disposed 1 month and liquids 2 weeks
after the date of issue of this test certificate

Approved By:

Authorised Signatories:

Emma Sharp
Laboratory Office Manager

Ben Sharp
Contracts Manager


Paul Evans
Quality Manager

Contract No: 33562
 Client Ref:
 Location: ST.Athan
 Date: 06-01-2017

Summary of Chemical Analysis

(BRE BR 279)

Hole Number	Sample Number	Sample Type	Depth m	Sulphate Content as SO ₄			Chloride Content		pH Value @ 25°C	Total Sulphur % S	Magnesium g/l	Nitrate NO ₃ mg/l
				Acid Soluble Sulphate as % SO ₄	Aqueous Extract Sulphate as g/l SO ₄	Ground-water g/l	Semi Quantative Test Strip mg Cl/l	Quantative g/l				
				BR 279	BR 279	BR 279	BR 279	BR 279				
SK507		B	0.3-0.55	0.24	0.04		NCP		7.66	0.08	<1	10
SK508		B	0.50-0.95	0.14	0.03		NCP		7.91	0.06	<1	10-25
BH502		B	1.4-2.0	0.17	0.02		NCP		7.33	0.06	<1	10-25
BH504		D	0.45-0.8	0.14	0.02		NCP		8.05	0.06	<1	10

NCP - No Chloride present

Test Report: Point Load Test

Int. J. Rock Mech. Sci. & Geomech. Abstr. Vol. 22, No. 2, pp. 51 - 60, 1985.

Client: Aecom
 Location: St Athan Northern Access Road GI
 Client Ref: 60509148
 Contract Number: 33562
 Borehole Number: As stated below
 Core Box Number: N/A
 Depth (m): As stated below
 Date Tested: 07-12-16

Borehole Number	Sample Number	Depth (m)	Type of Test		Width (W) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D _e) (mm)	Point Load (I _p) (MPa)	Size Factor (F)	Point Load Index (I _{p(50)}) (MPa)	Moisture Content (MC) (%)	Description (SC)	Angle between plane of anisotropy & core axis	Type of anisotropy (Bedding or Cleavage)
			d a b/l	i //											
BH501		1.00 - 2.50	i		79.8	76.5	33.29	88	4.28	1.29	5.53				
			i		75.8	48.7	15.02	69	3.20	1.15	3.68				
			i		82.1	65.1	21.68	82	3.19	1.25	3.99				
			i		66.7	46.2	19.23	63	4.90	1.11	5.43				
			i		78.8	44.2	11.85	67	2.67	1.14	3.04				
			d			82.2	30.06		4.45	1.25	5.56				
			i		70.4	63.8	18.32	76	3.20	1.20	3.86				
			i		78.2	68.4	24.02	83	3.53	1.25	4.42				
			i		62.9	47.7	19.57	62	5.12	1.10	5.63				
			i		64.5	58	15.39	69	3.23	1.16	3.74				
		4.00 - 5.50	a		85.7	68.2	30.76	86	4.13	1.28	5.28				
			a		86.4	72.2	28.44	89	3.58	1.30	4.64				
			d			86.7	30.49		4.06	1.28	5.20				
			d			86.7	27.01		3.59	1.28	4.60				
			a		85.5	55.6	18.82	78	3.11	1.22	3.79				
			a		85.6	53.8	23.81	77	4.06	1.21	4.92				
			i		67.6	53.2	24.97	68	5.45	1.15	6.25				
			i		63.4	36.6	20.26	54	6.86	1.04	7.12				
			i		55.8	51.1	20.83	60	5.74	1.09	6.24				
			i		49.9	42.8	21.66	52	7.97	1.02	8.12				

Key: d = diametral; a = axial; b = block; i = irregular lump test; l = perpendicular; // = parallel to planes of weakness.

Remarks:



emma sharp
 Checked By
 Emma Sharp
 Office Manager

12-01-17
 Date

Paul Evans
 Approved By
 Paul Evans
 Quality/Technical Manager

12-01-17
 Date



Test Report: Point Load Test

Int. J. Rock Mech. Sci. & Geomech. Abstr. Vol. 22, No. 2, pp. 51 - 60, 1985.

Client: Aecom
 Location: St Athan Northern Access Road GI
 Client Ref: 60509148
 Contract Number: 33562
 Borehole Number: As stated below
 Core Box Number: N/A
 Depth (m): As stated below
 Date Tested: 07-12-16

Borehole Number	Sample Number	Depth (m)	Type of Test		Width (W) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D _e) (mm)	Point Load (I _p) (MPa)	Size Factor (F)	Point Load Index (I _{p(50)}) (MPa)	Moisture Content (MC) (%)	Description (SC)	Angle between plane of anisotropy & core axis.	Type of anisotropy (Bedding or Cleavage).		
			d	i //													
BH502		7.00 - 8.00	d		86	19.56			2.64	1.28	3.38						
			d		86	21.28			2.88	1.28	3.67						
			a		86	75.1	14.15	91	1.72	1.31	2.25						
			d			85.9	12.06			1.63	1.28	2.08					
			a		85.9	53.4	29.89	76	5.12	1.21	6.19						
			a		85.8	56.2	22.74	78	3.70	1.22	4.53						
			a		86	44.5	15.06	70	3.09	1.16	3.59						
			i		71	68.6	13.00	79	2.10	1.23	2.57						
			i		73.6	42.4	16.71	63	4.20	1.11	4.67						
			i		55.7	38.5	13.94	52	5.11	1.02	5.21						

Key: d = diametral; a = axial; b = block; i = irregular lump test; | = perpendicular; // = parallel to planes of weakness.

Remarks:



Emma Sharp
 Checked By
 Emma Sharp
 Office Manager

12-01-17
 Date

Paul Evans
 Approved By
 Paul Evans
 Quality/Technical Manager

12-01-17
 Date



Test Report: Point Load Test

Int. J. Rock Mech. Sci. & Geomech. Abstr. Vol. 22, No. 2, pp. 51 - 60, 1985.

Client: Aecom
 Location: St Athan Northern Access Road GI
 Client Ref: 60509148
 Contract Number: 33562
 Borehole Number: As stated below
 Core Box Number: N/A
 Depth (m): As stated below
 Date Tested: 07-12-16

Borehole Number	Sample Number	Depth (m)	Type of Test		Width (W) (mm)	Platen Separation (D) (mm)	Failure Load (P) (kN)	Equivalent Diameter (D _e) (mm)	Point Load (I _p) (MPa)	Size Factor (F)	Point Load Index (I _{s(50)}) (MPa)	Moisture Content (MC) (%)	Description (SC)	Angle between plane of anisotropy & core axis.	Type of anisotropy (Bedding or Cleavage).
			d	i											
BH503		2.40 - 4.00	i	//	69.2	62.3	11.70	74	2.13	1.19	2.54				
			i		59	33	40.54	50	16.35	1.00	16.32				
			i		68.8	57.6	8.85	71	1.75	1.17	2.05				
			i		68.7	30.7	4.04	52	1.50	1.02	1.53				
			d			85.1	19.63		2.71	1.27	3.44				
			d			85.1	16.13		2.23	1.27	2.83				
			a		85	46.2	13.76	71	2.75	1.17	3.22				
			i		83.2	42.7	8.62	67	1.90	1.14	2.18				
			i		82.3	56.6	12.97	77	2.19	1.21	2.66				
			i		74.4	61.8	8.61	77	1.47	1.21	1.78				

Key: d = diametral; a = axial; b = block; i = irregular lump test; I = perpendicular; // = parallel to planes of weakness.

Remarks:



Emma Sharp
 Checked By
 Emma Sharp
 Office Manager

12-01-17
 Date

Paul Evans
 Approved By
 Paul Evans
 Quality/Technical Manager

12-01-17
 Date



Test Report:

Determination of Unconfined Compressive Strength.
ISRM Suggested Methods Vol 16, No. 2, pp. 135-140 1979..

Date: 12-Jan-17
 Contract Number: 33562-
 Client reference: N/A
 Location: St Athan Northern Access Road GI
 Sample Type: Core
 Sample Preparation: Sawing and Grinding
 Operator: Jason Dawney

Borehole Number	Depth (m) from	Depth (m) to	Diameter (mm)	Length (mm)	Initial Mass (g)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Moisture Content (%)	Load Failure (kn)	Maximum Compressive Strength (mpa)	Date Tested
BH501	2.50	4.00	86.00	212.50	3286.7	2.66	2.64	0.90	889.2	153.1	11-Jan-17
BH504	6.80	8.30	86.10	212.50	3258.2	2.63	2.61	0.70	446.2	76.6	11-Jan-17



For and behalf of GEO Site & Testing Services Limited

Paul Evans - Technical/Quality Manager
 Emma Sharp - Office Manager
 Ben Sharp - Contracts Manager
 Wayne Honey - Quality/Office Assistant



Date Approved:

12.1.17



Test Report: Method of the Determination of the Slake Durability index.
ISRM Part 2.2 (Page 104)

Date: 12-Jan-17
Contract Number: 33562-
Location: St Athan Northern Access Road GI
Client Ref: 60509148
Hole Number: BH501
Sample Number:
Depth from (m): 1.00
Depth to (m): 2.50
Sample Type : B
Nature of slaking Fluid: Water
Temperature (°C): 20
Rock type: Light brown SILTSTONE
Date Tested: 20-10-15
Operator: Wayne Honey

Slake-Durability index (first cycle) % 98.67

Slake-Durability index (second cycle) % 98.11

Appearance of fragments retained in drum:

10 pieces of sub-angular to well-rounded rock core with many pieces with ground corners and edges

Appearance of material passing through the drum:

Sub-angular to well rounded of <2mm fragments to a silty CLAY

If there is any remaining samples it shall be retained for
a period of one month from the above date,
after which time all samples shall be disposed of.

For and behalf of GEO Site & Testing Ltd

Paul Evans - Quality Manager

DP Evans

Emma Williams - Office Manager

Date Approved: **12.1.17**



Test Report: Method of the Determination of the Slake Durability index.
ISRM Part 2.2 (Page 104)

Date: 12-Jan-17
Contract Number: 33562-
Location: St Athan Northern Access Road GI
Client Ref: 60509148
Hole Number: BH502
Sample Number:
Depth from (m): 2.50
Depth to (m): 4.00
Sample Type : B
Nature of slaking Fluid: Water
Temperature (°C): 20
Rock type: Light brown SILTSTONE
Date Tested: 20-10-15
Operator: Wayne Honey

Slake-Durability index (first cycle) % 98.93

Slake-Durability index (second cycle) % 98.55

Appearance of fragments retained in drum:

10 pieces of sub-angular to well-rounded rock core with many pieces with ground corners and edges

Appearance of material passing through the drum:

Sub-angular to well rounded of <2mm fragments to a silty CLAY

If there is any remaining samples it shall be retained for a period of one month from the above date, after which time all samples shall be disposed of.

For and behalf of GEO Site & Testing Ltd

Paul Evans - Quality Manager

DP Evans

Emma Williams - Office Manager

Date Approved: **12.1.17**



Test Report: Method of the Determination of the Slake Durability index.
ISRM Part 2.2 (Page 104)

Date: 12-Jan-17
Contract Number: 33562-
Location: St Athan Northern Access Road GI
Client Ref: 60509148
Hole Number: BH503
Sample Number:
Depth from (m): 0.80
Depth to (m): 1.00
Sample Type : B
Nature of slaking Fluid: Water
Temperature (°C): 20
Rock type: Light brown SILTSTONE
Date Tested: 20-10-15
Operator: Wayne Honey

Slake-Durability index (first cycle) % 98.09

Slake-Durability index (second cycle) % 97.39

Appearance of fragments retained in drum:

10 pieces of sub-angular to well-rounded rock core with many pieces with ground corners and edges

Appearance of material passing through the drum:

Sub-angular to well rounded of <2mm fragments to a silty CLAY

If there is any remaining samples it shall be retained for a period of one month from the above date, after which time all samples shall be disposed of.

For and behalf of GEO Site & Testing Ltd

Paul Evans - Quality Manager

DP Evans

Emma Williams - Office Manager

Date Approved: **12.1.17**



Test Report: Method of the Determination of the Slake Durability index.
ISRM Part 2.2 (Page 104)

Date: 12-Jan-17
Contract Number: 33562-
Location: St Athan Northern Access Road GI
Client Ref: 60509148
Hole Number: BH504
Sample Number:
Depth from (m): 1.00
Depth to (m): 2.50
Sample Type : B
Nature of slaking Fluid: Water
Temperature (°C): 20
Rock type: Light brown SILTSTONE
Date Tested: 20-10-15
Operator: Wayne Honey

Slake-Durability index (first cycle) % 98.28

Slake-Durability index (second cycle) % 97.23

Appearance of fragments retained in drum:

10 pieces of sub-angular to well-rounded rock core with many pieces with ground corners and edges

Appearance of material passing through the drum:

Sub-angular to well rounded of <2mm fragments to a silty CLAY

If there is any remaining samples it shall be retained for
a period of one month from the above date,
after which time all samples shall be disposed of.

For and behalf of GEO Site & Testing Ltd

Paul Evans - Quality Manager

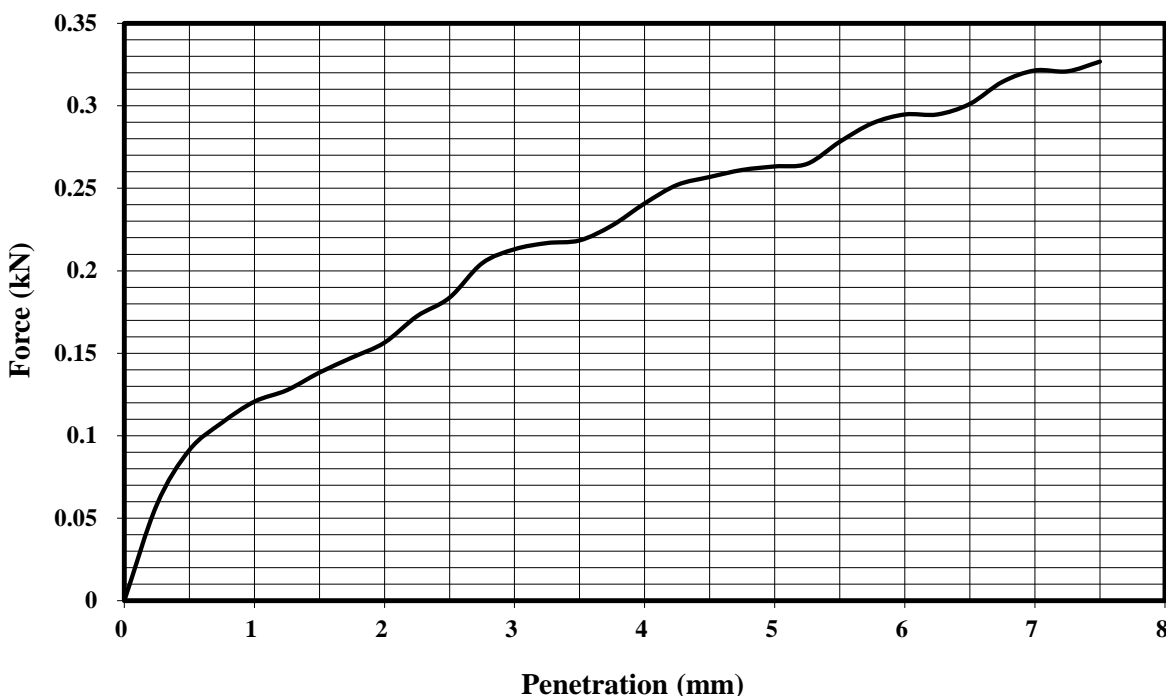
DP Evans

Emma Williams - Office Manager

Date Approved: **12.1.17**

Test Report: Determination of the California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Client ref: 60509148
 Location: St Athan Northern Access Road GI
 Contract Number: 33562-
 Sample Type: B
 Hole Number: SK502
 Sample Number: N/A
 Depth (m): 0.35 - 0.70
 Description: Brown silty CLAY containing organic material.



Initial Sample Conditions		Test Conditions		Method of Compaction:	
Moisture Content:	43	Surcharge Kg:	2.0	2.5kg Rammer	
Bulk Density Mg/m3:	1.69	Soaking Time (hrs):		Final Moisture Content %	
Dry Density Mg/m3:	1.18	Swelling mm:		Sample Top	43
C.B.R. Value %	Sample Top		1.39	Sample Bottom	43
Percentage retained on 20mm BS test sieve:	0	Remarks:			

Checked By:
Emma Sharp (Office Manager)

Approved By:
Paul Evans (Quality Manager)

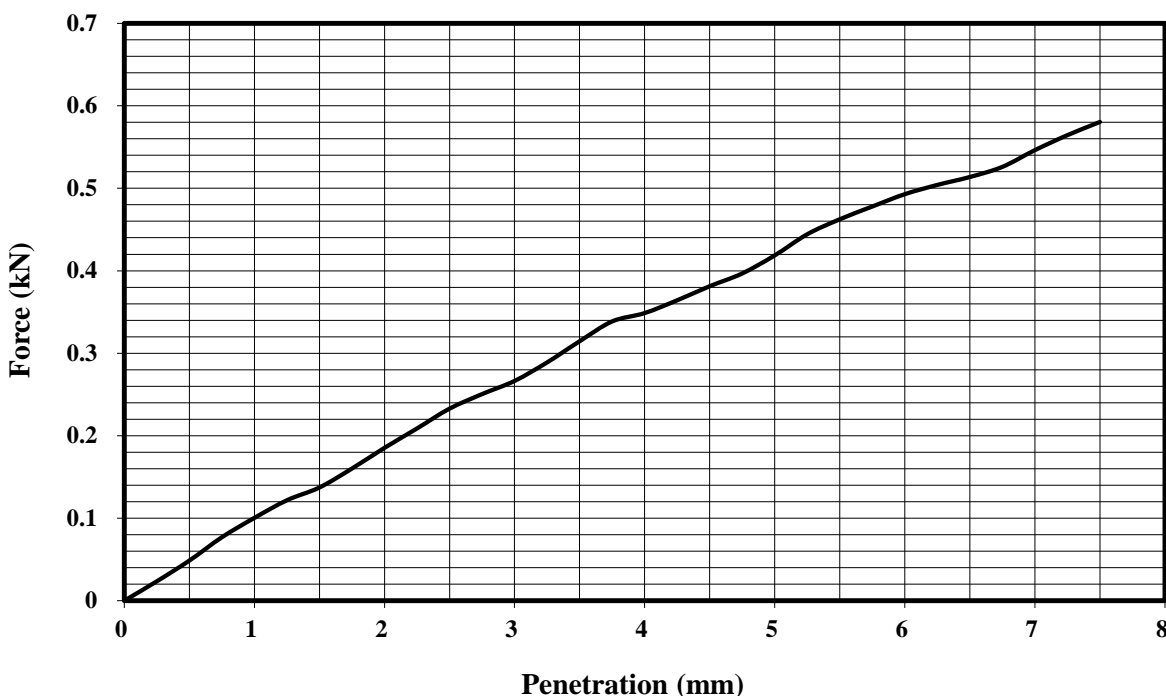


Date Approved: 11.1.17



Test Report: Determination of the California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Client ref: 60509148
 Location: St Athan Northern Access Road GI
 Contract Number: 33562-
 Sample Type: B
 Hole Number: SK503
 Sample Number: N/A
 Depth (m): 0.30 - 0.70
 Description: Brown silty CLAY.



Initial Sample Conditions

Test Conditions

Method of Compaction:

Moisture Content: 32

Surcharge Kg: 2.0

2.5kg Rammer

Bulk Density Mg/m3: 1.85

Soaking Time (hrs):

Final Moisture Content %

Dry Density Mg/m3: 1.40

Swelling mm:

Sample Top

32

C.B.R. Value %

Sample Top

2.09

Sample Bottom

32

Percentage retained on 20mm BS test sieve: 0

Remarks:

Checked By:
Emma Sharp (Office Manager)

Approved By:
Paul Evans (Quality Manager)



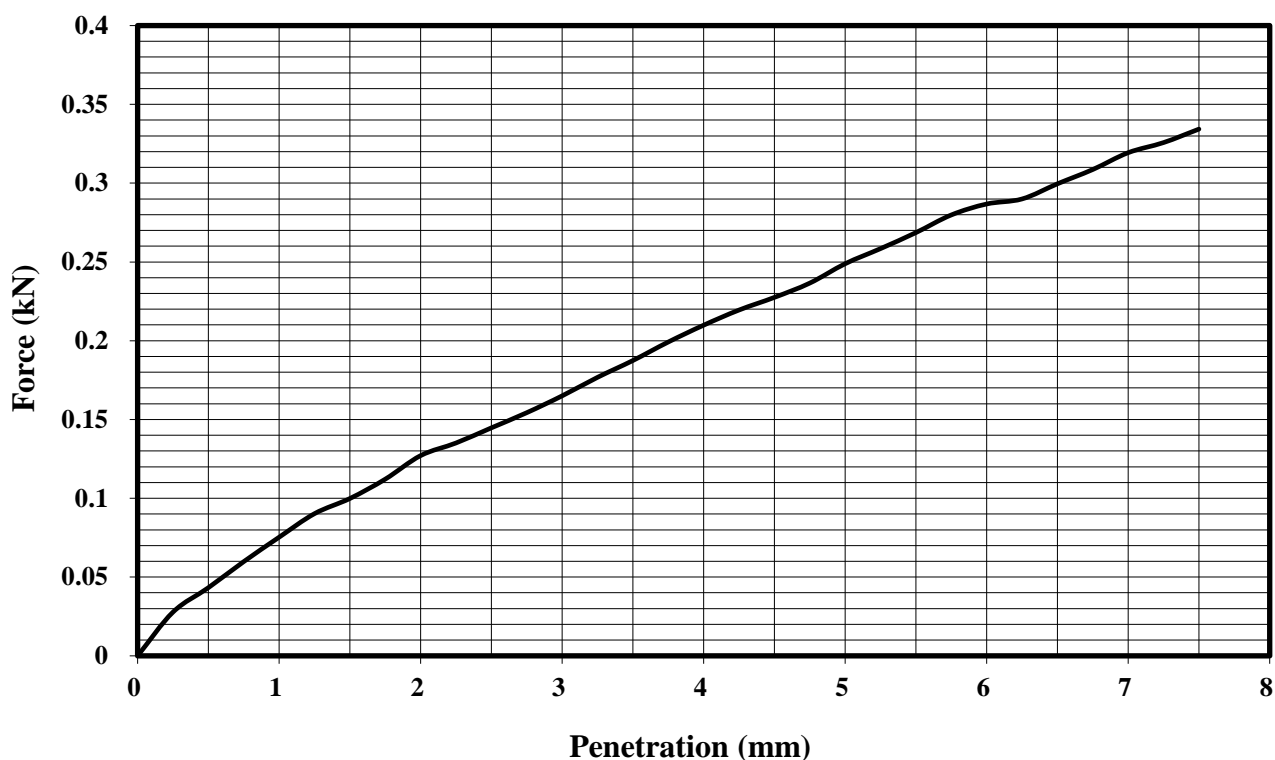
Date Approved:

11.1.17



Test Report: Determination of the California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Client ref: 60509148
 Location: St Athan Northern Access Road GI
 Contract Number: 33562-
 Sample Type: B
 Hole Number: SK504
 Sample Number: N/A
 Depth (m): 0.50 - 0.75
 Description: Brown silty CLAY.



Initial Sample Conditions

Test Conditions

Method of Compaction:

Moisture Content:

35

Surcharge Kg:

2.0

2.5kg Rammer

Bulk Density Mg/m³:

1.83

Soaking Time (hrs):

Final Moisture Content %

Dry Density Mg/m³:

1.36

Swelling mm:

Sample Top

35

C.B.R. Value %

Sample Top

1.24

Sample Bottom

35

Percentage retained on 20mm BS test sieve:

54

Remarks:

Checked By:

Emma Sharp (Office Manager)

Approved By:

Paul Evans (Quality Manager)



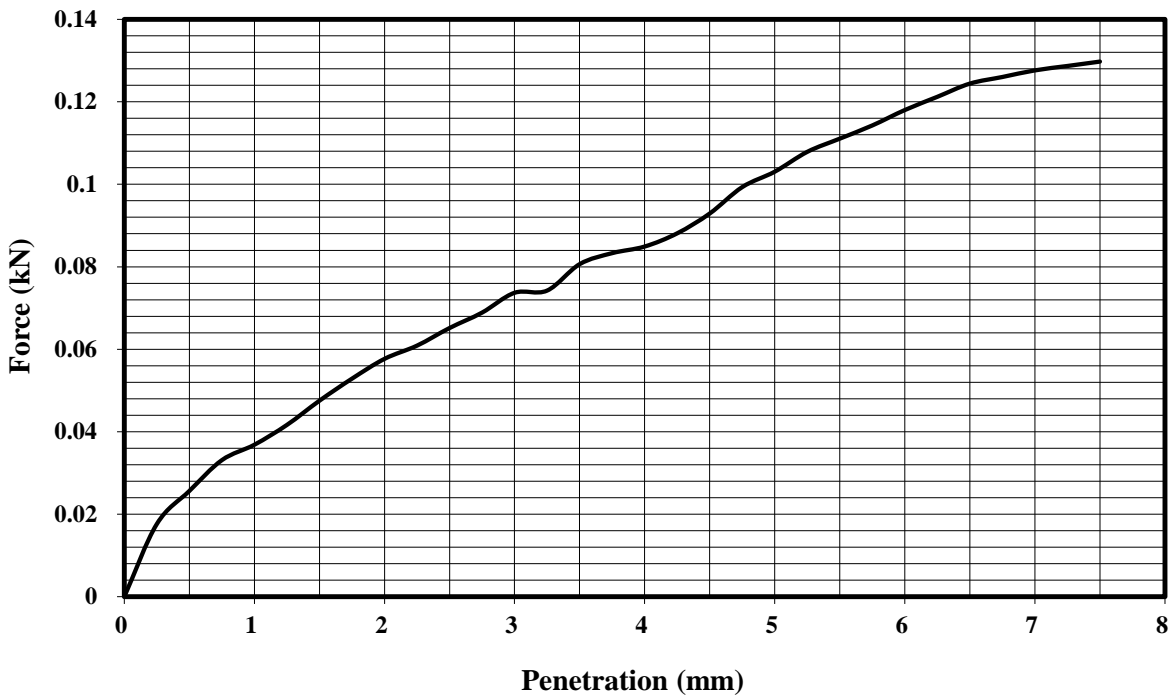
Date Approved:

16.1.17



Test Report: Determination of the California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Client ref: 60509148
 Location: St Athan Northern Access Road GI
 Contract Number: 33562-
 Sample Type: B
 Hole Number: SK508
 Sample Number: N/A
 Depth (m): 0.50 - 0.95
 Description: Brown silty CLAY.



Initial Sample Conditions		Test Conditions		Method of Compaction:	
Moisture Content:	38	Surcharge Kg:	2.0	2.5kg Rammer	
Bulk Density Mg/m3:	1.79	Soaking Time (hrs):		Final Moisture Content %	
Dry Density Mg/m3:	1.30	Swelling mm:		Sample Top	38
C.B.R. Value %	Sample Top		0.52	Sample Bottom	38
Percentage retained on 20mm BS test sieve:	0	Remarks:			

Checked By:
Emma Sharp (Office Manager)

Approved By:
Paul Evans (Quality Manager)

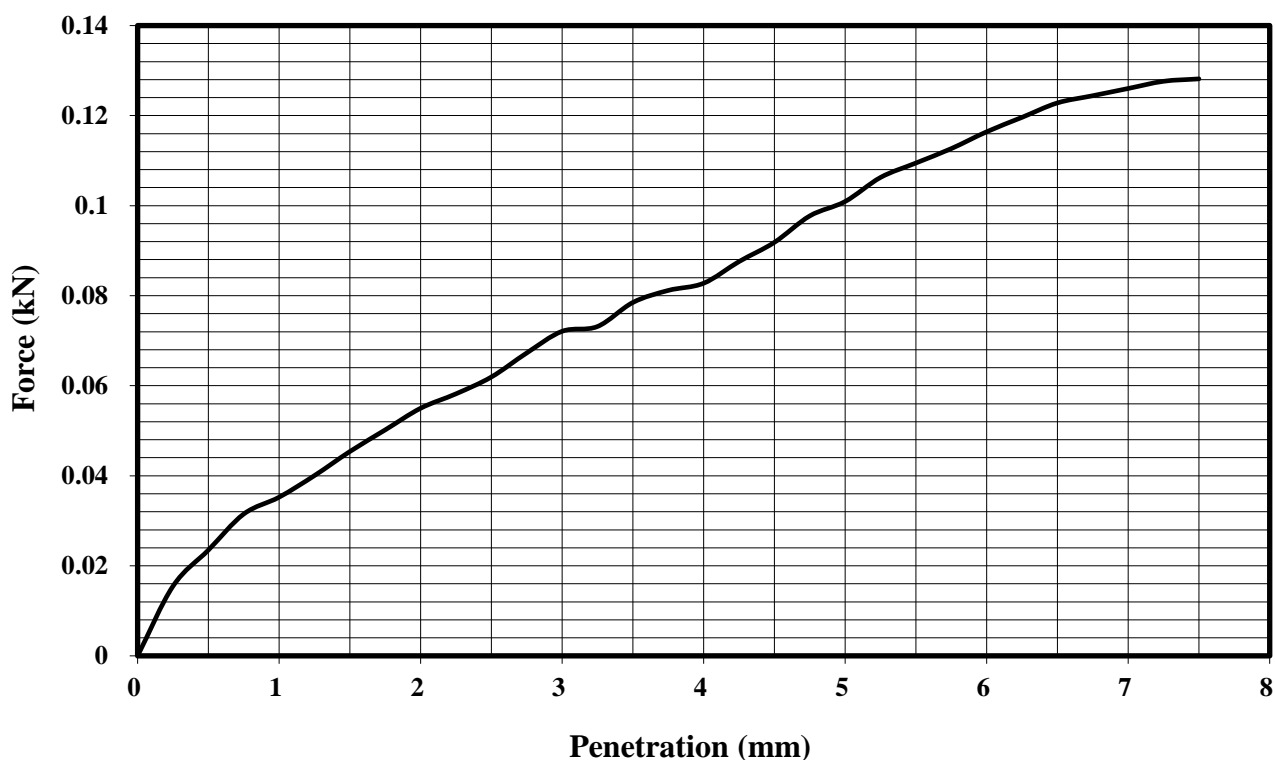


Date Approved: 11.1.17



Test Report: Determination of the California Bearing Ratio
BS 1377: Part 4: 1990 Clause 7

Client ref: 60509148
 Location: St Athan Northern Access Road GI
 Contract Number: 33562-
 Sample Type: B
 Hole Number: SK509
 Sample Number: N/A
 Depth (m): 0.80 - 1.30
 Description: Brown silty CLAY.



Initial Sample Conditions

Test Conditions

Method of Compaction:

Moisture Content: 38

Surcharge Kg: 2.0

2.5kg Rammer

Bulk Density Mg/m³: 1.77

Soaking Time (hrs):

Final Moisture Content %

Dry Density Mg/m³: 1.28

Swelling mm:

Sample Top 38

C.B.R. Value % Sample Top 0.50

Sample Bottom 38

Percentage retained on 20mm BS test sieve: 18

Remarks:

Checked By:
Emma Sharp (Office Manager)

Approved By:
Paul Evans (Quality Manager)



Emma Sharp

Paul Evans

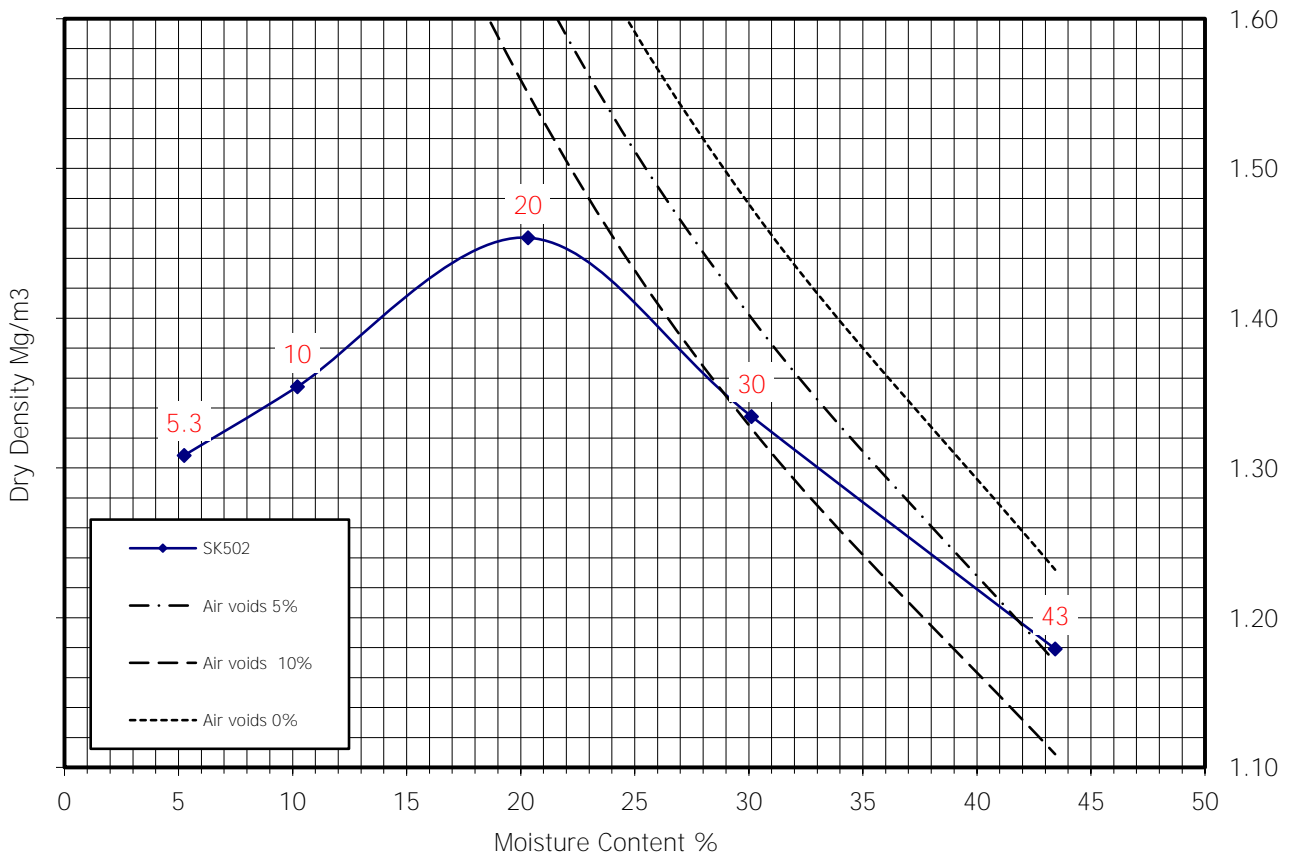
Date Approved: 16.1.17



Dry Density/Moisture Content Relationship

BS 1377:Part 4:1990

Client ref: 60509148
 Location: St Athan Northern Access Road GI
 Contract Number: 33562-
 Hole Number: SK502
 Sample Number: N/A
 Depth (m): 0.35 - 0.70
 Sample Type: B
 Description: Brown silty organic CLAY.



Compaction Point:	1	2	3	4	5
Moisture Content:	5.3	10	20	30.1	43.4
Bulk Density (Mg/m ³):	1.38	1.49	1.75	1.74	1.69
Dry Density (Mg/m ³):	1.31	1.35	1.45	1.33	1.18

Initial Moisture Content:	43	Method of Compaction:	2.5kg Rammer
Particle Density (Mg/m ³):	2.65 Assumed	Material Retained on 37.5 mm Test Sieve (%):	0
Maximum Dry Density (mg/m ³):	1.45	Material Retained on 20.0 mm Test Sieve (%):	0
Optimum Moisture Content (%):	20	Sample Preparation Clause:	3.2.4.1

Remarks:

Checked By:
Emma Sharp

Approved By:
Paul Evans

Date Approved:

16.1.17



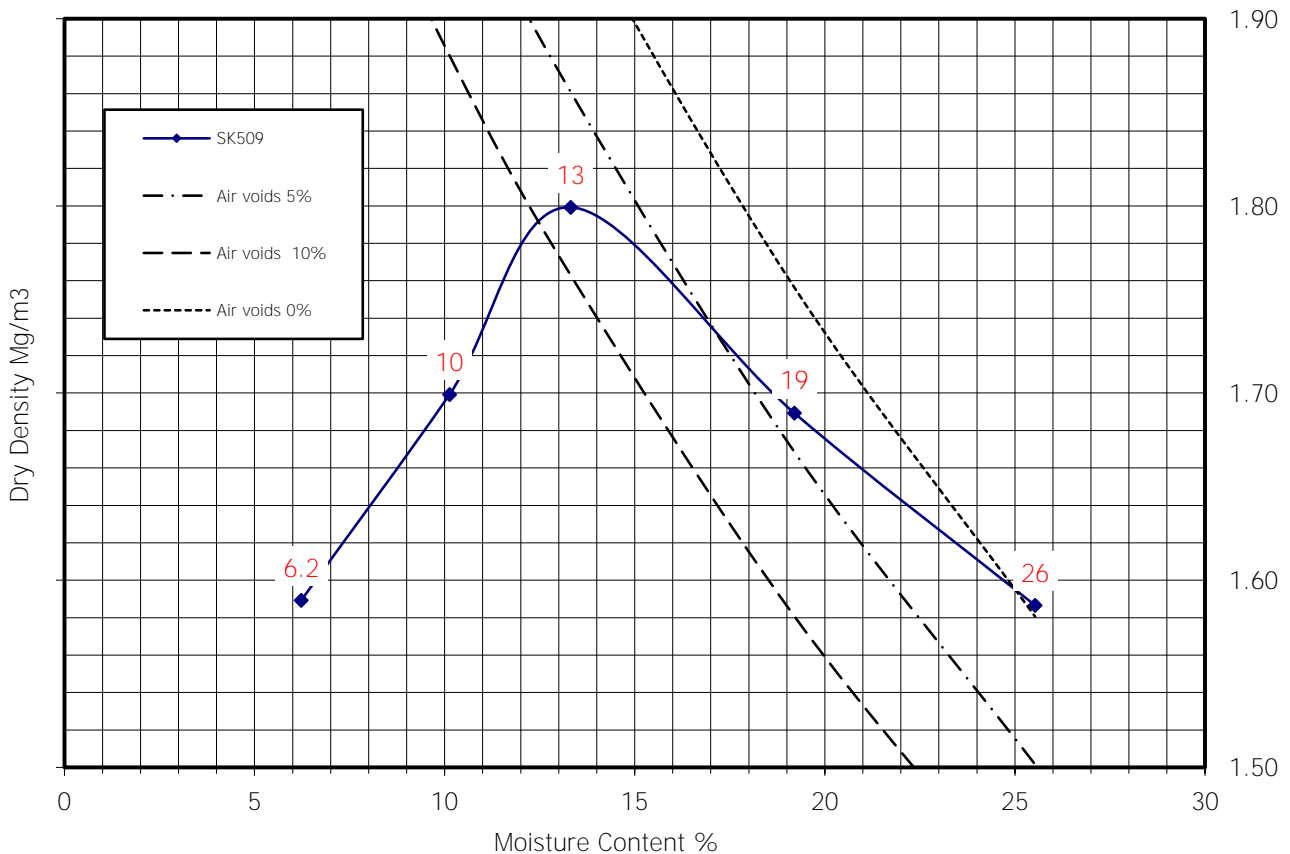
2788



Dry Density/Moisture Content Relationship

BS 1377:Part 4:1990

Client ref: 60509148
 Location: St Athan Northern Access Road GI
 Contract Number: 33562-
 Hole Number: SK509
 Sample Number: N/A
 Depth (m): 0.35 - 0.80
 Sample Type: B
 Description: Brown gravelly silty CLAY.



Compaction Point:	1	2	3	4	5
Moisture Content:	6.2	10	13	19.2	25.5
Bulk Density (Mg/m ³):	1.69	1.87	2.04	2.01	1.99
Dry Density (Mg/m ³):	1.59	1.70	1.80	1.69	1.59

Initial Moisture Content:	25	Method of Compaction:	2.5kg Rammer
Particle Density (Mg/m ³):	2.65 Assumed	Material Retained on 37.5 mm Test Sieve (%):	8.2
Maximum Dry Density (mg/m ³):	1.80	Material Retained on 20.0 mm Test Sieve (%):	4.6
Optimum Moisture Content (%):	13	Sample Preparation Clause:	3.2.4.2

Remarks:

Checked By:
Emma Sharp

Approved By:
Paul Evans

Date Approved:

16.1.17



2788



SUMMARY OF SHEAR STRENGTH TESTS (TOTAL STRESS)
(BS 1377 : PART 7 : 3 : 1990)

Client ref: 60509148
 Location: St Athan Northern Access Road GI
 Contract Number: 33562-

Borhole Number	Sample Number	Sample Depth from m	Sample Depth to m	Sample Type	Moisture Content %	Bulk Density Mg/m ³	Dry Density Mg/m ³	Undrained Triaxial Compression Tests (Total Stress)						Hand Vane kPa	
								Size	Lateral Pressure s ₃	Cohesion 1/2(s ₁ -s ₃)	Average Cohesion	Failure Strain %	Type of Failure	Peak	Residual
								mm	kPa	kPa	kPa	%			
SK504		0.50	0.75	B										47	18
SK507		0.30	0.55	B										56	23
SK509		0.35	0.80	B										62	32

SYMBOLS: RM: Remoulded MS: Multistage B: Brittle P: Plastic C: Compound Vane Size : 19mm/33




 Checked by:


 Approved by:

24/01/17
Date of approval: