

GLOBAL CENTRE OF RAIL EXCELLENCE

GROUND INVESTIGATION:

Factual Report

Report No. Q0652/FR_01

April 2022

DOCUMENT CONTROL

Contract Name: Global Centre of Rail Excellence

Contract Reference: Q0652

Report Type: Ground Investigation Factual Report

Report Reference: Q0652/FR_01

Date of Report Production: April 2022

Client: Global Centre of Rail Excellence

Client/ Scheme Engineer: ARUP

Version:	Date:	Prepared by:	Checked by:	Approved by:
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1	14/03/22			
2	05/04/22			
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CONTENTS

0.	FOREWORD	1
1.	INTRODUCTION	2
1.1	General	2
1.2	Purpose of Ground Investigation.....	2
1.3	Scope of Work	2
2.	SITE DETAIL	4
2.1	Site Description.....	4
2.2	Statutory Service Information.....	4
2.3	Published Geology.....	4
3.	FIELDWORK	6
3.1	General	6
3.2	Exploratory Hole Locations	6
3.3	Boreholes.....	8
3.4	Machine Excavated Trial Pits and Trenches	10
3.5	In-Situ Testing.....	12
3.6	Sampling - General	13
3.7	Groundwater & Landgas Standpipe Installations	13
3.8	Post-Fieldwork Monitoring	14
4.	LABORATORY TESTING.....	15
4.1	Geotechnical Laboratory Testing	15
4.2	Geo-Environmental Laboratory Testing	15
5.	REFERENCES	17

APPENDICES

APPENDIX I – SITE PLANS AND FIGURES	I
APPENDIX II – ENGINEER’S BOREHOLE LOGS	II
APPENDIX III – ENGINEERS MACHINE EXCAVATED TRENCH & PIT LOGS	III
APPENDIX IV – SOAKAWAY TEST RECORDS	IV
APPENDIX V – GRATICULE RESULTS	V
APPENDIX VI – ARCHEOLOGIST REPORT.....	VI
APPENDIX VII – GEOTECHNICAL LABORATORY TEST RESULTS	VII
APPENDIX VIII – CHEMICAL LABORATORY TEST RESULTS	VIII
APPENDIX IX – GEOPHYSICAL SURVEY REPORT.....	IX
APPENDIX X – GROUND GAS & GROUNDWATER MONITORING RECORDS	X

0. FOREWORD

The following Conditions and Notes on Site Investigation Procedures should be read in conjunction with this report.

0.1 General

Recommendations made and opinions expressed in the report are based on the strata observed in the excavations, together with the results of site and laboratory tests. No responsibility can be held for conditions which have not been revealed by the Exploratory Holes or which occur between Exploratory Holes. Whilst the report may suggest the likely configuration of strata, both between Exploratory Holes and below the maximum depth of investigation, this is only indicative and liability cannot be accepted for its accuracy.

Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction below or close to the site.

0.2 Investigation Procedures

Cable Percussive Borehole Drilling, Rotary Percussive Borehole Drilling (*dynamic sampled / rotary cored / rotary probed*), Sonic Drilling, Machine Excavated Trial Pits/ Trenches and Geophysical Surveying techniques for ground investigation have been employed on this scheme. All Exploratory Hole operations, sampling and logging of soils, rocks and in-situ testing complies with the recommendations of the British Code of Practice BS 5930:2015+A1:2020, 'Site Investigations', British Code of Practice BS 10175: 2011 + A1:2013, 'Investigation of Potentially Contaminated Sites' and BS 1377: 1990, 'Methods of Test for Soils for Engineering Purposes'. Additional Ground penetrating Radar (GPR) survey of buried utilities was also undertaken.

0.3 Routine Sampling

Representative bulk, undisturbed, disturbed and environmental samples of the different strata are taken during the formation of the exploratory holes and following completion of logging as required and in accordance with Project Specification. These samples are sealed and labelled in clear plastic bags and 2kg plastic tubs. Soil and water samples obtained for environmental testing are sampled and sealed in borosilicate amber jars or in specialist vessels where required. All samples are returned from site to QGL's laboratory for controlled storage within 24 hours of sampling to await test scheduling /requirements.

0.4 In-Situ Testing

- Standard Penetration Testing within Boreholes (SPT)
- Hand Shear Vane Testing in Trenches/ Pits where cohesive soils encountered
- Magnetic Geophysical Survey
- Electromagnetic Geophysical Survey
- Microgravity Geophysical Survey
- Soakaway Testing

0.5 Groundwater

Where possible, or applicable, the depth of entry of any influx of groundwater is recorded during the course of excavation or boring operations. The rate of inflow into the excavation or borehole is monitored during the course of the excavation or during boring procedures. Upon encountering any water strikes, work is temporarily halted and the water levels monitored for a standard twenty minute period recording the change in water level at the end of the twenty minutes.

Groundwater conditions observed in the excavations are those appertaining to the period of investigation. It should be noted, however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions or other causes.

0.6 Retention of Samples

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material is discarded. Further to notifying the Engineer/ Client with one week's notice all soil and/or rock samples will be discarded 28 days after submission of the approved final report.

1. INTRODUCTION

1.1 General

Upon the instructions of ARUP (Scheme Engineer/ Investigation Supervisor), acting on behalf of the Client, Global Centre of Rail Excellence, Quantum Geotechnic Ltd (QGL) was commissioned to undertake the initial ground investigation for the proposed Global Centre of Rail Excellence, located at the Nant Helen Opencast site, Onllwyn Washery and the adjacent area.

QGL fulfilled the role as Principal Contractors for this scheme.

This report presents a factual account of the fieldwork carried out, including an account of the fieldworks undertaken, descriptions of strata encountered and provision of subsequent laboratory test results. Other available sources of information that have been consulted in the preparation of this Factual Report include the published geological maps for the area and online databases.

General notes on the techniques employed by QGL are described in the Foreword together with the limitations inherent in carrying out site investigation work.

1.2 Purpose of Ground Investigation

The ground investigation is to assist with the design of the proposed development. The proposed main works is the development of a rail testing facility that will include a 7km track, the construction of which will involve the construction of significant cuttings and embankments, a platform environment, train storage facilities, train decommissioning area and an educational facility.

1.3 Scope of Work

The initial scope of works finalised by the Investigation Supervisor / Designer comprised the following:

- 1 no cable percussive with rotary core follow on borehole
- 3 no cable percussive with open hole follow on boreholes
- 3 no cable percussive with rotary coring and open hole follow on boreholes
- 2 no rotary coring boreholes
- 10 no rotary coring with open hole follow on boreholes
- 10 no sonic boreholes
- 33 no trial pits
- Four areas of geophysical testing, including magnetometer, electromagnetic and microgravity surveys

The aim of the exploratory holes is to facilitate:

- Detailed descriptions of the site stratigraphy and the nature and disposition of the superficial soils and rock
- Details of potentially mined coal seams and information to assess subsidence risks associated with these
- Chemical and geotechnical testing of soil and rock samples
- Chemical testing of groundwater samples
- Groundwater and ground gas monitoring from standpipe installations
- In-situ testing, including Standard Penetration Tests, hand vane tests and infiltration tests

2. SITE DETAIL

2.1 Site Description

The site covers an area of approximately 500 hectares and is located between the A4109 to the south and the A4221 to the north-east, at approximate National Grid Reference 282580, 211080.

The majority of the western area of the site is occupied by Celtic Energy as the Nant Helen active open cast coal mine. The western extent is the Nant Helen Extension opencast working. The central and south western portion of the site contains a large overburden storage area whilst the Celtic Energy Nant Helen yard, offices and car parking are located towards the centre of the site. Onllwyn Washery occupies the eastern area of the site and is connected to the Nant Helen site by a series of access roads. The remainder of the site is farmland.

The topography of the site varies significantly and rises inwards to elevations of between 280 and 295m AOD in the central area of the site.

2.2 Statutory Service Information

All service information was provided by the Scheme Engineers and also a separate set of service drawings were obtained by QGL prior to commencement of the intrusive works. A permit to excavate system was implemented by QGL throughout the works for all exploratory holes. Standard QGL procedures for breaking ground were followed and all areas were scanned using a cable avoidance tool. A hand dug trial pit was excavated to 1.2m prior to commencement of borehole drilling. All hand excavation was undertaken using insulated digging tools.

2.3 Published Geology

Details of the geology of the site are provided by British Geological Survey (BGS) Sheet 231 'Merthyr Tydfil', Solid and Drift edition at 1:50,000 scale, and BGS's online tool Geology of Britain Viewer. The maps indicate superficial deposits of Peat to underlie areas of the eastern area of the site, whilst deposits of Glacial Till underlie localised areas below the eastern and central areas of the site.

The solid geology below the site is mapped as the South Wales Coal Measures, typically comprising mudstones, siltstones, sandstones, grits, fireclays, seatearths and coals.

In addition to the geological mapping, the Engineer / Investigation Supervisor provided the following information:

Made Ground material is anticipated beneath the washery site and is likely to comprise a mixture of varied granular backfill material within a cohesive clay matrix. Various gravel inclusions within the Made Ground were noted to be mudstone, sandstone, coal, clinker and wood. The thickness of this material is anticipated to range between 0.25 and 7.0m, although locally thicker deposits could be encountered in the locations of any stockpiles / spoil heaps within the washery site.

Backfilled opencast mining material is anticipated in various areas of the site. The backfill material has derived from the mining of the Middle and Lower Coal Measures. The anticipated depth of backfill between 40 and 150m.

3. FIELDWORK

3.1 General

The fieldwork was carried out between 15th November 2021 and 19th January 2022. Full-time on-site supervision and attendance by an Engineering Geologist from QGL was undertaken on all aspects of the site works.

All works were conducted within safe working practices set out by QGL's Risk Assessed Method Statement including CAT scanning and service inspection hand excavated pits to 1.2mbgl in all borehole locations.

All inductions and regular site briefings were carried out by QGL's Engineering Geologist as well as site specific inductions provided by Celtic Energy. No deviations from the Standards and Procedures adopted for the works were recorded.

Sensitive vegetation clearance was undertaken to access areas of the site where the potential presence of reptiles and amphibians exists, under the supervision of an Ecological Clerk of Works.

Trial Pits and hand excavated service clearance pits outside of the backfilled opencast mines were undertaken under an archaeological watching brief. The scope of the works and supervision was agreed with Glamorgan-Gwent Archaeological Trust and Clwyd-Powys Archaeological Trust prior to commencing work in the areas of interest. The Archaeological report is presented within Appendix VI.

3.2 Exploratory Hole Locations

The exploratory hole locations were set out by QGL in liaison with the Investigation Supervisor. On completion of the ground investigation all exploratory hole positions were surveyed by QGL to National Grid Co-Ordinates and Ordnance Datum (accurate to 0.005m horizontal and 0.01m vertical) using QGL in-house GPS equipment.

An Exploratory Hole Location Plan is presented as Figure 2 in Appendix I, and exploratory hole coordinates and levels are presented on the engineer's log sheets in the corresponding Appendices.

Table 1 presents the National Grid Co-Ordinates and Ordnance Datum for the exploratory holes.

Table 1: Exploratory Hole Co-Ordinates & Levels

Exploratory Hole ID	Easting	Northing	Elevation (mAOD)	Exploratory Hole ID	Easting	Northing	Elevation (mAOD)
BH01	284008.752	210457.288	228.289	TP01	284246.92	210515.985	229.984
BH02	283562.15	210475.288	238.034	TP02	284410.812	210600.045	231.438
BH03	283200	210681	258.30	TP03	284554.783	210496.562	234.921
BH04	282861.715	210545.421	257.69	TP04	284819.634	210502.793	239.164
BH05	282375.778	210348.29	239.39	TP05	284970.622	210390.891	240.574
BH06	281804.05	210415.339	263.08	TP06	285168.401	210396.23	237.139
BH07	281544.876	210721.078	271.278	TP07	285325.242	210402.826	232.565
BH08	282776.077	211918.353	236.309	TP08	284939.196	210661.097	243.459
BH09	283119.525	211903.085	230.86	TP09	285134.983	210589.126	243.465
BH10	283369.5	211901.555	236.953	TP10	283248.015	210699.94	257.767
BH11	283659.495	211793.719	258.786	TP11	283484.765	210766.086	251.088
BH12	283925.43	211066.299	258.21	TP12	285143.133	210543.076	242.244
BH13	283817.797	210965.719	259.335	TP13	285116.027	210469.732	238.825
BH14	283702.056	210915.057	260.008	TP14	285232.47	210442.229	233.459
BH15	283332.648	210758.175	249.628	TP14A	285233.984	210444.909	232.944
BH16	283439.29	211441.069	280.709	TP15	284779.25	210390.75	248.109
BH17	283274.059	211061.09	276.83	TP17	284728	210394	247.22
BH18	283148.397	210982.779	275.032	TP18	283467.81	210253.53	221.201
BH19	281397.517	211205.939	255.047	TP19	282624.076	210468.096	247.39
BH19A	281399.062	211202.028	255.32	TP20	283231.186	211035.804	275.005
BH20	281652.88	211668.6	251.00	TP21	283037.695	211907.981	230.341
BH21	281893.75	211906.21	228.232	TP22	282687.913	210984.945	279.117
BH22	282101.253	212011.3	213.006	TP23	281381.91	211314.37	248.13
BH23	282565.867	211985.864	199.76	TP24	281948.549	211934.417	228.438
BH24	283944.594	211545.584	258.672	TP25	283990.42	211456.97	255.626
BH25	283952.651	211213.21	257.678	TP26	282977.921	210985.136	286.054
BH26	283672.545	211573.995	273.065	TP27	282341.166	210344.218	239.617
BH27	282777.925	210976.889	283.501	TP28	281604.404	211639.767	251.054
BH28	282572.648	210970.189	277.374	TP29	282282.615	212062.103	230.736
BH29	284719.483	210705.393	230.736	TP30	284010.546	211327.163	252.686
BH30	284925.689	210549.408	239.096	TP31	282490.134	211876.52	232.41
BH31	284880.773	210454.806	238.608	TP32	282814.327	211902.586	235.632
BH32	284967.95	210230.008	244.73	TP33	283304.686	211902.413	236.288
BH33	284397.044	210700.878	230.51	TP34	283918.939	211654.186	253.8
BH34	284419.614	210543.602	232.63	TP34A	284641.854	210699.974	230.763
				TP35	285316.156	210289.506	234.766
				TP36	285090.027	210482.138	239.896
				TP37	284931.976	210605.035	239.19
				TP38	284921.927	210557.022	238.95

3.3 Boreholes

A total of thirty-five boreholes were drilled during the site works using a combination of drill rigs and techniques.

The Cable Percussive element of the borehole works were drilled using a Dando 2000 rig utilising 200mm diameter casing and tools.

The dynamic sampling, rotary coring and rotary probing element of the borehole works were undertaken using two Commachio 600 multi-purpose drill rigs, using 101mm diameter dynamic sample barrel for soil sampling and 412F coring barrel for bedrock. A combined air/mist flush was used to clear the hole of returns and debris during the drilling process. 115mm diameter ODEX overburden drill system was used by the Commachio drill rig to maintain the borehole open through the superficial deposits.

Three sonic boreholes were undertaken across the site using a Mito XL140 drill rig operated by Borehole Solutions Limited. Due to ground conditions, which comprised an extensive number of boulders and the continued loss of drill flush, it was not possible to progress the drill casing to the required depths and therefore the scheduled depths were not achieved. The remaining boreholes scheduled as sonic boreholes were undertaken using rotary percussive methods to the maximum depths considered achievable with the available equipment and the ground conditions encountered.

The recovered rock sample liners were split and logged in accordance with BS5930: (2015); BS EN ISO 14688-1:2002; BS EN ISO 14688-2:2005 and BS EN ISO 14689-1:2003, including fracture spacing, by a QGL Engineering Geologist. All retrieved core is stored in wooden lockable boxes and was logged and photographed on site prior to being transported back to QGL premises for storage.

In-situ Standard Penetration Testing (SPT) was carried out in all boreholes (see section 3.5.1.).

Upon completion, selected boreholes were installed with 50mm Internal Diameter combined HDPE landgas and groundwater pipes for subsequent monitoring. Further details are listed in Section 3.7. Boreholes not subject to standpipe installations were backfilled with a Cement and Bentonite grout mix, tremmied to the base of the boreholes, with surfacing reinstated like-for-like.

Details of all Boreholes including final depths are provided below in Table 2.

Table 2: Borehole Detail

Exploratory Hole ID	Borehole Type	Completed Depth (mbgl)	SPT Hammer Ref	Terminating Strata	Backfill Details	Notes/Reason for Termination
BH01	Rotary Probe Borehole	30.0		Sandstone Bedrock	Grout Backfill	Scheduled Depth
BH02	Rotary Probe Borehole	30.0		Hard Drill (Loss of	Grout Backfill	Scheduled Depth

Exploratory Hole ID	Borehole Type	Completed Depth (mbgl)	SPT Hammer Ref	Terminating Strata	Backfill Details	Notes/Reason for Termination
				Flush)		
BH03	Rotary Cored & Probed Boreholes	32.7	Q2 AR830	Mudstone Bedrock	Grout Backfill	Upon Engineer Instruction
BH04	Rotary Cored & Probed Boreholes	30.0	Q2 AR830	Mudstone Bedrock	Grout Backfill	Scheduled Depth
BH05	Dynamic Sampled with Rotary Core follow-on	30.7	Q5	Mudstone Bedrock	Grout Backfill	Scheduled Depth
BH06	Rotary Cored & Probed Boreholes	30.0	Q5	Mudstone and Sandstone Bedrock	Grout Backfill	Scheduled Depth
BH07	Rotary Cored & Probed Boreholes	35.0	Q5	Mudstone and Sandstone Bedrock	Land Gas & Ground Water Installation	Scheduled Depth
BH08	Rotary Probe Borehole	42.0		Mudstone and Sandstone Bedrock	Grout Backfill	Upon Engineer Instruction
BH09	Rotary Probe Borehole	30.0		Siltstone Bedrock	Grout Backfill	Scheduled Depth
BH10	Rotary Probe Borehole	30.0		Sandstone Bedrock	Grout Backfill	Scheduled Depth
BH11	Rotary Cored & Probed Boreholes	30.0	Q2 AR830	Mudstone and Sandstone Bedrock	Grout Backfill	Scheduled Depth
BH12	Rotary Cored & Probed Boreholes	30.0	Q2 AR830	Mudstone Bedrock	Grout Backfill	Scheduled Depth
BH13	Rotary Cored Boreholes	30.0	Q5	Mudstone Bedrock	Grout Backfill	Scheduled Depth
BH14	Rotary Cored & Probed Boreholes	30.0	Q5	Mudstone and Sandstone Bedrock	Grout Backfill	Scheduled Depth
BH15	Rotary Cored & Probed Boreholes	30.0	Q5	Mudstone Bedrock	Land Gas & Ground Water Installation	Scheduled Depth
BH16	Rotary Cored Boreholes	40.2	Q2 AR830	Mudstone Bedrock	Land Gas & Ground Water Installation	Scheduled Depth
BH17	Rotary Cored & Probed Boreholes	30.0	Q2 AR830	Mudstone Bedrock	Grout Backfill	Scheduled Depth
BH18	Rotary Cored & Probed Boreholes	45.2	Q2 AR830	Mudstone Bedrock	Grout Backfill	Upon Engineer Instruction
BH19	Rotary Probe Borehole	19.2	Q2 AR830	Made Ground – Opencast Backfill	Grout Backfill	Unable to progress borehole
BH19A	Rotary Probe Borehole	28.2	Q2 AR830	Made Ground – Opencast Backfill	Land Gas & Ground Water Installation	Unable to progress borehole
BH20	Rotary Probe Borehole	40.2	Q2 AR830	Made Ground – Opencast Backfill	Grout Backfill	Unable to progress borehole
BH21	Sonic Borehole	33.0	XL140	Made Ground – Opencast Backfill	Grout Backfill	Unable to progress borehole
BH22	Sonic Borehole	32.0	XL140	Possible Bedrock	Grout Backfill	Unable to progress borehole
BH22A	Rotary Probe Borehole	34.0		Possible Bedrock	Land Gas & Ground Water Installation	Unable to progress borehole
BH23	Rotary Cored & Probed Boreholes	30.0	Q2 AR830	Mudstone Bedrock	Grout Backfill	Scheduled Depth
BH24	Rotary Probe Borehole	50.7	Q2 AR830	Made Ground – Opencast Backfill	Land Gas & Ground Water Installation	Unable to progress borehole
BH25	Rotary Probe Borehole	50.7	Q2 AR830	Made Ground – Opencast Backfill	Land Gas & Ground Water Installation	Unable to progress borehole

Exploratory Hole ID	Borehole Type	Completed Depth (mbgl)	SPT Hammer Ref	Terminating Strata	Backfill Details	Notes/Reason for Termination
BH26	Rotary Cored & Probed Boreholes	40.2	Q2 AR830	Mudstone Bedrock	Grout Backfill	Upon Engineer Instruction
BH27	Sonic Borehole	61.5	XL140	Made Ground – Opencast Backfill	Grout Backfill	Unable to progress borehole
BH28	Rotary Probe Borehole	49.2	Q2 AR830	Made Ground – Opencast Backfill	Land Gas & Ground Water Installation	Unable to progress borehole
BH29	Cable Percussive Borehole with Rotary Probe 'follow on'	35.0	SAM1	Mudstone / Siltstone Bedrock	Land Gas & Ground Water Installation	Scheduled Depth
BH30	Cable Percussive Borehole with Rotary Cored and Probe 'follow on'	35.0	SAM1	Mudstone Bedrock	Land Gas & Ground Water Installation	Scheduled Depth
BH31	Cable Percussive Borehole with Rotary Probe 'follow on'	35.0	SAM1	Mudstone Bedrock	Land Gas & Ground Water Installation	Scheduled Depth
BH32	Cable Percussive Borehole with Rotary Cored and Probe 'follow on'	35.0	SAM1	Mudstone / Siltstone Bedrock	Land Gas & Ground Water Installation	Scheduled Depth
BH33	Cable Percussive Borehole with Rotary Cored and Probe 'follow on'	35.0	SAM1	Mudstone / Siltstone Bedrock	Land Gas & Ground Water Installation	Scheduled Depth
BH34	Cable Percussive Borehole with Rotary Probe 'follow on'	30.0	SAM1	Mudstone Bedrock	Land Gas & Ground Water Installation	Scheduled Depth

A complete set of borehole logs are presented in Appendix II along with SPT Hammer calibration certificates for both the Cable Percussive and the Commachio drill rigs for reference purposes.

3.4 Machine Excavated Trial Pits and Trenches

A total of forty pits and trenches were excavated using 360 tracked excavators, either 9 Tonne or 13 Tonne, depending on depth requirement and access/ working area constraints.

Trial Pits TP12 – TP17 and TP35 – TP38 were excavated to investigate possible mining related anomalies identified from the Geophysical survey undertaken.

Soil infiltration tests were scheduled within Trial Pits TP01 – TP02, TP04 and TP18 – TP21 (see Section 3.5.2).

The trial pitting method of investigation allows direct sampling of the near surface deposits for identification purposes, locating of buried services, as well as assessment of any salient features and Made Ground or disturbed ground. The trial pits were logged in accordance with BS5930:2015+A1:2020; BS EN ISO 14688-1:2002 and BS EN ISO 14688-2:2004, and supervised at all times by an Engineering Geologist from QGL.

A graticule was used to assist with the field description of grading for material within Trial Pits TP22 – TP33. The graticule records are included as Appendix V.

All machine excavated trial pits and trenches were backfilled with compacted layers of arisings upon completion.

Geotechnical and Environmental samples were taken within the superficial deposits for laboratory testing purposes.

Details of the Machine Excavated Trial Trenches and Pits are provided in Table 3 below;

Table 3: Machine Excavated Trial Trench and Trial Pit Detail

Exploratory Hole ID	Completed Depth (mbgl)	Notes/Reason for Termination	Exploratory Hole ID	Completed Depth (mbgl)	Notes/Reason for Termination
TP01	2.8	Sides unstable and collapsing. Unable to undertake soakaway test due to high ground water encountered	TP21	4	Scheduled Depth
TP02	2.3	Sides unstable and collapsing. Unable to undertake soakaway test due to high ground water encountered	TP22	4.3	Sides collapsing, pit unstable.
TP03	3.3	Sides unstable and collapsing no progress being made	TP23	4	Scheduled Depth
TP04	3.6	Unable to proceed past cobbles/boulders at base of pit	TP24	4.5	Scheduled Depth
TP05	3	Sides unstable and collapsing no progress being made	TP25	4.5	Scheduled Depth
TP06	2.8	Unable to proceed past cobbles/boulders at base of pit	TP26	3.8	Sides collapsing, pit unstable.
TP07	4	Scheduled Depth	TP27	4.5	Scheduled Depth
TP08	3	Sides unstable and collapsing no progress being made	TP28	4	Scheduled Depth
TP09	4	Scheduled Depth	TP29	4.5	Scheduled Depth
TP10	2.6	Sides collapsing, pit unstable.	TP30	4.5	Scheduled Depth
TP11	2.7	Sides collapsing due to fast groundwater ingress.	TP31	4.5	Scheduled Depth
TP12	4.5	Scheduled Depth	TP32	4.5	Scheduled Depth
TP13	4	On natural strata	TP33	4.5	Scheduled Depth
TP14	3.5	Sides unstable and collapsing	TP34	4.5	Scheduled Depth
TP14A	3.5	Sides unstable and collapsing	TP34A	2.5	Sides unstable and collapsing. Unable to undertake soakaway test due to high ground water encountered
TP15	4.5	Scheduled Depth	TP35	4	Scheduled Depth
TP17	4	Scheduled Depth	TP36	4	Scheduled Depth
TP18	3	Significant Instability	TP37	4.5	Scheduled Depth
TP19	4	Scheduled Depth	TP37A	2	Encountered possible service

Exploratory Hole ID	Completed Depth (mbgl)	Notes/Reason for Termination	Exploratory Hole ID	Completed Depth (mbgl)	Notes/Reason for Termination
TP20	4	Scheduled Depth	TP38	4	Scheduled Depth

A full set of machine excavated trial trench and trial pit logs are presented in Appendix III.

The graticule results are provided in Appendix V.

3.5 In-Situ Testing

3.5.1 Standard Penetration Testing

Standard penetration tests (SPTs) were undertaken in all boreholes through the superficial deposits and weak bedrock at intervals shown on the engineer's logs, typically 1m intervals to 5m depth and 1.5m thereafter.

This dynamic in-situ test measures the density of soil or rock and is described in BS1377:1990 (part 9), partially superseded by BS EN ISO 22476-3 (2005). Within fine grained or cohesive soils, the test incorporates a small diameter tube (650mm length, 50mm external diameter and 35mm internal diameter) with a cutting shoe known as the 'split barrel sampler'. The sampler is forced into the soil dynamically using blows from a 63.5kg hammer dropped through 760mm. The sampler is initially advanced 150mm into the soil with seating blows, then the number of blows required to advance the sampler each 75mm increment up to a depth of 300mm is recorded. This cumulative total number of blows over the 300mm test is referred to as the "N" value. For coarse gravels and bedrock, the split barrel is replaced by a 60° cone.

SPT results can be found on the corresponding borehole logs in Appendix II.

3.5.2 Soakaway Testing

Soakaway testing was undertaken in accordance with BRE365 within selected Trial Pits. The test involved pumping clean water into a Trial Pit and measuring the time taken for the water level to fall. Where permeability allows, the test is repeated three times.

The soakaway test results are included within Appendix IV.

3.5.3 Geophysical Survey

A Geophysical Survey was undertaken by Terradat in four zones in and around Onllwyn Washery to identify areas containing possible mining related features. A Magnetic Survey was undertaken to map distortions in the Earth's magnetic field due to the presence of buried ferrous material that may be related to mine workings. An Electromagnetic Survey was undertaken to map variations in the near surface ground conductivity and in-phase response associated with different shallow materials / structures. A Microgravity survey was undertaken

to confirm the presence of any localised areas of mass deficiency within the subsurface that may be associated with voiding or less dense in-fill material associated with the mine entry features.

The Geophysical survey report is presented in Appendix IX.

3.6 Sampling - General

Sampling of soils, rocks and waters were undertaken as instructed by the Client in accordance with the specification. Bulk, disturbed and undisturbed samples were taken where required within the superficial deposits for strata identification and laboratory testing purposes.

Geotechnical samples were returned from site to QGL's offsite controlled storage to await test scheduling/requirements. The environmental samples were transported within 24hrs to QGL's specialist chemical testing laboratory sub-contractor premises, Eurofins Chemtest Ltd to await test scheduling/requirements. Sample type depth are recorded on the corresponding exploratory hole logs found within Appendices II and III. For specific details of laboratory testing see Section 4.

3.7 Groundwater & Landgas Standpipe Installations

Thirteen boreholes were installed with either 50mm Ø HDPE or both 50mm and 19mm Ø HDPE combined land gas and groundwater monitoring standpipe to permit post-fieldwork landgas and groundwater monitoring visits.

Groundwater and landgas monitoring standpipes consist of plastic pipework set in filter aggregate (pea gravel) forming a well. The filter is sealed at one or both ends by use of bentonite grout. Parts of the pipe itself are slotted, allowing the infiltration of groundwater which can then be accessed through the pipe from ground level. Slotted sections are covered by 'geo-sock' to reduce the intrusion of silt into the standpipes and the range of depths at which the groundwater is intercepted is known as the 'response zone'.

Standpipes were installed using 1m lengths of pipework (threaded at either end) fitted together and lowered into the borehole. The boreholes were then filled with either pea gravel or bentonite (depending on which zone or level) and cemented in place at ground level with a steel flush cover. Table 5 details the installation undertaken.

Table 5: Borehole Installation Detail

Exploratory Hole ID	Installation Standpipe Internal Diameter (mm)	Installation Depth (m.bgl)	Installation Response Zone (m.bgl)
BH07	50	10.0	8.0-10.0
BH15	50	5.0	1.0-5.0
BH16	50	10.0	8.0-10.0

BH19A	50	28.2	25.2 – 28.2
BH22	50	34.0	29.0 – 34.0
BH25	50	49.2	39.2 – 49.2
BH28	50	49.2	39.2 – 49.2
BH29	50	15.0	12.0 – 15.0
BH30	50	4.0	3.0 – 4.0
BH31	50	5.0	1.0 – 5.0
	50	21.0	16.0 – 21.0
BH32	50	17.5	12.5 – 17.5
BH33	50	20.0	15.0 – 20.0
BH34	50	3.3	1.0 – 3.3
	50	13.0	11.0 – 13.0

3.8 Post-Fieldwork Monitoring

The standpipe installations were scheduled for two post-fieldwork monitoring visits with two rounds of groundwater sampling from selected boreholes to be undertaken. Each post-fieldwork monitoring visit included the measurement of the following parameters:

- O₂ (% v/v)
- CH₄ (% v/v)
- H₂S (ppm)
- CO₂ (% v/v)
- Flow Rate (l/hr)
- Atmospheric Pressure (mb)
- Groundwater Level (m.bgl/ mAOD)
- CO (% v/v)

The results of the scheduled post-fieldwork monitoring visits are undertaken to date are presented in Appendix X.

4. LABORATORY TESTING

The laboratory testing was scheduled by the Scheme Engineer and comprised a number of geotechnical and geo-environmental tests on soil, water and rock samples recovered from this ground investigation phase.

4.1 Geotechnical Laboratory Testing

Geotechnical tests undertaken on selected soil and rock samples are detailed in Table 6. All the geotechnical soil testing work was carried out in accordance with the procedures stipulated in the various sections of BS 1377:1990 "Methods of test for soils for civil engineering purposes" and to UKAS accreditation where applicable.

Table 6: Geotechnical Laboratory Tests

Test	Number of Tests
Moisture Content of Soil	23
4 Point Liquid & Plastic Limit	24
Particle Size Distribution (PSD) Wet Sieve	51
PSD: Sedimentation by Pipette	20
Undrained strength of a single 100mm diameter specimen in triaxial compression without the measurement of pore pressure	4
One-dimensional consolidation properties, test period 5days	4
Dry density/moisture content relationship using 2.5kg rammer	4
Moisture Condition Value/moisture content relationship	11
5 point compaction test using 4.5kg rammer in CBR mould	7
Loss on Ignition	5
Organic Matter	7
BRE SD1 Suite B	31
BRE SD1 Suite D	10
Point load Index (Rock)	47
Unconfined Compressive Strength (UCS – Rock)	1
LA coefficient	6
Freeze Thaw	6
Soundness by magnesium sulphate	6
Slake Durability	6

Available geotechnical laboratory test certificates are provided within Appendix VII.

4.2 Geo-Environmental Laboratory Testing

Geo-environmental testing was carried out on selected soil and water samples gained from the ground investigation as summarised in Table 7.

Table 7: Geo-Environmental Laboratory Tests

Test/ Suite	Number of Tests
Specification Suite E1 – Soils Samples General Suite	28
Specification Suite E2 – Asbestos Suite	26
Specification Suite E3 – TPH CWG Suite	21
Specification Suite E4 – PAH & BTEX Suite	28
Specification Suite E5 – VOC & SVOC	1
Specification Suite E9 – Hex Chromium	7
Specification Suite E16 – Loss on Ignition	7
Specification Suite F1 – Water Samples General Suite	9
Specification Suite F2 – TPH CWG Suite	9
Specification Suite F3 – PAH & BTEX Suite	9
Specification Suite F5 – PCB's	9
Specification Suite H – Waste Acceptance Total Solids	7
Specification Suite I – Waste Acceptance Leachability	7
Specification Suite J1 – Soil Leachability general	9
Specification Suite J2 – Soil leachability PAH	1

A full set of geo-environmental laboratory test certificates are provided within Appendix VIII.

5. REFERENCES

British Geological Survey (BGS)

- BGS online maps and lexicon database – www.bgs.co.uk
- BGS Sheet 261 'Merthyr Tydfil' Solid and Drift edition at 1:50,000 scale.

British Standards

- British Code of Practice BS 5930:2015+A1:2020 '*Code of Practice for Site Investigations*'
- British Code of Practice BS 1377:1990 '*Methods of test for soils for civil engineering purposes*'.
- British Code of Practice BS EN ISO 14688-1:2002+A2:2013 '*Geotechnical investigation and testing – Identification and classification of soil – Part 1: Identification and description*'
- British Code of Practice BS EN ISO 14688-2:2004+A2:2013 '*Geotechnical investigation and testing – Identification and classification of soil – Part 2: Principles for a classification*'
- British Code of Practice BS EN ISO 22475-1:2006 '*Geotechnical investigation and testing – Sampling methods and groundwater measurements*'

Institution of Civil Engineers (ICE)

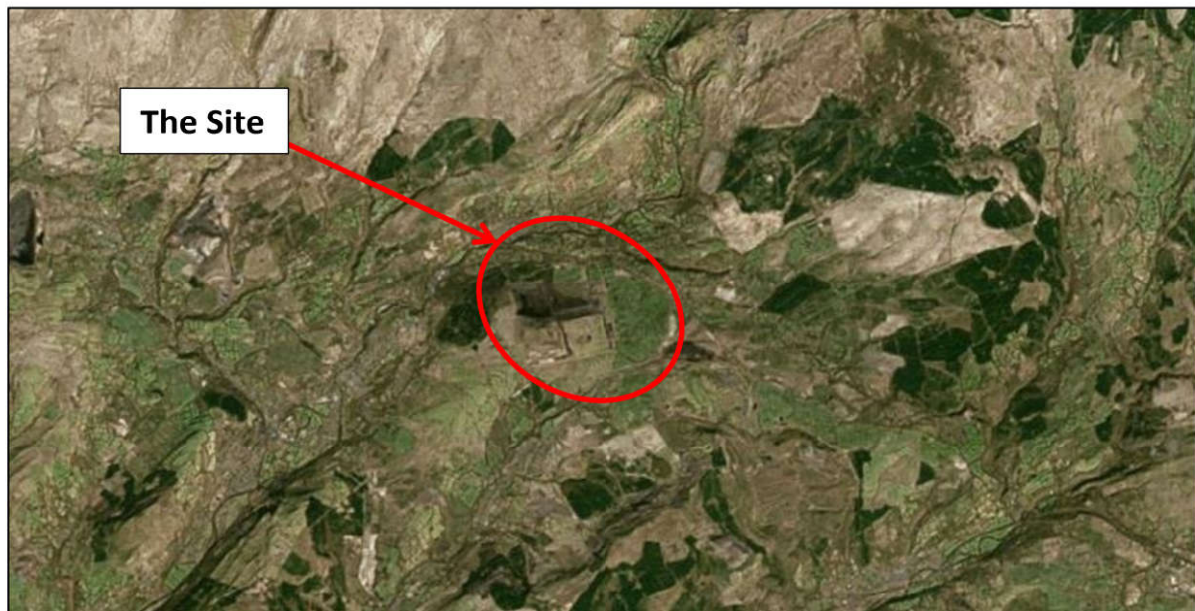
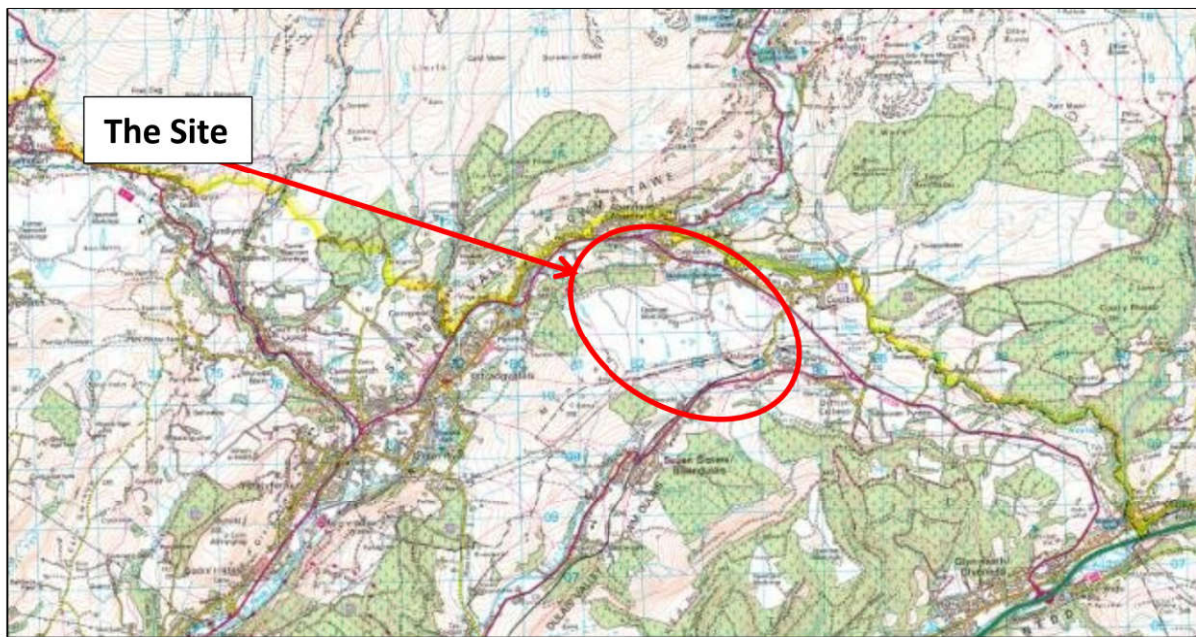
- UK Specification for Ground Investigation, Second Edition (2012)

Specialist Publications

- Health and Safety Executive Guidance Note EH40/90

APPENDIX I – SITE PLANS AND FIGURES

- **Figure 1: *Location Plan***
- **Figure 2: *Exploratory Hole Location Plan***



Source: www.bing.com/maps

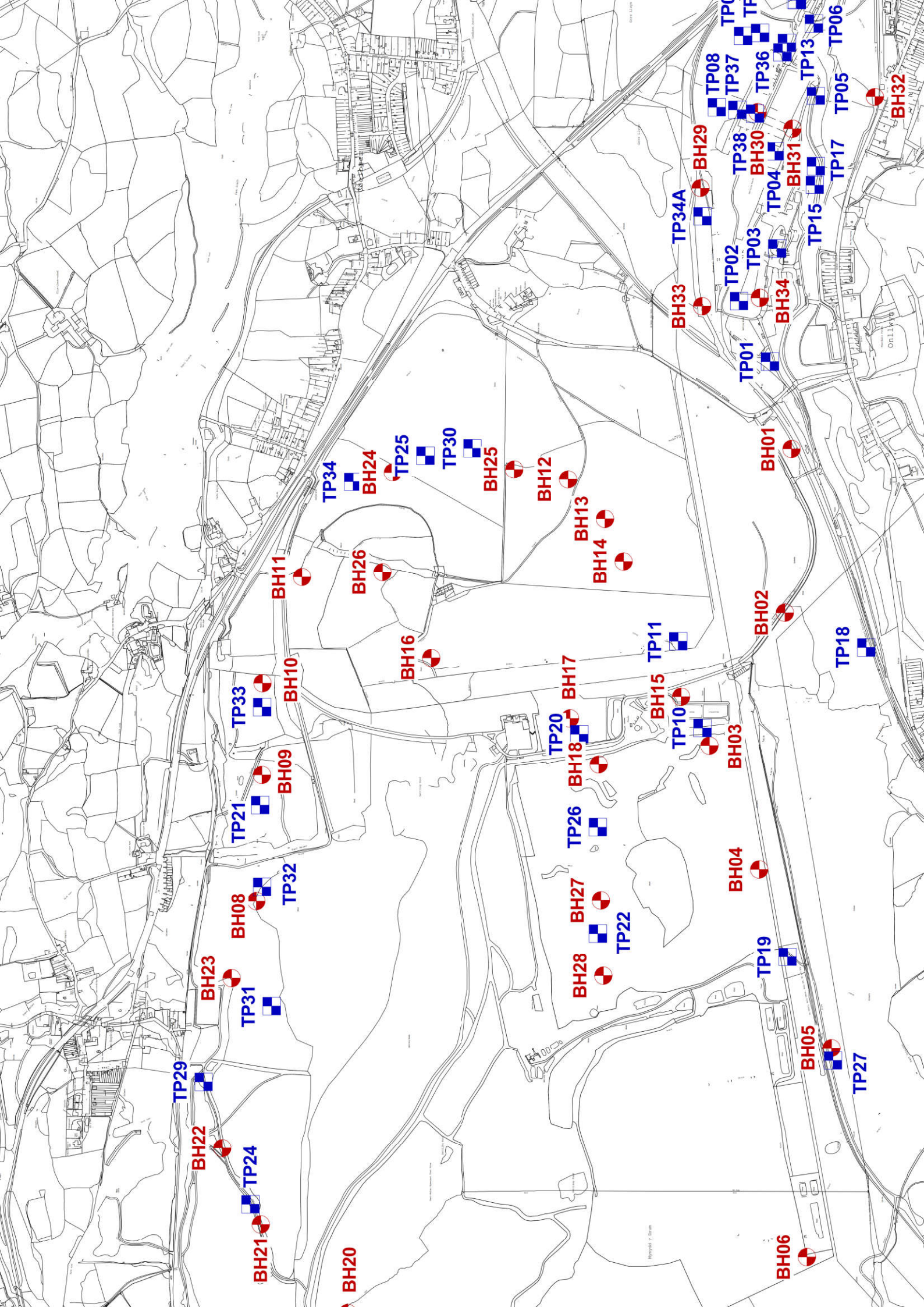


FIGURE 1

Project: Global Centre of Rail Excellence

Job No: Q0652

Drawing Title: Site Location Plan



APPENDIX II – ENGINEER’S BOREHOLE LOGS

Contract : Global Centre of Rail Excellence										Borehole No.	
Client : Global Centre of Rail Excellence										BH01	
Dates : 30/11/21 - 20/11/21					Job Number : Q0652					Ground Level : 228.29 m A.O.D. <i>Level to Ordnance Datum</i>	
Location :					Engineer : ARUP					Coordinates: 284008.75 E 210457.29 N <i>Co-ordinates to National Grid</i>	

m B.G.L.	Run Details					Fractures		Samples		Strata					Water
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Type No. Blows	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.			
0										Clay and Colliery Spoil (Drillers Description)					
1															
2															
3															
4															
5									5.00	Weathered Mudstone (Drillers Description)		223.29			
6															
7															
8									7.20	Mudstone with Sandstone Bands (Drillers Description)		221.09			
9															
10															
11															
12															
13									13.20	Weak Coal (Drillers Description)		215.09			
14															
15									14.90	Mudstone (Drillers Description)		213.39			
16															
17															
18															
19															
20															
21															
22															
23									22.50	Sandstone (Drillers Description)		205.79			
24															
25															
26															
27															
28															
29															
30															
31									30.00	Terminated at 30.0mbgl (Scheduled Depth)		198.29			
32															
33															
34															

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
				7.20	115.00	5.00 13.70	0.00 0.00	Rapid Groundwater Inflow. Rose to 0.5magl Rapid Groundwater Inflow. Rose to 0.5magl		0.00 - 30.00	Mist	100

Plant: Commachio 600
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-7.2mbgl, Rotary 'open hole' 7.2-30.0mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		QGL	P Darby	1 Of 1	35		

Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence												Borehole No. BH02	
Dates : 29/11/21 - 29/11/21 Location :						Job Number : Q0652 Engineer : ARUP				Ground Level : 238.03 m A.O.D. Level to Ordnance Datum Coordinates: 283562.15 E 210475.29 N Co-ordinates to National Grid			

m B.G.L.	Run Details					Fractures		Samples		Strata					Water
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Type No. Blows	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.			
0										Colliery Spoil (Drillers Description)					
1									(1.20)						
2									1.20	Brown Clay (Drillers Description)		236.83			
3									(0.80)	Clay and Boulders (Drillers Description)		236.03			
4									2.00						
5									(1.90)						
6									3.90	Weathered Mudstone (Drillers Description)		234.13			
7									(1.80)						
8									5.70	Mudstone (Drillers Description)		232.33			
9									(3.10)						
10									8.80	Sandstone (Drillers Description)		229.23			
11									(4.30)						
12															
13									13.10	Mudstone (Drillers Description)		224.93			
14															
15															
16															
17									(6.60)						
18															
19															
20									19.70	Cavity (Drillers Description)		218.33			
21									(0.70)	Hard Drill - Loss of Returns (Drillers Description)		217.63			
22									20.40						
23															
24															
25															
26									(9.60)						
27															
28															
29															
30															
31									30.00	Terminated at 30.0mbgl (Scheduled Depth)		208.03			
32															
33															
34															

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
				4.20	115.00					0.00 - 19.70	Mist	100
										19.70 - 30.00	Mist	0

Plant: Commachio 600
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. No Groundwater Encountered. ODEX GL-4.2mbgl, Rotary 'open hole' 4.2-30.0mbgl

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		QGL	P Darby	1 Of 1	35		

Core Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
							MADE GROUND - Grey clayey slightly sandy GRAVEL. Gravel is fine to coarse angular mudstone.							
		1.20 - 2.70	D1	1.2	SPT (C) 50/60mm (25/10mm-75/50mm----	(1.20)								
		2.70 - 3.70	D2	2.7	SPT (C) 50/90mm (12-13/5mm-41-915mm--)	1.20	Colliery Spoil (Drillers Description) Arisings are grey clayey Gravel. Gravel is fine to medium angular mudstone		257.10					
		4.20 - 5.70	D3	4.2	SPT (C) 50/30mm (25/5mm-75/25mm----		 between 3.7 and 4.2mbgl mudstone boulder							
		5.70 - 7.20	D4	5.7	SPT (C) 50/65mm (25/10mm-75/55mm----									
		7.20 - 8.70	D5	7.2	SPT (C) 75/120mm (12-13/6mm-39-36/45mm--)									
		8.70 - 10.20	D6	8.7	SPT (C) 50/110mm (25/45mm-75/65mm----									
		10.20 - 11.70	D7	10.2	SPT (C) 75/190mm (10-15/60mm-25-30-20/40mm--)									
			Casing			Groundwater		Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug Groundwater Encountered. ODEX GL-22.2mbgl, Rotary coring 22.2-32.7mbgl			
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				
							0.00 - 13.20	Mist	100					

Borehole Details			Samples		Insitu Tests		Strata				Discontinuities												
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des									
		11.70 - 13.20	D8	11.7	SPT (C) 66 (10-10-15-15-21)	(20.60)																	
		13.20 - 14.70	D9	13.2	SPT (C) 92/285mm (5-3-7-14-31-40/60mm)																		
		14.70 - 16.20	D10	14.7	SPT (C) 92/260mm (6-2-8-13-30-41/35mm)																		
		16.20 - 17.70	D11	16.2	SPT (C) 50/80mm (25/50mm-75/30mm----																		
		17.70 - 19.20	D12	17.7	SPT (C) 75/155mm (18-7/0mm-27-31-17/5mm--)																		
		19.20 - 20.70	D13	19.2	SPT (C) 50/115mm (25/50mm-75/65mm----																		
		20.70 - 21.80	D14	20.7	SPT (C) 75/80mm (21-4/0mm-61-14/5mm--)																		
															21.80	Mudstone (Drillers Description)							236.50
							Flush				Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug Groundwater Encountered. ODEX GL-22.2mbgl, Rotary coring 22.2-32.7mbgl												
Water			Casing		Groundwater		Sealed	Behaviour															
			Depth	Diam.	Struck	Rose To		Depth	Type	Returns	Colour												

Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH03

Dates : 18/11/21 - 22/11/21

Job Number : Q0652

Ground Level : 258.30 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283200.00 E
210681.00 N
Co-ordinates to National Grid



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QGL

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1 Of 2

m Per
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2

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otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH03

Dates : 18/11/21 - 22/11/21

Job Number : Q0652

Ground Level : 258.30 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283200.00E
210681.00 N
Co-ordinates to National Grid



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2

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metres unless
otherwise stated



Borehole Details			Samples		Insitu Tests		Strata			Discontinuities					
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des	
		0.00 - 0.50	B1	1.2	SPT (C) 75/110mm (18-70mm-25-50/35mm--)	(0.50)	MADE GROUND - Brown slightly gravelly organic SILT.								
		0.00 - 1.60	D1			0.50	MADE GROUND - Soft to firm grey gravelly CLAY. Gravel is fine to coarse angular mudstone.		257.19						
		0.50 - 1.00	B2			(1.10)									
		1.60 - 2.00	D2			1.60 (0.40)	Dark brown PEAT		256.09						
		2.00 - 2.70	D3			2.00	Firm light brown slightly gravelly CLAY. Gravel is fine to coarse angular mudstone.		255.69						
150		2.70 - 3.10	SPTLS1 D4	2.7	SPT (S) 95/260mm (2-3-3-4-5-83/35mm)	(1.10)									
		3.10 - 3.90	D5			3.10 (0.80)	Clay & Boulders (Drillers Description)		254.59						
		3.90 - 4.20	D6			3.90	Light grey slightly clayey slightly silty slightly sandy GRAVEL. Gravel is fine to coarse angular to sub-angular mudstone. (COMPLETELY WEATHERED SOUTH WALES COAL MEASURES)		253.79						
		4.20 - 5.20	B3			(1.30)									
		5.20	C9			5.20	Weak grey SILTSTONE with two discontinuity sets. (SOUTH WALES COAL MEASURES)		252.49	5.70					
50	NI	5.70	C1	4.2	SPT (C) 75/80mm (20-50mm-55-20/5mm--)									Sub-horizontal to 10 degree discontinuity sets. Spaced, smooth planar, tight to partly open surface staining and highly weathered to silty. Sub-vertical to 70 degree undulating tight to partly open clean / fresh staining and silt surface coating..	
		7.20	C2			(3.50)	 Between 7.2 and 7.4mbgl non-intact, recovered as fine to coarse angular Gravel								
100	25	8.70	C3			8.70	Weak grey MUDSTONE with two discontinuity sets. (SOUTH WALES COAL MEASURES)		248.99					Between 8.7 and 11.7mbgl sub-horizontal extremely closely spaced.	
		10.20	C4												
	NI														
			Casing		Groundwater			Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug. Groundwater Encountered. ODEX GL-4.2mbgl, Rotary coring 4.2-17.8mbgl, Rotary 'open hole' 17.8-30.0mbgl.				
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour					
	5.70	115.00					0.00 - 30.00	Mist							

Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
	NI						 Between 11.7 and 14.7mbgl non-intact, recovered as fine to coarse angular Gravel and angular Cobbles			11.70				
	NI	13.20	C5			(8.30)								
	NI	14.70	C6				 Between 14.7 and 15.0mbgl completely weathered to a clayey sandy fine to coarse angular Gravel							
	NI	16.20	C7				 Between 16.2 and 17.1mbgl non-intact, recovered as coarse angular Gravel							
230	4	17.45 - 17.70	C8			17.00 (0.15) 17.15 (0.55) 17.70	Weak black COAL. Highly weathered to fine to medium angular Gravel. (SOUTH WALES COAL MEASURES) Between 17.1 and 17.3mbgl completely weathered to soft to firm gravelly Clay Medium strong MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES) Mudstone (Drillers Description)		240.69 240.54 239.99					
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug. Groundwater Encountered. ODEX GL-4.2mbgl, Rotary coring 4.2-17.8mbgl, Rotary 'open hole' 17.8-30.0mbgl.														

[illegible]

Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH04

Dates : 22/11/21 - 23/11/21

Job Number : Q0652

Ground Level : 257.69 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 282861.72E
210545.42 N
Co-ordinates to National Grid



Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:
QGL

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P Darby

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2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH04

Dates : 22/11/21 - 23/11/21

Job Number : Q0652

Ground Level : 257.69 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 282861.72E
210545.42 N
Co-ordinates to Nation Grid



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metres unless
otherwise stated



[illegible]

Sample Details			Samples		Insitu Tests		Strata				Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description	
300	4	11.60 - 11.85	C1			11.00	Medium strong to strong grey thinly to thickly interlaminated MUDSTONE and SANDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)		228.39	11.00				Sub-horizontal to 15 degree discontinuity set, rough planar, partly open to open, clean / fine / medium spaced, angular coarse gravel infill. At 11.3mbgl sub-angular coarse gravel infill.	
		12.20 - 12.60	C2			(2.20)				2.20					
380	8						Medium strong grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)		226.19	13.20				Sub-horizontal to 15 degree discontinuity set, rough planar, partly open to open, clean / fine / medium spaced, angular coarse gravel infill. Below 16.0mbgl sub-horizontal discontinuity set, rough planar, partly open to open, clean / fine / medium spaced and locally with silt surface coating.	
		13.85 - 14.00	C3												
260	8	15.90 - 16.00	C4				 between 15.2 and 15.3mbgl highly weathered to sandy fine to coarse angular Gravel			6.90					Below 16.0mbgl sub-horizontal discontinuity set, rough planar, partly open to open, clean / fine / medium spaced and locally with silt surface coating.
280	10	17.20 - 17.35	C5			(6.90)								At 17.67mbgl sub-horizontal discontinuity set, rough planar, partly open to open, clean / fine / medium spaced, angular gravel up to 60mm penetration. Between 17.8 and 17.9mbgl sub-vertical discontinuity set, rough planar, partly open to open, clean / fine / medium spaced and locally with silt surface coating.	
160	12	18.65 - 18.75	C6				Weak to medium strong black COAL with one discontinuity set. (SOUTH WALES COAL MEASURES) between 20.5 and 20.67mbgl highly weathered to fine to coarse angular Gravel		219.29	20.10				Sub-horizontal discontinuity set extremely rough planar, partly open, locally highly weathered, angular gravel upto 10mm penetration.	
100	27	19.90	C7			20.10 (0.60)	Strong grey SILTSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)		218.69	20.70				Sub-horizontal to 15 degree discontinuity set, medium spaced, rough planar to undulating locally with silt surface coating. Between 20.9 and 21.2mbgl and 21.6 and 21.8mbgl sub-horizontal discontinuity set, rough planar, undulating, partly open to open, clean / fine / medium spaced, angular coarse gravel infill.	
						20.70									
140	10	21.40 - 21.70	C8												
Remarks:			BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug.												
ODEX GL-7.2mbgl, Rotary coring 7.2-30.7mbgl															
Casing			Groundwater			Flush									
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour					
1.20															

[illegible]

Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH05

Dates : 1/12/21 - 3/12/21

Job Number : Q0652

Ground Level : 239.39 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 282375.78E
210348.29 N
Co-ordinates to National Grid



Plas Newydd
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email: enquiries@quantumgeotechnic.co.uk

Operator:
QGL

Logged By:
P Darby

Sheet No.
1 Of 4

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH05

Dates : 1/12/21 - 3/12/21

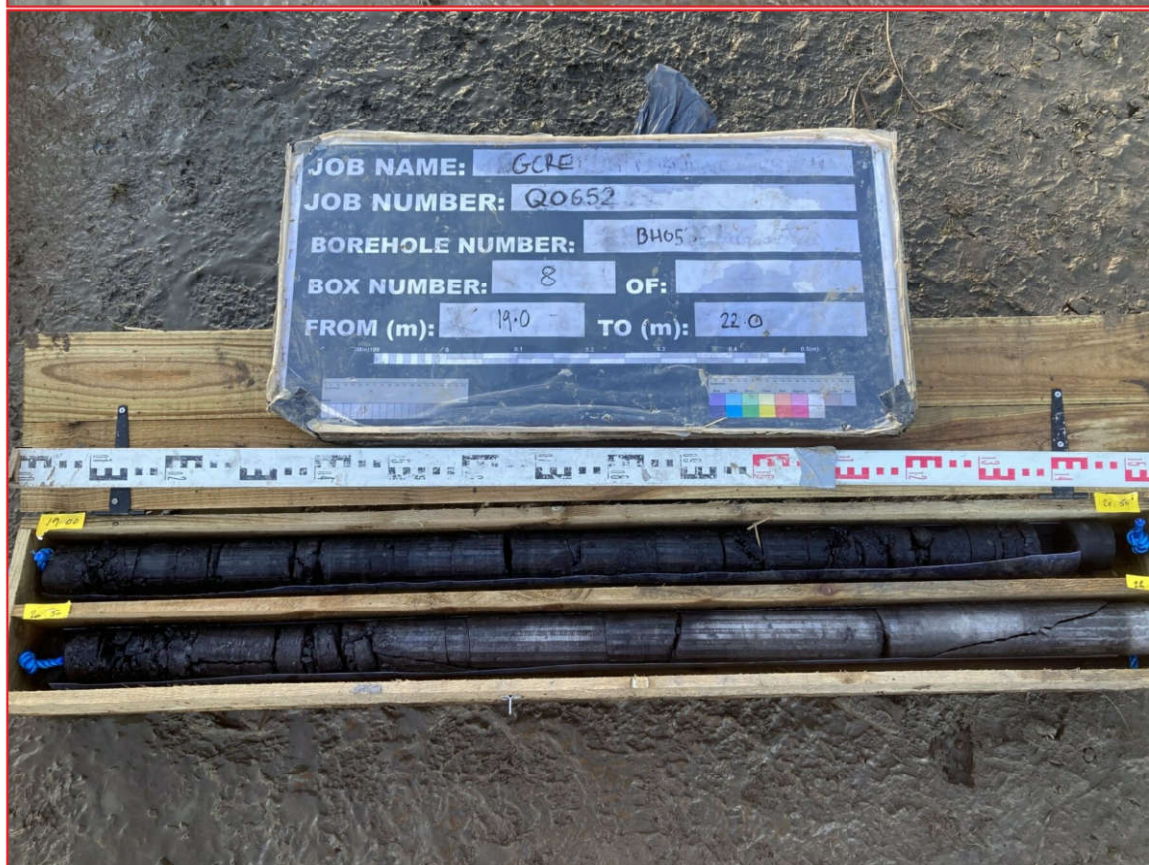
Job Number : Q0652

Ground Level : 239.39 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 282375.78E
210348.29 N
Co-ordinates to National
Grid



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Sheet No.
2 Of 4

m Per
Page
2

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metres unless
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH05

Dates : 1/12/21 - 3/12/21

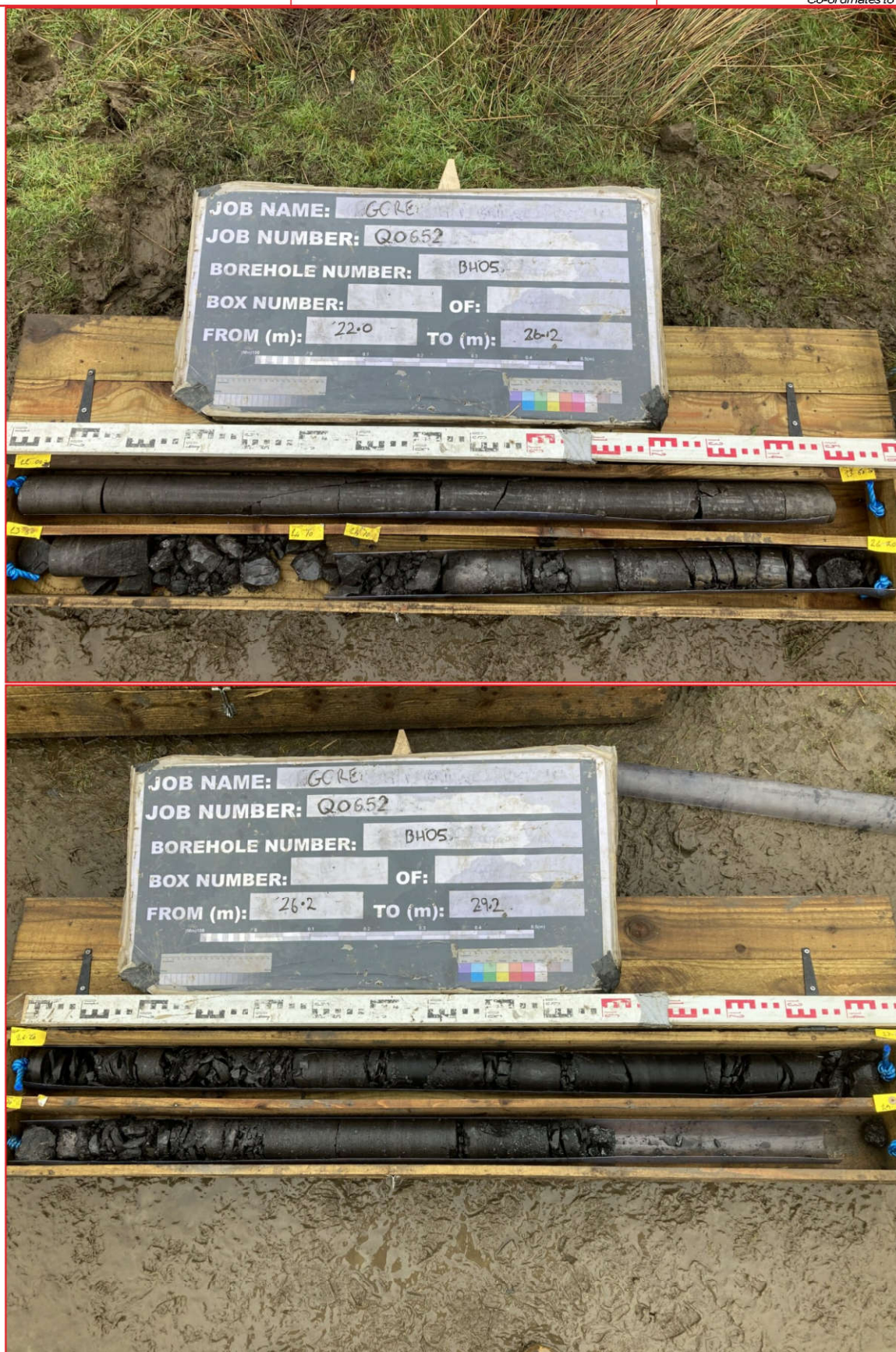
Job Number : Q0652

Ground Level : 239.39 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 282375.78E
210348.29 N
Co-ordinates to National Grid



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Sheet No.
3 Of 4

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH05

Dates : 1/12/21 - 3/12/21

Job Number : Q0652

Ground Level : 239.39 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 282375.78E
210348.29 N
Co-ordinates to National Grid



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QGL

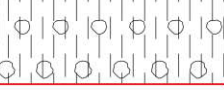
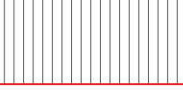
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Sheet No.
4 Of 4

m Per Page
2

All measurements in
metres unless
otherwise stated



Core Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
		1.20 - 2.70	D1	1.2	SPT (S) 23 (3-3-4-5-7)	(2.00)	Clay and Cobbles (Drillers Description) sample between 1.2 and 2.7mbgl CLAY							
				2.7	SPT (S) 50/189mm (5-10-15-20-39mm-)	2.00	Weathered Mudstone (Drillers Description)		261.08					
	NI	4.00	C8	3.7	SPT (S) 50/167mm (5-7-12-17-21-17mm-)	3.70	Medium strong grey MUDSTONE with two discontinuity sets. (SOUTH WALES COAL MEASURES) Between 3.7 and 4.3mbgl completely weathered to fine to coarse angular Gravel		259.38	3.70				Sub-horizontal to 10 degree discontinuity s smooth to rough planar locally planar to un locally with silt surface coating sub-vertical planar to undulating, partly open, clean / fr to fine angular gravel up to 10mm penetrat
100	7	4.70 - 4.78	C1											
140	20	6.00 - 6.05	C2											Between 6.05 and 6.8mbgl sub-vertical dis
120	11													
		7.70 - 7.80	C3											
120	12													Between 8.2 and 8.35mbgl sub-vertical to drilling induced.
		8.75 - 8.90	C4							10.20				
130	25													Between 9.65 and 9.97mbgl sub-vertical d 9.97mbgl sub-horizontal discontinuities ext
130	10	10.25 - 10.40	C5			(10.20)								Between 10.67 and 10.9mbgl sub-vertical
			Casing		Groundwater		Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug Groundwater Strike Observed. ODEX GL-2.7mbgl, Rotary coring 2.7-13.9mbgl, Rotary 'open hole' 13.9-				
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				
5.75	3.70	115.00					0.00 - 30.00	Mist	100					

Core Details			Samples		Insitu Tests		Strata			Discontinuities					
Max	FI		Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
130	17		11.35 - 11.50	C6				 between 12.4 and 12.7mbgl weak dark grey to black carbonaceous MUDSTONE with thin coal bands Below 12.7mbgl weak to medium strong grey and light grey thinly laminated MUDSTONE							Between 12.1 and 12.4mbgl sub-vertical d Below 12.4mbgl sub-horizontal discontinuity locally completely weathered to fine angular to weak upto 50mm penetration.
130	17														
40	10		13.20 - 13.40	C7											
160	13														
							13.90	Mudstone (Drillers Description)		249.18					
							(13.10)								
			Casing				Groundwater			Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug Groundwater Strike Observed. ODEX GL-2.7mbgl, Rotary coring 2.7-13.9mbgl, Rotary 'open hole' 13.9-		
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour					

[illegible]

Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH06

Dates : 24/11/21 - 26/11/21

Job Number : Q0652

Ground Level : 263.08 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 281804.05E
210415.34 N
Co-ordinates to National Grid



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Operator:
QGL

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P Darby

Sheet No.
1 Of 2

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH06

Dates : 24/11/21 - 26/11/21

Job Number : Q0652

Ground Level : 263.08 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 281804.05E
210415.34 N
Co-ordinates to National Grid



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QGL

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2 Of 2

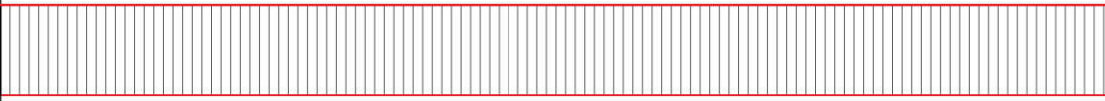
m Per
Page
2

All measurements in
metres unless
otherwise stated



Core Details			Samples		Insitu Tests		Strata			Discontinuities											
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description							
50	13	4.40	C1	1.2	SPT (S) 6 (2-1-2-1-1-2)	(0.30)	MADE GROUND - Grey clayey GRAVEL. Gravel is fine to coarse angular mudstone. Soft grey and light brown slightly gravelly CLAY. Gravel is fine to coarse sub-rounded to angular mudstone. (Description from SPT sample).		270.98												
						0.30															
						(1.70)															
						(2.20)															
110	NI 6	5.90	C2	4.2	SPT (S) 45/97mm (3-22-6-39/22mm-)	4.20	Weak to medium strong grey SILTSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)		267.08	4.20				Sub-horizontal to 10 degree discontinuity set close to closely spaced, rough planar, partly with brown silt coating and highly weathered angular gravel up to 20mm penetration.							
						(1.50)				1.50											
						5.70		Medium strong dark grey MUDSTONE with one discontinuity set (SOUTH WALES COAL MEASURES) Between 5.7 and 5.95mbgl highly to completely weathered to fine to coarse angular Gravel		265.58	5.70				Sub-horizontal to 10 degree discontinuity set close to closely spaced, smooth to rough planar, generally clean / fresh locally with yellowish coating..						
130	16	7.40	C3											Between 7.35 and 8.2mbgl sub-vertical to smooth planar, partly open, with yellowish coating.							
150	18	8.90	C4											Between 8.8 and 8.95mbgl sub-vertical to undulating to stepped, tight, clean / fresh. Between 9.23 and 9.95mbgl sub-vertical to discontinuity smooth planar, partly open, local surface staining and yellowish brown clay. At 9.4mbgl sub-horizontal discontinuity highly angular gravel up to 50mm penetration. Between 9.75 and 10.1mbgl sub-vertical to discontinuity smooth planar, tight to partly open.							
120	15						 between 10.2 and 10.6mbgl thinly to thickly laminated with strong light grey Sandstone laminae.														
Remarks:			Casing		Groundwater		Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-4.2mbgl, Rotary coring 4.2-16.2mbgl, Rotary 'open hole' 16.2-35.0mbgl											
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour											
	7.20	115.00																			

[illegible]

Borehole Details		Samples		Insitu Tests		Strata		Discontinuities									
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description			
						22.00	Coal (Drillers Description)		249.28								
						(1.50)											
						23.50	Mudstone with Sandstone bands (Drillers Description)		247.78								
						(11.50)											
Casing				Groundwater			Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-4.2mbgl, Rotary coring 4.2-16.2mbgl, Rotary 'open hole' 16.2-35.0mbgl							
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour							
			28.00	21.00	Fast groundwater inflow												

[illegible]

Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH07

Dates : 29/11/21 - 30/11/21

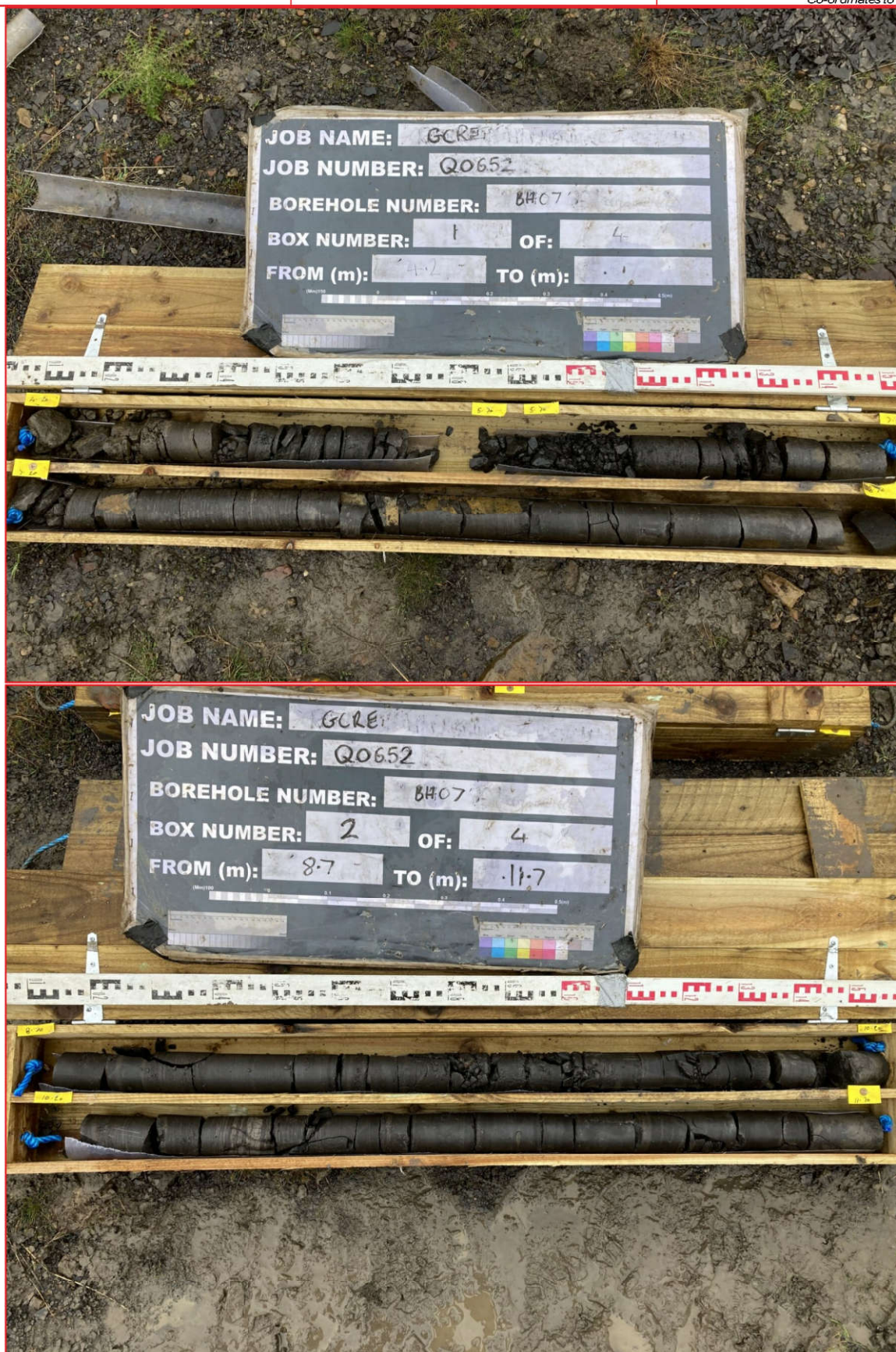
Job Number : Q0652

Ground Level : 271.28 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 281544.88E
210721.08 N
Co-ordinates to National Grid



Plas Newydd
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Operator:
QGL

Logged By:
P Darby

Sheet No.
1 Of 2

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH07

Dates : 29/11/21 - 30/11/21

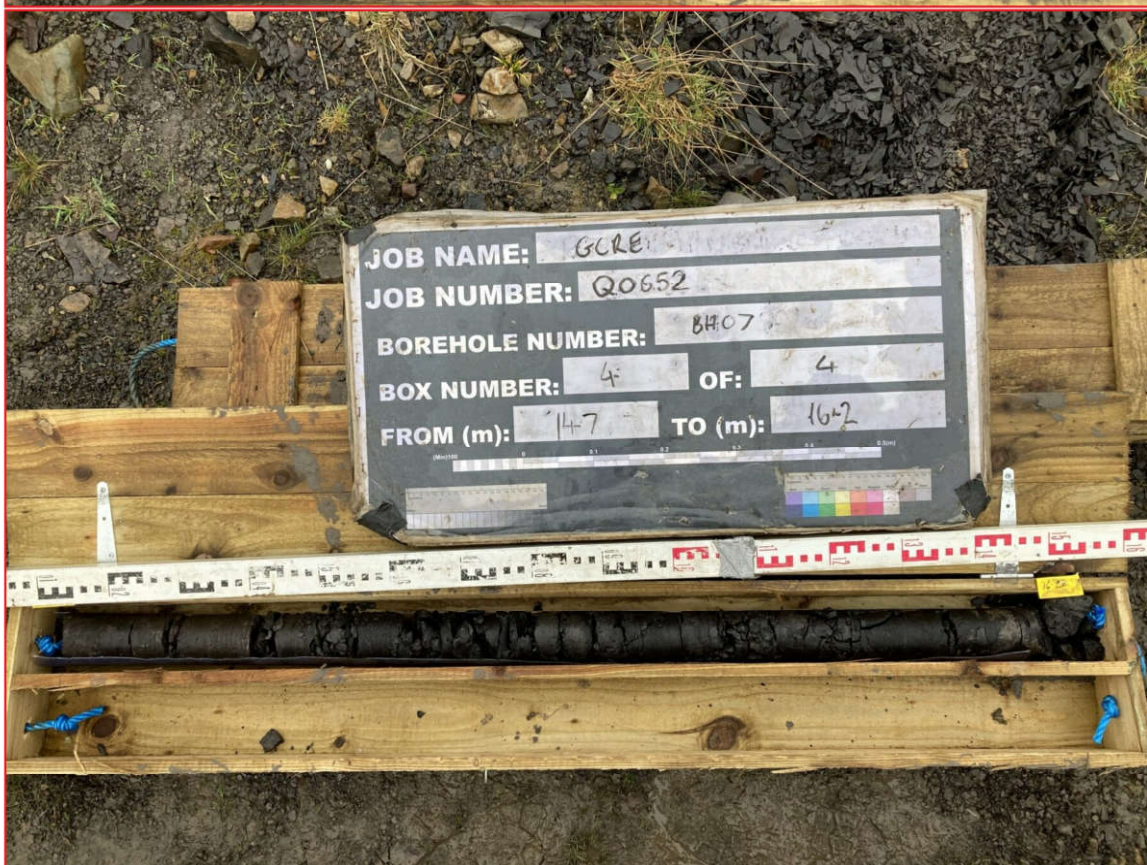
Job Number : Q0652

Ground Level : 271.28 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 281544.88E
210721.08 N
Co-ordinates to NationalGrid



Plas Newydd
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P Darby

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2 Of 2

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence											Borehole No. BH08		
Dates : 7/12/21 - 8/12/21 Location :					Job Number : Q0652 Engineer : ARUP					Ground Level : 236.31 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 282776.08 E 211918.35 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Run Details					Fractures		Samples		Strata					Water
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Type No. Blows	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.			
0															
1										Colliery Spoil (Drillers Description)					
2															
3															
4															
5															
6															
7									(12.00)						
8															
9															
10															
11															
12									12.00	Clay (Drillers Description)		224.31			
13									(1.50)						
14									13.50	Clay with quartz cobbles (Drillers Description)			222.81		
15															
16															
17									(6.50)						
18															
19															
20									20.00	Black silty Clay (Drillers Description)		216.31			
21									(2.00)						
22									22.00	Mudstone with Sandstone bands (Drillers Description)		214.31			
23															
24															
25															
26															
27															
28															
29															
30															
31															
32									(20.00)						
33															
34															
35															
36															
37															
38															
39															
40															
41															
42									42.00	Terminated at 42.0mgl (Investigation SUPervisors Instruction)		194.31			
43															
44															

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
08/12/2021 16:00	42.00	20.50	23.00	20.50	115.00	9.00	8.75	Seepage between 9.0 and 13.5mbgl	13.50	0.00 - 42.00	Mist	100

Plant: Commachio 600
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-20.5mbgl, Rotary 'open hole' 20.5-42.0mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: QGL	Logged By: P Darby	Sheet No. 1 Of 1	m Per Page 45	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence										Borehole No. BH09	
Client : Global Centre of Rail Excellence											
Dates : 9/12/21 - 9/12/21					Job Number : Q0652					Ground Level : 230.86 m A.O.D. <i>Level to Ordnance Datum</i>	
Location :					Engineer : ARUP					Coordinates: 283119.53 E 211903.09 N <i>Co-ordinates to National Grid</i>	

m B.G.L.	Run Details					Fractures		Samples		Strata					Water
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Type No. Blows	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.			
0										(0.50)	Topsoil (Drillers Description)		230.36	↓	
1										0.50	Clay and Boulders (Drillers Description) - Probable / Possible Made Ground				
2															
3										(4.40)					
4															
5										4.90	Colliery Spoil (Drillers Description)		225.96		
6										(0.80)	Mudstone and Siltstone (Drillers Description)		225.16		
7										5.70					
8															
9															
10															
11															
12															
13															
14										(15.70)					
15															
16															
17															
18															
19															
20															
21															
22										21.40	Coal and Mudstone (Drillers Description)		209.46		
23										(1.70)					
24										23.10	Siltstone (Drillers Description)	x x x x	207.76		
25											x x x x				
26											x x x x				
27											x x x x				
28											x x x x				
29										(6.90)		x x x x			
30											x x x x				
31										30.00	Terminated at 30.0mbgl (Scheduled Depth)		200.86		
32															
33															
34															
35															
36															
37															
38															
39															

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
				7.50	115.00	4.70		Fast groundwater inflow at 4.7mbgl		0.00 - 30.00	Mist	100

Plant: Commachio 600
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-7.2mbgl, Rotary 'open hole' 7.2-30.0mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		QGL	P Darby	1 Of 1	40		

Contract : Global Centre of Rail Excellence										Borehole No.		
Client : Global Centre of Rail Excellence										BH10		
Dates : 13/12/21 - 13/12/21					Job Number : Q0652					Ground Level : 236.95 m A.O.D. Level to Ordnance Datum		
Location :					Engineer : ARUP					Coordinates: 283369.50 E 211901.56 N Co-ordinates to National Grid		

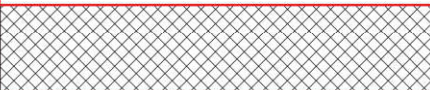
m B.G.L.	Run Details				Fractures		Samples		Strata					Water
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Type No. Blows	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.		
0									(0.70)	Topsoil (Drillers Description)		236.25		
1									0.70	Mudstone (Drillers Description)				
2														
3														
4														
5														
6														
7														
8														
9														
10														
11									(19.30)					
12														
13														
14														
15														
16														
17														
18														
19														
20									20.00	Mudstone with Sandstone Bands		216.95		
21									(4.00)					
22														
23														
24									24.00	Coal (Drillers Description)		212.95		
25									(1.20)					
26									25.20	Sandstone (Drillers Description)		211.75		
27														
28									(4.80)					
29														
30									30.00	Terminated at 30.0mbgl (Scheduled Depth)		206.95		
31														
32														
33														
34														
35														
36														
37														
38														
39														

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
13/12/2021 14:30	30.00	9.25	9.25	7.50	115.00	7.75	4.20					

Plant: Commachio 600
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-7.2mbgl, Rotary 'open hole' 7.2-30.0mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		QGL	P Darby	1 Of 1	40		

Form Name: ROTARY. Version 2.11.000, 22/05/15 Output By: Phil Darby. Library File: C:\USERS\PHIL DARBY\ONEDRIVE - QUANTUM GEOTECHNIC LTD\QUANTUM 4.GLB.

Core Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
					SPT (C) 50/35mm (25/15mm-50/35mm---)	1.2	Grass over brown grey Sandstone boulders with clay bands (Drillers Description)							
14	26			2.7	SPT (C) 50/140mm (11'-6/50mm-31-19/65mm---)	(5.40)			253.39					
13	23			4.2	SPT (C) 50/60mm (10-15/45mm-50/60mm---)				253.09	5.70			1	Bedding fracture set, undulating smooth, m open.
10	23			(4.95)						4.95				
	10					10.65 (0.55)	Weak black COAL (SOUTH WALES COAL MEASURES)		248.14					
15	14			11.20		11.20	Strong grey SILTSTONE (SOUTH WALES COAL MEASURES)		247.59	11.20			2	
20		7		(5.00)		(5.00)				5.00				
	NI													
18	15													
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug														
Water	Depth	Diam.	Struck	Rose To	Groundwater			Flush						
					Behaviour	Sealed	Depth	Type	Returns	Colour				
	5.70	115.00	14.70	11.90	Medium ground water strike at 14.70mbgl		0.00 - 30.00	Air Mist	100	Grey brown				

Core Details			Samples		Insitu Tests		Strata				Discontinuities			
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
	NL 3					16.20	Grey MUDSTONE with Sandstone bands (Drillers Description)	x x x x x	242.59					
						(13.80)								
						30.00			228.79					
							Terminated at 30.00mbgl (Scheduled Depth)							
Casing			Groundwater			Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-5.7mbgl, Rotary coring 5.7-16.2mbgl, Rotary 'open hole' 16.2-30.0mbgl					
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				

Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH11

Dates : 16/12/21 - 17/12/21

Job Number : Q0652

Ground Level : 258.79 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 283659.50E
211793.72 N
Co-ordinates to National Grid



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Sheet No.
1 Of 2

m Per
Page
2

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH11

Dates: 16/12/21 - 17/12/21

Job Number : Q0652

Ground Level : 258.79 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 283659.50E
211793.72 N
Co-ordinates to National Grid



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Sheet No.
2 Of 2

m Per
Page
2

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Borehole Details			Samples		Insitu Tests		Strata				Discontinuities			
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
							Topsoil (Drillers Description)							
						(0.50)								
						0.50	Brown Clay (Drillers Description)		257.71					
						(0.70)								
		1.20	SPTLS1	1.2	SPT (S) 42 (4-7-12-10-10)	1.20	Weathered Mudstone (Drillers Description) - SPT sample Firm dark grey Clay		257.01					
						(1.50)								
						2.70	Weak to medium strong grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)		255.51	2.70				10 to 30 degree discontinuity set (bedding) - smooth and rough planar, partly open to open, orange surface staining. locally with clayey angular infill..
70	14			2.7	SPT (S) 50/41mm (10-15/12mm-50/41mm---)									
						(3.00)	 between 4.2 and 5.7mbgl locally highly to completely weathered to fine to coarse angular Gravel							
	NI	4.30	C2											
						5.70	Actual Zone of Core Loss no recovery between 5.7 and 6.7mbgl. SPT sample grey gravelly Clay. Gravel is fine angular weak Mudstone		252.51	6.30				
		5.70	SPTLS3	5.7	SPT (S) 50/58mm (25/29mm-50/29mm----)	5.70								
						(1.00)								
	NI					6.70	Weak to medium strong grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES) between 6.7 and 7.35mbgl highly weathered to medium to coarse sub-angular to angular Gravel and Cobbles		251.51					Below 7.35mbgl discontinuities closely spaced
150	7	7.45 - 7.54	C3			(1.20)	 below 7.35mbgl thinly laminated							
						7.90	Actual Zone of Core Loss		250.31					
						(0.30)								
	NI					8.20	Weak to medium strong grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES) .		250.01					Between 8.2 and 8.52mbgl discontinuities - sub-vertical discontinuity smooth planar to
						(0.80)								
280	12	9.20 - 9.45	C4			9.00	Medium strong to strong light grey SILTSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)		249.21	9.00				Sub-horizontal to 15 degree discontinuity smooth to rough planar, partly open to open
						(3.70)								Between 10.5 and 10.7mbgl sub-vertical discontinuity clean.
	230	10.14 - 10.37	C5							3.70				
Remarks:			BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug. Groundwater Strike Observed. ODEX GL-2.7mbgl, Rotary coring 2.7-12.7mbgl, Rotary 'open hole' 12.7-12.7mbgl.											
Casing			Groundwater			Flush			Discontinuity Des					
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				
	5.70	115.00					0.00 - 30.00	Mist	100					

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Client : Global Centre of Rail Excellence

Borehole No.

BH12

Dates : 14/12/21 - 15/12/21

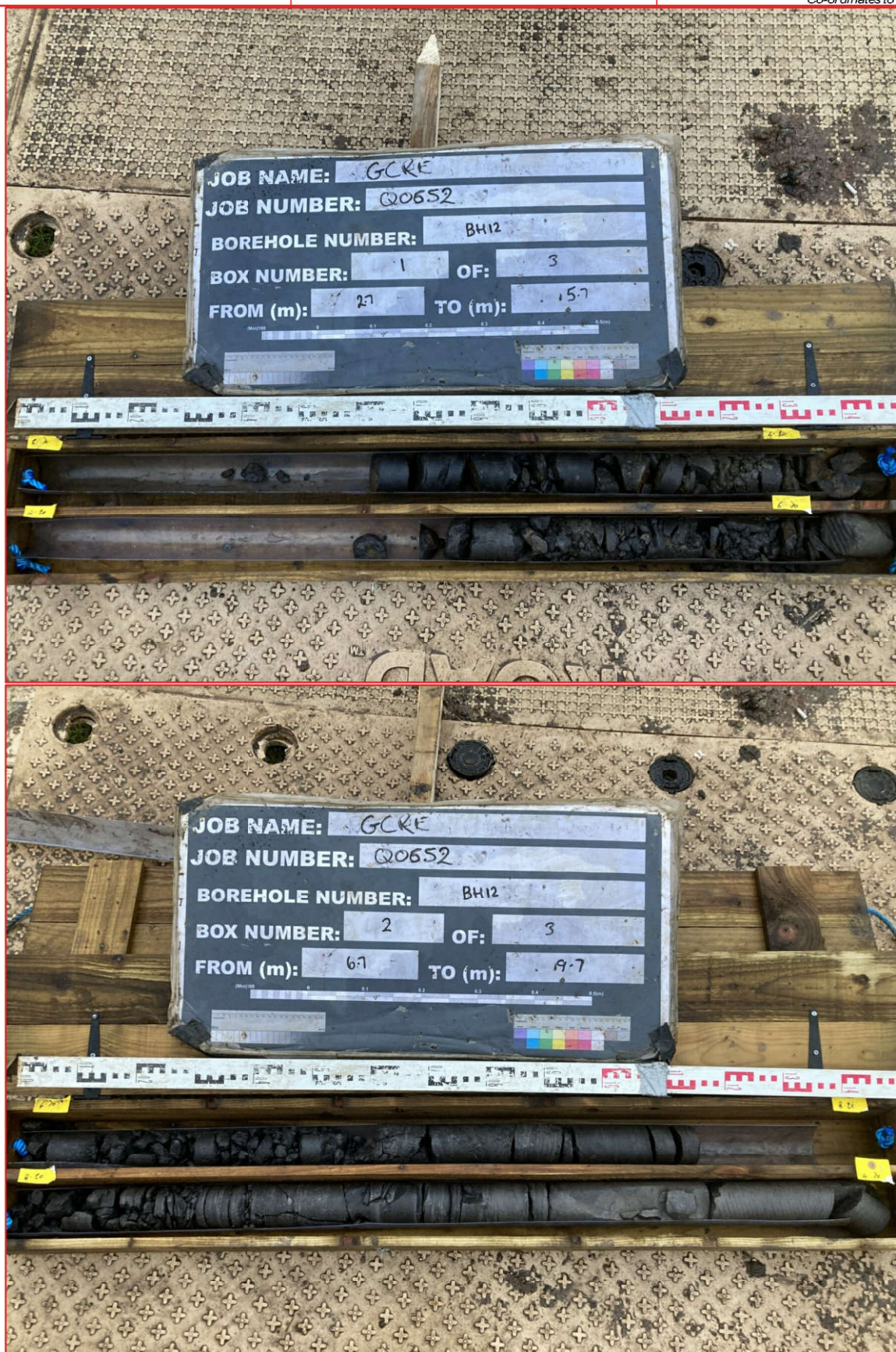
Job Number : Q0652

Ground Level : 258.21 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283925.43E
211066.30 N
Co-ordinates to National Grid



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Sheet No.
1 Of 2

m Per
Page
2

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH12

Dates : 14/12/21 - 15/12/21

Job Number : Q0652

Ground Level : 258.21 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283925.43E
211066.30 N
Co-ordinates to National Grid



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2 Of 2

m Per Page
2

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Borehole Details			Samples		Insitu Tests		Strata				Discontinuities			
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
		1.20	SPTLS1	1.2	SPT (S) 16 (2-2-4-4-4)	(0.50)	Topsoil (Drillers Description)							
						0.50	MADE GROUND - Mudstone Fill (Drillers Description)		258.84					
						(0.50)								
						1.00	Clay (Drillers Description). SPT sample firm brown and grey slightly gravelly silty CLAY. Gravel is fine to medium sub-rounded mudstone		258.34					
						(1.70)								
		2.70 - 4.20 2.70	D1 SPTLS2	2.7	SPT (S) 5 (4-2-2-1-1-1)	2.70	Cobbles, Boulders and Clay (Drillers Description)		256.64					
						(2.50)								
80	NI	8.20 - 8.29	C1	5.7	SPT (C) 50/18mm (17-8/14mm-50/18mm--)	5.20	Weathered Mudstone (Drillers Description)		254.14					
						(0.50)								
						5.70	Fractured Mudstone (Drillers Description)		253.64					
						(1.00)								
	NI	8.20 - 8.29	C1			6.70	Weak to medium strong grey MUDSTONE with two discontinuity sets. (SOUTH WALES COAL MEASURES)		252.64	6.70				Sub-horizontal to 10 degree discontinuity spaced, rough planar, partly open, locally v weathered to medium gravel up to 20mm p discontinuity set (joints) rough planar, partl
100	NI	9.55 - 9.60	C2				 between 8.7 and 9.3mbgl highly weathered to fine to coarse angular Gravel							Between 9.3 and 10.0mbgl sub-vertical dis
100							 between 10.0 and 10.3mbgl highly weathered to fine to coarse angular Gravel							
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug Groundwater Strike Observed. ODEX GL-5.7mbgl, Rotary coring 5.7-29.7mbgl														
Casing			Groundwater			Flush								
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				
	5.70	115.00					0.00 - 30.00	Mist	100					

Sample Details				Samples		Insitu Tests		Strata					Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description			
100	19	11.15 - 11.25	C3				 between 11.6 and 11.9mbgl highly weathered to fine to coarse angular Gravel between 11.6 and 13.1mbgl thinly laminated							Between 12.8 and 13.1mbgl sub-vertical discontinuity surface coating.			
80	21	12.40 - 12.48	C4				 between 13.1 and 13.8mbgl highly weathered to fine to coarse angular Gravel							Between 13.8 and 14.1mbgl sub-vertical discontinuity surface coating.			
	NI	13.50	C5				 between 14.1 and 14.35mbgl highly weathered to fine to coarse angular Gravel							Between 15.3 and 15.94mbgl sub-vertical discontinuity surface coating.			
110	11	14.80 - 14.90	C6			(17.50)	 below 16.7mbgl medium strong, locally weak			17.50				Between 16.7 and 19.7mbgl sub-horizontal discontinuity closely spaced.			
70	12	16.30	C7											Between 18.9 and 19.05mbgl sub-vertical discontinuity surface coating.			
	NI	17.98 - 18.10	C8											Between 19.7 and 21.3mbgl sub-horizontal discontinuity surface coating.			
150	18	19.30 - 19.42	C9											At 20.28mbgl 30 degree discontinuity smooth.			
	NI	20.35 - 20.50	C10											Between 21.35 and 22.05mbgl sub-horizontal discontinuity close to medium spaced.			
150	14																
	NI																
300	5	21.80 -	C11														
														Remarks: BH set out by QGL in liaison with ARUP . Services checked, area CAT scanned and hand dug Groundwater Strike Observed. ODEX GL-5.7mbgl, Rotary coring 5.7-29.7mbgl			
Casing				Groundwater				Flush									
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour							

Core Details			Samples		Insitu Tests		Strata				Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des	
300	5	22.10	C12	23.10 - 23.18			 between 22.25 and 22.7mbgl highly weathered to fine to coarse angular Gravel							Between 22.2 and 22.3mbgl sub-vertical discontinuity and localised orange surface staining.	
	NI														
100	9														
	NI		C13	24.85 - 25.03		24.20 (0.30)	Weak black COAL. Highly weathered to fine to coarse angular Gravel and Cobbles (SOUTH WALES COAL MEASURES)		235.14	24.50				Sub-horizontal to 10 degree discontinuity surface closely spaced, smooth and rough planar, surface coating. 45 degree discontinuity surface open, with clay surface coating.	
170	12					24.50	Medium strong grey MUDSTONE with two discontinuity sets. (SOUTH WALES COAL MEASURES) between 25.0 and 25.3mbgl occasional Calcite nodules		234.84						
160	9	26.05 - 26.13	C14			(5.50)	 between 26.0 and 26.2mbgl sub-vertical calcite veins (healed sub-vertical discontinuities)							At 25.7mbgl 45 degree discontinuity open	
	15	27.30 - 27.45	C15												
200	20	28.80 - 28.90	C16			30.00	Terminated at 30.0mbgl (Scheduled Depth)		229.34						
Casing			Groundwater			Flush				Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug Groundwater Strike Observed. ODEX GL-5.7mbgl, Rotary coring 5.7-29.7mbgl					
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour					

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Client : Global Centre of Rail Excellence

Borehole No.

BH13

Dates : 16/12/21 - 4/1/22

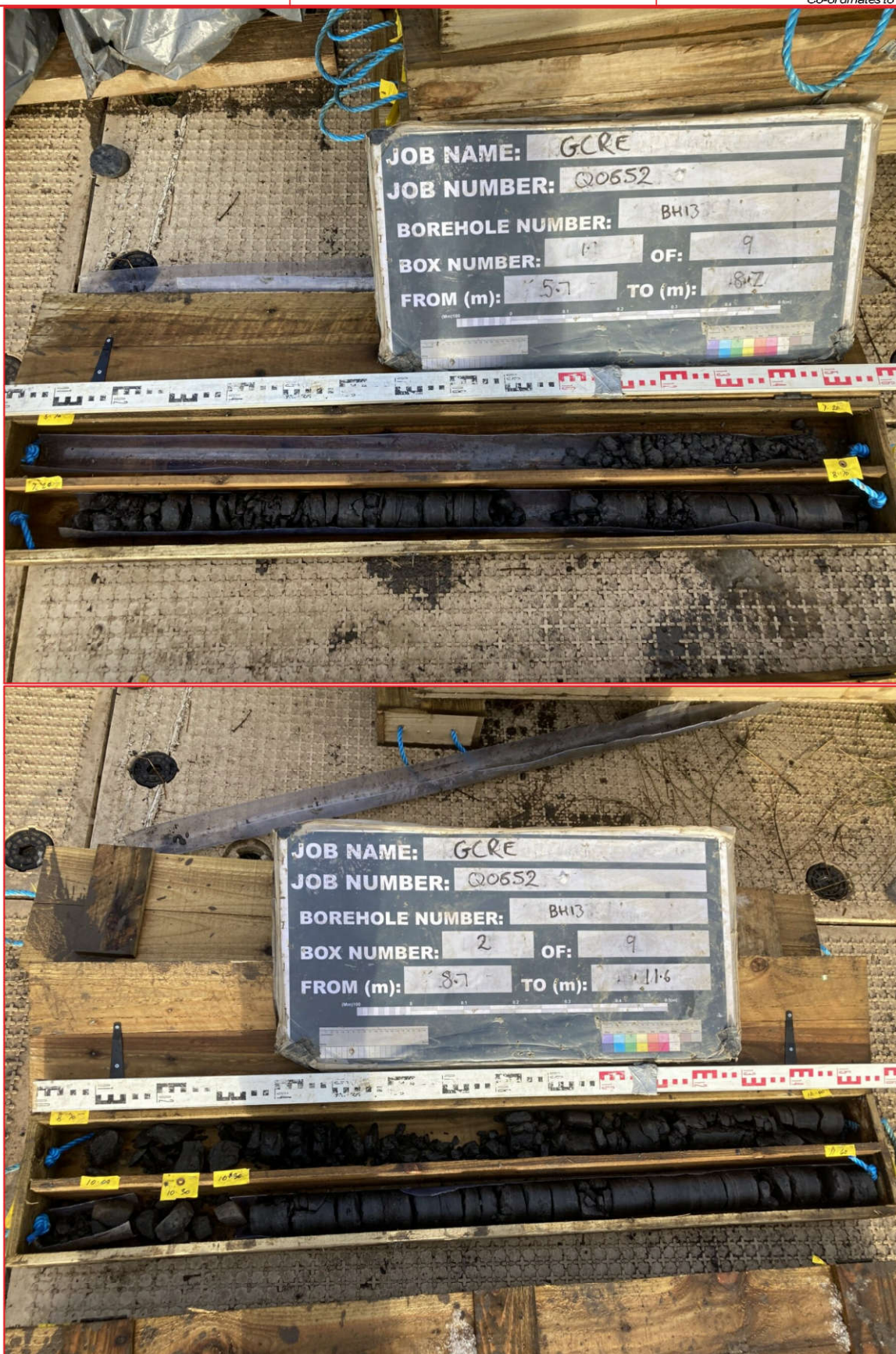
Job Number : Q0652

Ground Level : 259.34 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283817.80E
210965.72 N
Co-ordinates to National Grid



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Sheet No.
1 Of 5

m Per
Page
2

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Client : Global Centre of Rail Excellence

Borehole No.

BH13

Dates : 16/12/21 - 4/1/22

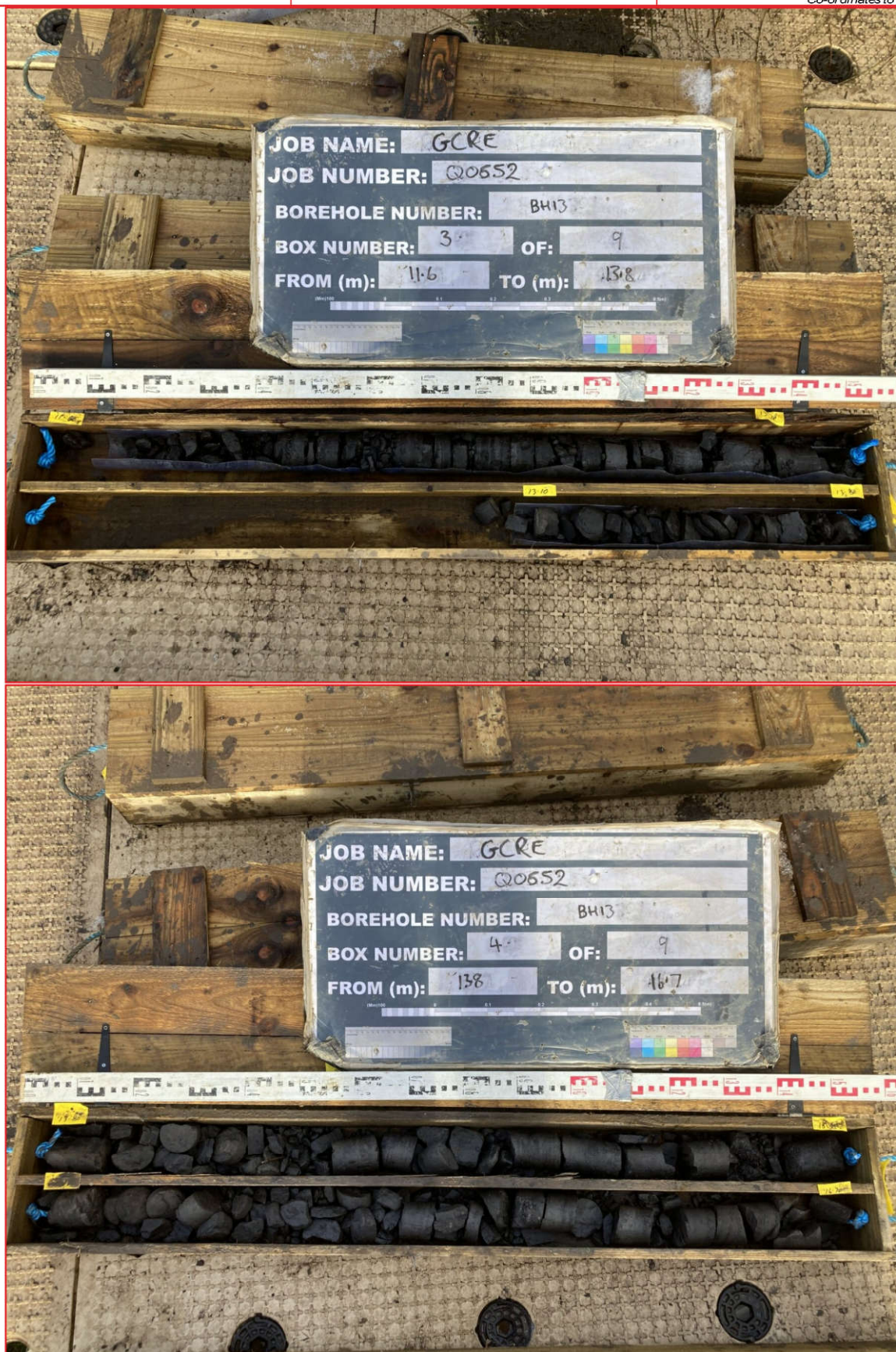
Job Number : Q0652

Ground Level : 259.34 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283817.80E
210965.72 N
Co-ordinates to National Grid



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Borehole No.

BH13

Dates : 16/12/21 - 4/1/22

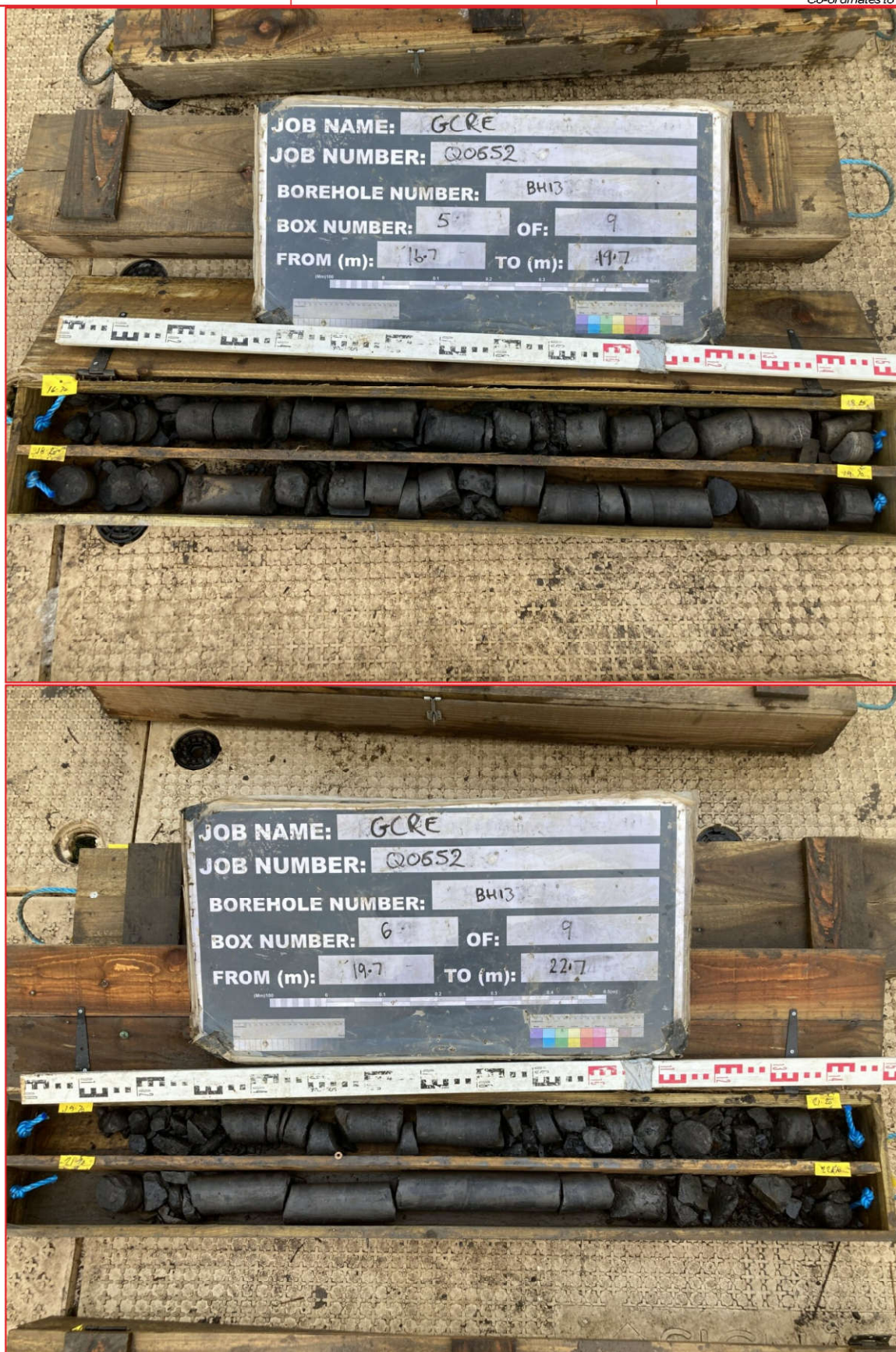
Job Number : Q0652

Ground Level : 259.34 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283817.80E
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Sheet No.
3 Of 5

m Per
Page
2

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Client : Global Centre of Rail Excellence

Borehole No.

BH13

Dates : 16/12/21 - 4/1/22

Job Number : Q0652

Ground Level : 259.34 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283817.80E
210965.72 N
Co-ordinates to National Grid



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Sheet No.
4 Of 5

m Per
Page
2

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Borehole No.

BH13

Dates : 16/12/21 - 4/1/22

Job Number : Q0652

Ground Level : 259.34 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283817.80E
210965.72 N
Co-ordinates to National Grid



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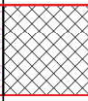
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Sheet No.
5 Of 5

**m Per
Page**
2

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Borehole Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
		0.20 - 0.60	B1			(0.10) 0.10 (1.10)	TOPSOIL - Brown CLAY / SILT with many rootlets MADE GROUND - Grey gravelly CLAY with medium cobble content. Gravel is fine to coarse angular mudstone. Cobbles are sub-angular mudstone.		259.91					
		1.20	SPTLS1	1.2	SPT (S) 10 (2-4-2-2-4)	1.20 (1.40)	Clay with mudstone and sandstone boulders (Drillers Description). SPT Sample at 1.2mbgl - Firm brown gravelly Clay. Gravel is fine to medium sub-rounded mudstone.		258.81					
		2.70 - 4.20 2.70	D1 SPTLS2	2.7	SPT (S) 50/42mm (25/14mm-50/42mm---)	2.60	Clay and sandstone boulders (Drillers Description)		257.41					
		4.20 - 5.70	D2	4.2	SPT (C) 50/29mm (20-5/16mm-50/29mm---)	(2.80)								
	NI		6.20	C1	5.7	SPT (C) 50/22mm (25/16mm-50/22mm---)	5.40 (0.30) 5.70	Weathered Sandstone (Drillers Description) Weak to medium strong dark grey MUDSTONE with two discontinuity sets. (SOUTH WALES COAL MEASURES)		254.61 254.31	5.70			
60	47	7.20	C2											
120	35	8.70	C3											
120	25	10.20	C4											
150	16													Below 10.7mbgl discontinuities closely spaced
Remarks:			Casing		Groundwater		Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug. Groundwater Strike Observed. ODEX GL-5.7mbgl, Rotary coring 5.7-16.3mbgl, Rotary 'open hole' 16.3-				
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				
	5.70	115.00					0.00 - 30.00	Mist	100					

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Client : Global Centre of Rail Excellence

Borehole No.

BH14

Dates : 15/12/21 - 16/12/21

Job Number : Q0652

Ground Level : 260.01 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283702.06 E
210915.06 N
Co-ordinates to National Grid



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Sheet No.
1 Of 2

m Per
Page
2

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH14

Dates : 15/12/21 - 16/12/21

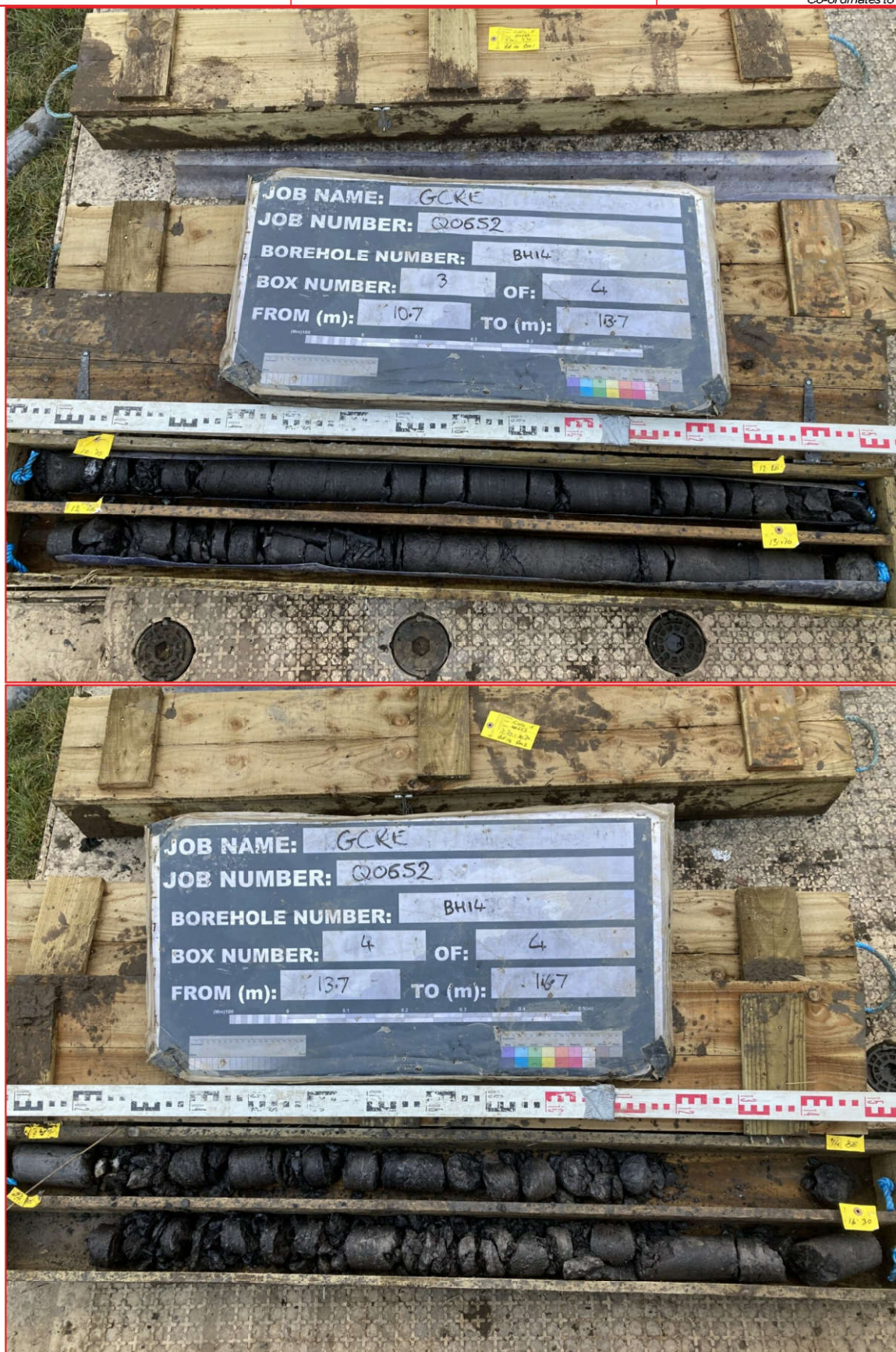
Job Number : Q0652

Ground Level : 260.01 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283702.06 E
210915.06 N
Co-ordinates to National Grid



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Client : Global Centre of Rail Excellence

Borehole No.

BH15

Dates : 5/12/21 - 6/12/21

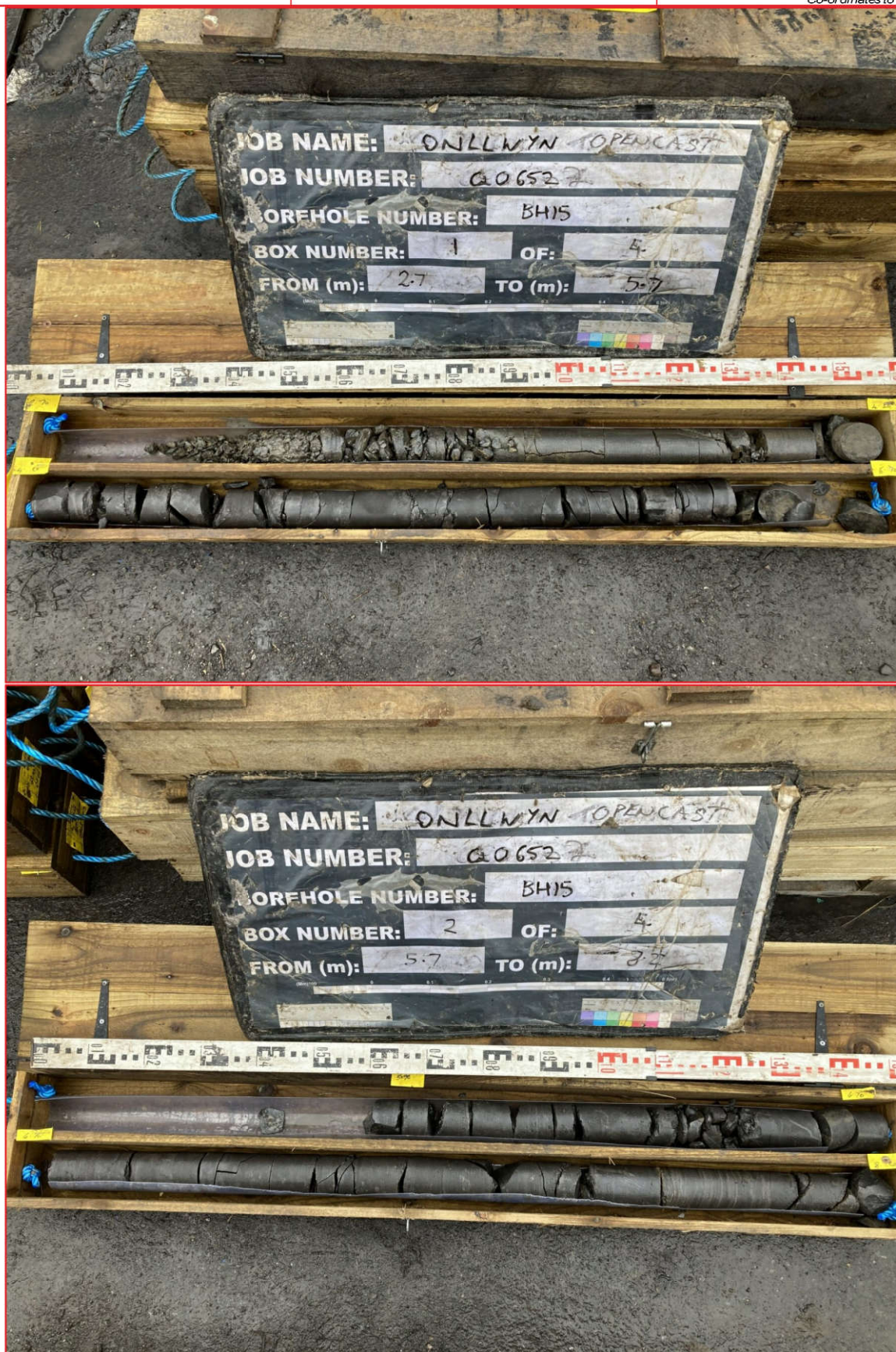
Job Number : Q0652

Ground Level : 249.63 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283332.65E
210758.18 N
Co-ordinates to National Grid



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Sheet No.
1 Of 2

m Per
Page
2

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Client : Global Centre of Rail Excellence

Borehole No.

BH15

Dates : 5/12/21 - 6/12/21

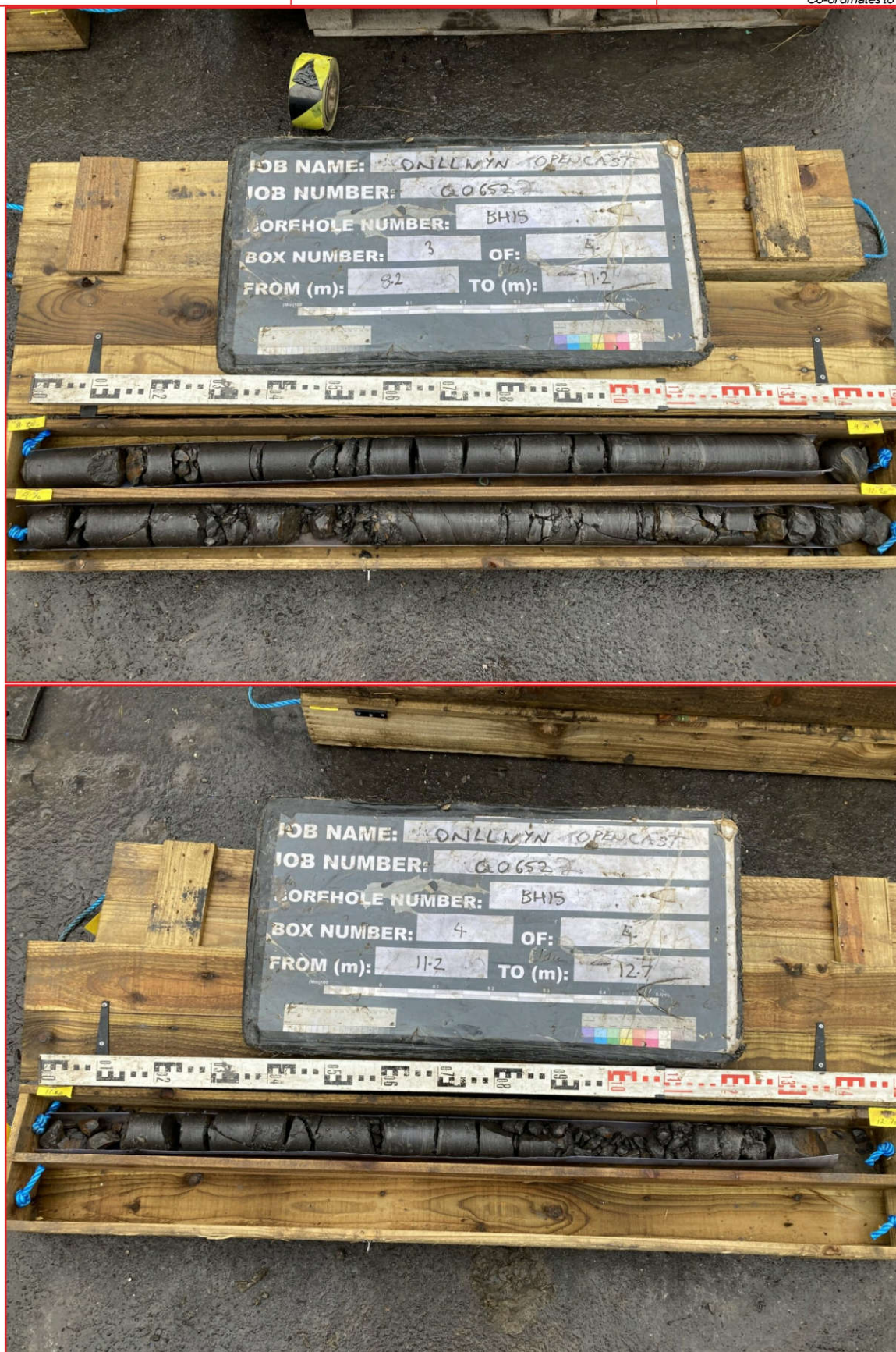
Job Number : Q0652

Ground Level : 249.63 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283332.65E
210758.18 N
Co-ordinates to National Grid



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m Per
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2

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Borehole Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description
							Clay and Gravel (Drillers Description)							
				1.2	SPT (S) 11 (3-3-3-2-3-3)	(2.70)								
				2.7	SPT (C) 50/35mm (25/60mm-50/35mm---)	2.70 (1.30)	Clay and Boulders (Drillers Description)		278.01					
				4.2	SPT (C) 50/10mm (25/30mm-50/10mm---)	4.00 (0.20) 4.20 (0.70) 4.90	Weathered Mudstone (Drillers Description) Strong light grey SANDSTONE with two discontinuity sets. (SOUTH WALES COAL MEASURES) Weak to medium strong grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES) between 4.9 and 5.2mbgl highly weathered to fine to coarse angular Gravel between 5.2 and 5.6mbgl completely weathered to silty Sand		276.71 276.51 275.81	4.20 0.70				30 degree discontinuity set closely spaced with black surface staining and locally highly fine to coarse angular gravel. 60 to 70 degrees closely spaced, rough planar, open with black staining locally highly weathered to sandy fine to coarse angular gravel.
	NI													
	NI	7.70	C2							7.20				Sub-horizontal to 10 degree discontinuity set closely spaced. smooth planar locally undulating highly weathered to fine to medium angular penetration.. Below 7.9mbgl locally highly weathered at 7.9mbgl with possible slickened surface between 7.9 and 8.2mbgl sub-horizontal discontinuities rough undulating partly open, clean, locally highly weathered angular gravel up to 5mm penetration..
	NI	9.20	C3											
150	8									4.90				Below 9.55mbgl discontinuities extremely closely spaced.
180	15	10.70	C4											
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-4.2mbgl, Rotary coring 4.2-40.2mbgl														

Core Details			Samples		Insitu Tests		Strata		Discontinuities					
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description
180	15	12.65 - 12.75	C5			12.10 (0.60)	Weak black COAL. Highly weathered to fine to coarse angular Gravel. (SOUTH WALES COAL MEASURES)		268.61					
120	6													
	NI													
160	6													
120	6													
	NI	14.10 - 14.25	C6			14.00 (0.28)	Weak to medium strong black COAL. (SOUTH WALES COAL MEASURES)		268.71					Sub-horizontal to 10 degree discontinuity spaced, smooth planar locally, open, clean.
60	6													
200	8	15.20 - 15.50	C7			14.28	Weak to medium strong grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)		268.43	14.28				Between 14.85 and 15.0mbgl sub-vertical undulating, partly open, clean.
230	12	16.90 - 17.00	C8											Between 15.85 and 16.0mbgl sub-vertical undulating, partly open, clean.
180	12	18.00 - 18.20	C9											Below 17.7mbgl discontinuities rough and
280	22	19.70 - 19.88	C10				 between 20.7 and 28.2mbgl fossiliferous							
160	19	21.70 - 21.80	C11				 between 21.1 and 21.7mbgl dark grey carbonaceous Mudstone			13.92				Between 20.7 and 28.2mbgl discontinuities closely spaced.
Casing			Groundwater			Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-4.2mbgl, Rotary coring 4.2-40.2mbgl					
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				

Core Details				Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description	
160	19														
300	21	23.05 - 23.20	C12											At 23.7mbgl 45 degree discontinuity rough clean.	
140	24	24.50 - 24.65	C13												
140	27	25.90 - 26.00	C14												
150	31	27.40 - 27.45	C15			(25.92)								Between 27.6 and 27.8mbgl sub-vertical discontinuity planar, partly open, clean.	
300	11	29.20 - 29.45	C16				 medium strong below 28.2mbgl			28.20					
200	12	30.50 - 30.65	C17												
220	22	31.00 - 31.05	C18											Sub-horizontal discontinuity set (bedding) locally rough planar, tight to partly open, free. Sub-horizontal and sub-vertical discontinuity open, clean.	
220															
220															
290	16													Between 31.6 and 34.mbgl sub-horizontal extremely closely spaced, rough planar, open.	
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-4.2mbgl, Rotary coring 4.2-40.2mbgl				Casing			Groundwater			Flush					
				Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour		
Water	4.20														

[illegible]

Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH16

Dates: 14/12/21 - 16/12/21

Job Number : Q0652

Ground Level : 280.71 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283439.29 E
211441.07 N
Co-ordinates to National Grid



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Sheet No.
1 Of 7

m Per
Page
2

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH16

Dates : 14/12/21 - 16/12/21

Job Number : Q0652

Ground Level : 280.71 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283439.29 E
211441.07 N
Co-ordinates to National Grid



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2 Of 7

m Per
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2

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH16

Dates: 14/12/21 - 16/12/21

Job Number : Q0652

Ground Level : 280.71 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283439.29 E
211441.07 N
Co-ordinates to National Grid



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3 Of 7

m Per
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2

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH16

Dates: 14/12/21 - 16/12/21

Job Number : Q0652

Ground Level : 280.71 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283439.29 E
211441.07 N
Co-ordinates to National Grid



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Sheet No.
4 Of 7

m Per
Page
2

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH16

Dates : 14/12/21 - 16/12/21

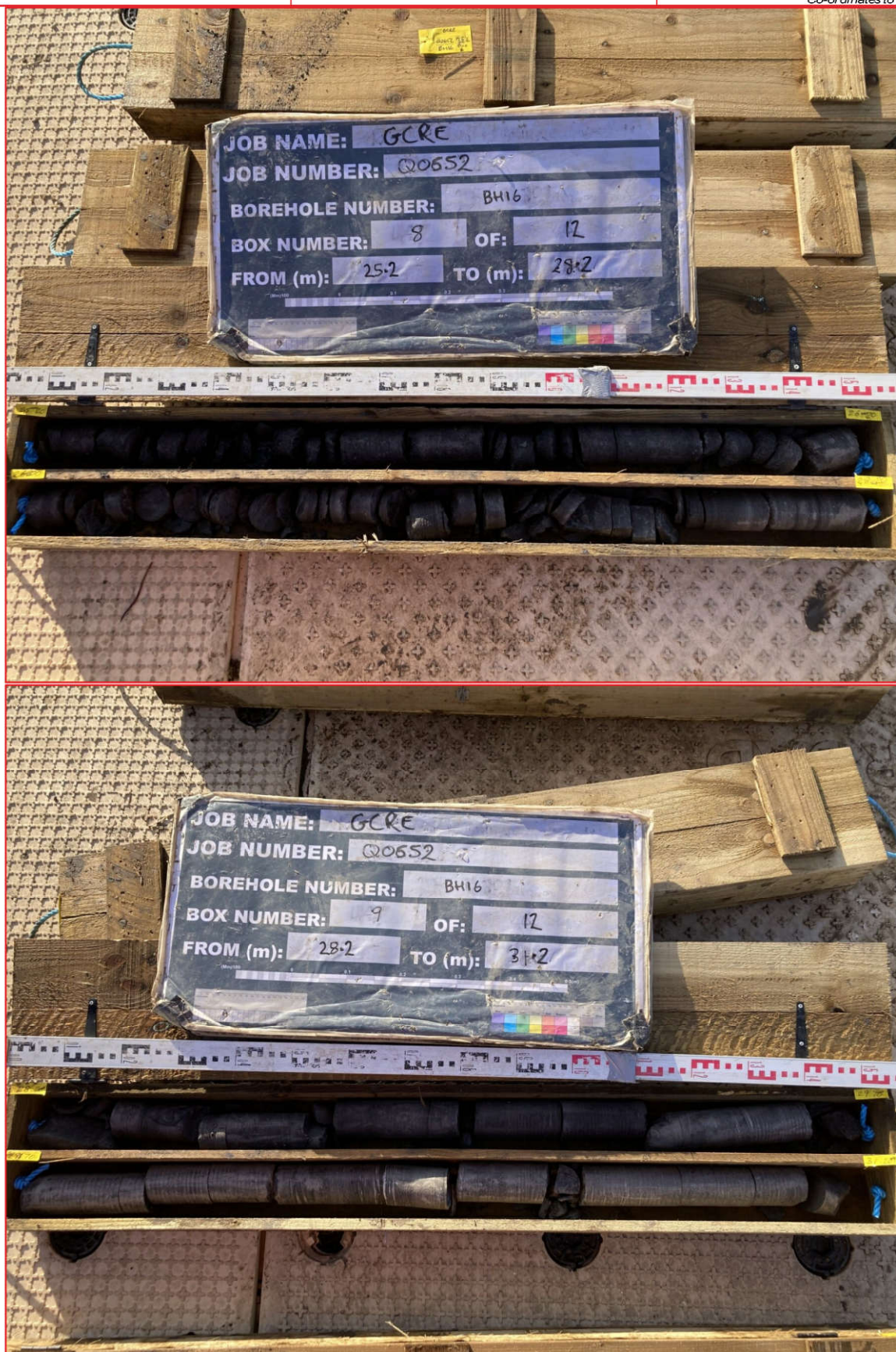
Job Number : Q0652

Ground Level : 280.71 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283439.29 E
211441.07 N
Co-ordinates to National Grid



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5 Of 7

m Per Page
2

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH16

Dates: 14/12/21 - 16/12/21

Job Number : Q0652

Ground Level : 280.71 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283439.29 E
211441.07 N
Co-ordinates to National Grid



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6 Of 7

m Per
Page
2

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Contract : Global Centre of Rail Excellence		Borehole No.
Client : Global Centre of Rail Excellence		BH16
Dates : 14/12/21 - 16/12/21	Job Number : Q0652	Ground Level : 280.71 m A.O.D. Level to Ordnance Datum
Location :	Engineer : ARUP	Coordinates: 283439.29 E 211441.07 N Co-ordinates to National Grid



Core Details			Samples		Insitu Tests		Strata				Discontinuities			
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
		0.00 - 2.70	D1				MADE GROUND: Grey clayey GRAVEL. Gravel is fine coarse angular mudstone (Colliery Spoil)							
				1.2	SPT (C) 40/15mm (5-5- 5-30 5mm-)	(1.20)								
		2.70 - 3.90	D2			1.20	Colliery Spoil (Drillers Description). Arisings are grey Clay and Gravel. Gravel is fine angular Mudstone		275.63					
						(1.50)								
		4.20 - 5.70	D3			2.70	Gravelly CLAY and boulders (Drillers Description). Arisings are gravelly Clay. Gravel is fine sub-angular to sub-rounded mudstone		274.13					
				4.2	SPT (C) 50/95mm (15-10/30mm- 21-29 20mm-)	(3.70)								
				5.7	SPT (C) 50/25mm (25/10mm-50/15mm-)									
						6.40	Weathered Mudstone (Drillers Description). Arisings are grey angular mudstone Gravel		270.43					
						(0.80)								
	NI	7.20	O6	7.2	SPT (C) 50/75mm (25/40mm-50/35mm-)	7.20	 between 7.2 and 7.8mbgl locally highly to completely weathered to fine to coarse angular to sub-angular Gravel Medium strong dark grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)		269.63	7.20				Sub-horizontal to 15 degree discontinuity spaced, smooth to rough planar, locally planar, slightly weathered with orange surface staining.
100	13	7.90 - 8.00	C1				 between 8.7 and 9.0mbgl highly to completely weathered to fine to coarse angular Gravel and gravelly Clay							Between 8.0 and 8.4mbgl sub-vertical discontinuity undulating, tight to partly open, slightly weathered with orange staining.
	NI					(3.85)								
120	17	9.70	C2											
										5.60				
120	13													
			Casing		Groundwater		Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-7.2mbgl, Rotary coring 7.2-14.7mbgl, Rotary 'open hole' 14.7-30.0mbgl				
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				
	7.20	115.00	3.90	2.80	Medium groundwater inflow	4.20	0.00 - 11.70	Mist	100					

Sample Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
120	13	11.55 - 11.70	C3			11.05	Strong grey sandstone CONGLOMERATE with mudstone nodules. (SOUTH WALES MIDDLE COAL MEASURES)		265.78					
170	9					(1.75)								
		12.65 - 12.80	C4			12.80 (0.10)	Black clayey Gravel. Gravel is sub-rounded to sub-angular mudstone and conglomerate. (POSSIBLE BACKFILLED MINE WORKINGS)		264.03 263.93					
						12.90 (0.35)				No Recovery	263.58			
200	12	14.20 - 14.40	C5			13.25	Medium strong dark grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)			13.25				Sub-horizontal to 15 degree discontinuity set - smooth to rough planar, locally planar to sub-planar / fresh.
						(1.45)					1.45			
						14.70	Hard Drill (Drillers Description)		262.13					
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-7.2mbgl, Rotary coring 7.2-14.7mbgl, Rotary 'open hole' 14.7-30.0mbgl														
Casing			Groundwater			Flush								
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				
							11.70 - 30.00	Mist	0					

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH17

Dates : 25/11/21 - 26/11/21

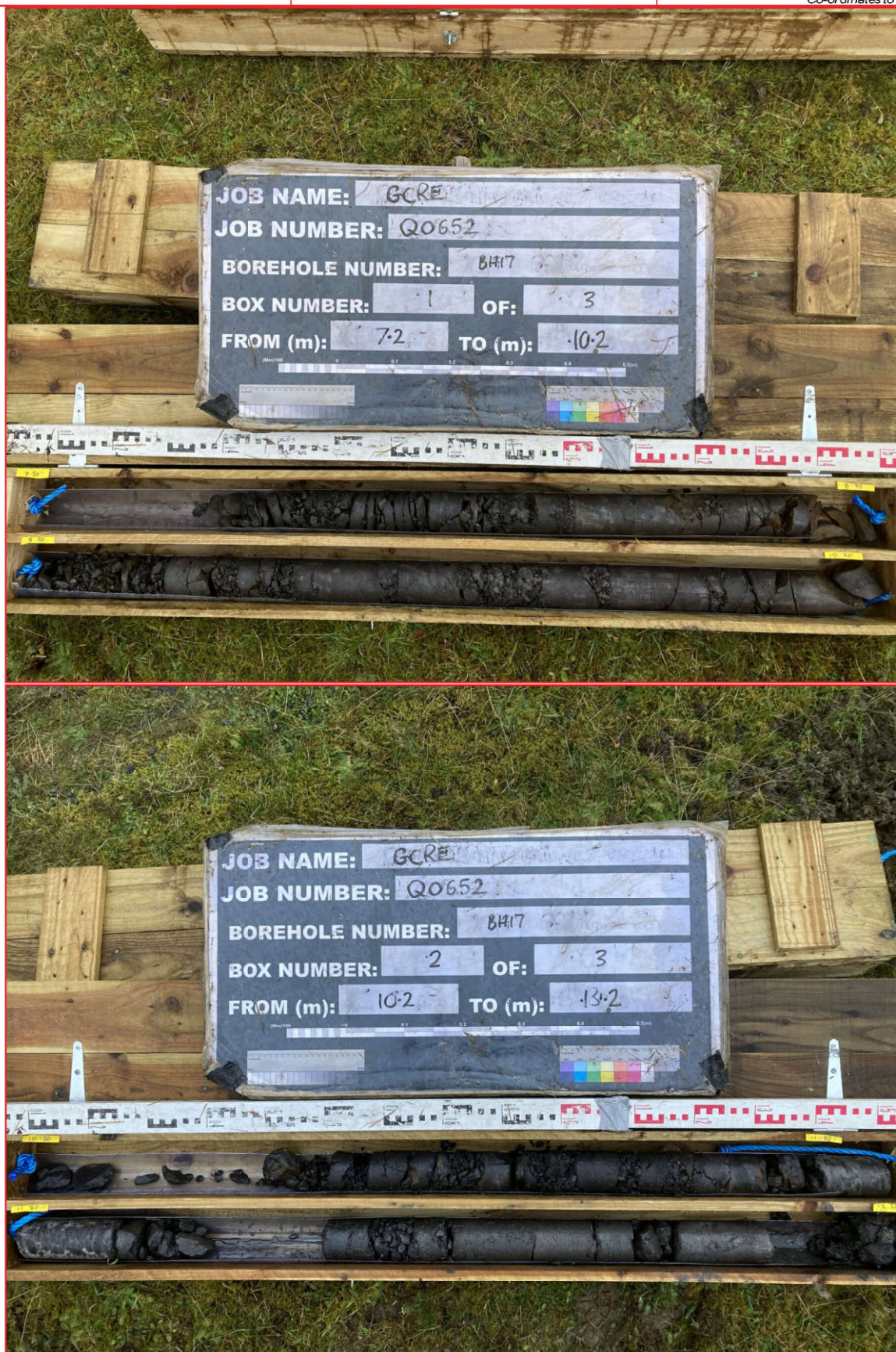
Job Number : Q0652

Ground Level : 276.83 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283274.06E
211061.09 N
Co-ordinates to National Grid



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Sheet No.
1 Of 2

m Per
Page
2

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH17

Dates : 25/11/21 - 26/11/21

Job Number : Q0652

Ground Level : 276.83 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283274.06E
211061.09 N
Co-ordinates to National Grid



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**m Per
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2

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Core Details			Samples		Insitu Tests		Strata				Discontinuities			
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
		0.00 - 0.50	B1			(0.50)	MADE GROUND - Soft dark organic silty CLAY.							
		0.50 - 1.00	B2			0.50	MADE GROUND - Grey clayey GRAVEL. Gravel is fine to coarse angular mudstone. below 1.2mbgl Colliery Spoil (Drillers -Description). Arisings were grey clayey, locally very clayey, fine to medium angular mudstone Gravel		274.53					
		1.20 - 4.20	D1	1.2	SPT (C) 75/75mm (10-15/10mm- 56-190mm -)									
				2.7	SPT (C) 50/80mm (25/15mm-75/65mm- ---)									
		4.20 - 5.70	D2	4.2	SPT (C) 19 (6-6- 5-5-4-5)									
		5.70 - 8.70	D3	5.7	SPT (C) 36 (8-8- 6-12-12)									
		8.70 - 11.70	D4	8.7	SPT (C) 15 (3-3- 4-4-4)									
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-24.7mbgl, Rotary coring 24.7-35.3mbgl, Rotary 'open hole' 35.3-45.2mbgl														
Casing			Groundwater			Flush								
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				
							0.00 - 30.70	Mist	100					

Core Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
		11.70 - 14.70	D5	11.7	SPT (C) 49/150mm (16-9/20mm- 21-24-40mm-)	(23.50)								
		14.70 - 17.70	D6	14.7	SPT (C) 38 (5-3-3- 10-13-12)									
		17.70 - 20.70	D7	17.7	SPT (C) 33 (10-11- 9-8-8-8)									
		20.70 - 23.70	D8	20.2	SPT (C) 50/125mm (25/60mm-31/65mm----)									
Remarks: BH set out by QGL in liaison with ARUP . Services checked, area CAT scanned and hand dug ODEX GL-24.7mbgl, Rotary coring 24.7-35.3mbgl, Rotary 'open hole' 35.3-45.2mbgl														

Sample Details				Samples		Insitu Tests		Strata				Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des		
		23.70 - 24.00	D9	23.7	SPT (C) 50/185mm (12-13/40mm-20-20-10/35mm)	24.00	Medium strong grey SILTSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES) between 24.7 and 25.2mbgl recovered as sub-angular to angular Gravel		251.03	24.00				Sub-horizontal to 15 degree (bedding) extra rough planar, open, locally with iron surface to coarse angular gravel.		
90	NI	25.20 - 25.30	C1													
230	4	27.10 - 27.25	C2			(6.70)								Below 26.2mbgl extremely close to closely		
	7													At 26.58mbgl 45 degree rough planar, open		
	9													At 26.85mbgl sub-horizontal discontinuity v and orange surface staining.		
380		29.05 - 29.20	C3							9.70				Below 27.7mbgl sub-horizontal discontinuity		
		29.50 - 29.85	C4											At 28.3 at 28.4mbgl 45 degree discontinuity / fresh.		
330	11													Between 28.4 and 28.8mbgl 70 to 80 degree partly open.		
						30.70	 between 30.4 and 30.6mbgl locally slightly weathered with reduction in strength to weak and highly weathered to fine to medium angular Gravel		244.33					Between 29.2 and 29.32mbgl sub-vertical silt surface coating.		
						(1.20)	Actual Zone of Core Loss between 30.7 and 31.9mbgl very soft, no recovery, loss of returns							Sub-horizontal discontinuity at mudstone / 29.85mbgl striated.		
90	2					31.90	Medium strong grey SILTSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES) between 32.3 and 33.4mbgl thinly laminated		243.13							
400	10	32.70 - 33.10	C5			(1.50)										
Casing				Depth	Diam.	Struck	Rose To	Groundwater				Flush				Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-24.7mbgl, Rotary coring 24.7-35.3mbgl, Rotary 'open hole' 35.3-45.2mbgl
Water		24.70	115.00					Sealed	Depth	Type	Returns	Colour				
										30.70 - 45.20	Mist	0				

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH18

Dates : 23/11/21 - 25/11/21

Job Number : Q0652

Ground Level : 275.03 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283148.40E
210982.78 N
Co-ordinates to National Grid



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Sheet No.
1 Of 2

m Per
Page
2

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH18

Dates : 23/11/21 - 25/11/21

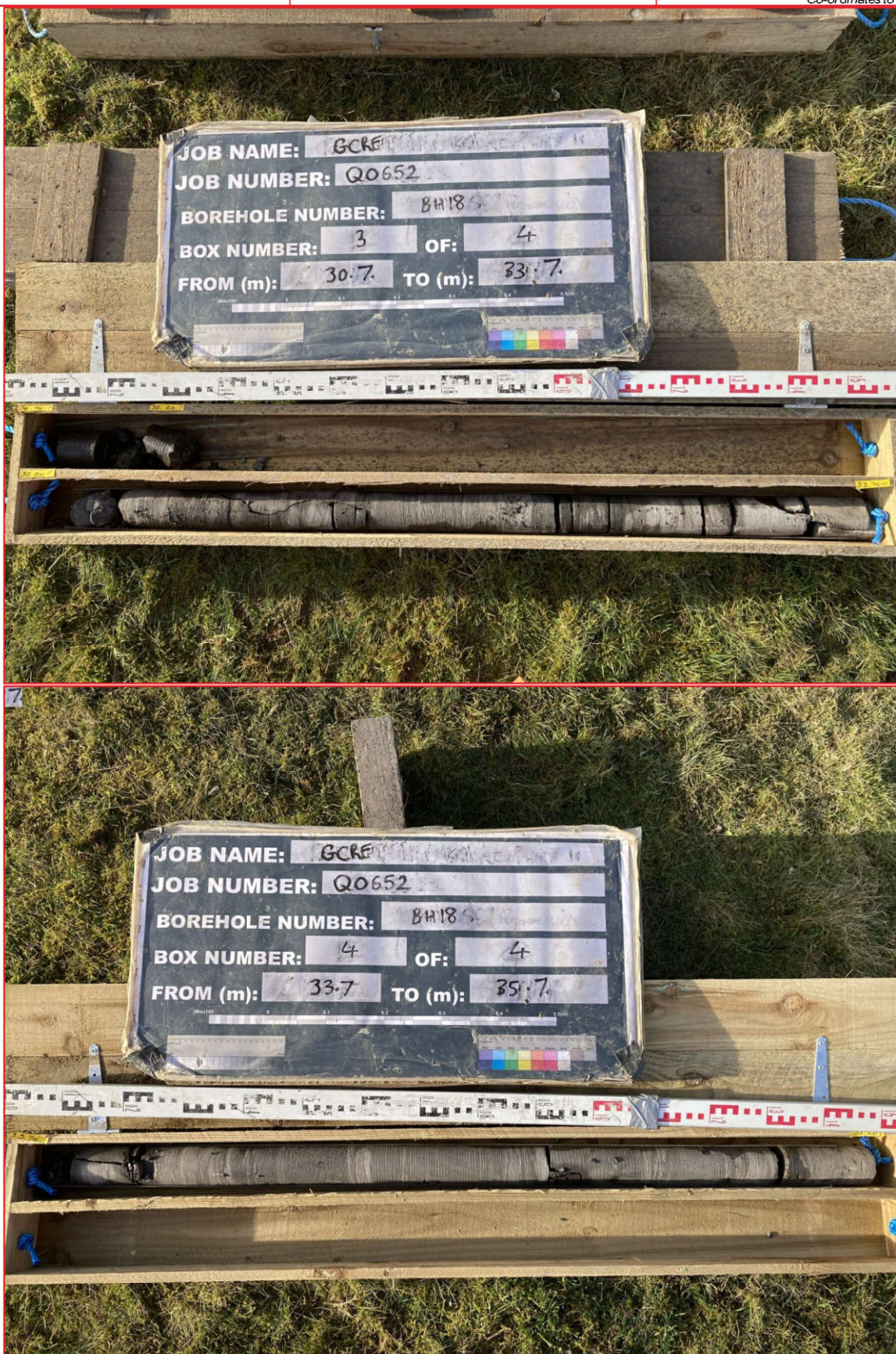
Job Number : Q0652

Ground Level : 275.03 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283148.40E
210982.78 N
Co-ordinates to National Grid



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Contract : Global Centre of Rail Excellence												Borehole No.	
Client : Global Centre of Rail Excellence												BH19	
Dates : 17/1/22 - 18/1/22						Job Number : Q0652				Ground Level : 255.05 m A.O.D. Level to Ordnance Datum			
Location : Around washery area						Engineer : ARUP				Coordinates: 281397.52 E 211205.94 N Co-ordinates to National Grid			

m B.G.L.	Run Details						Fractures		Insitu Tests		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.				
0											0.00 - 4.20	D1		MADE GROUND - Brown Clay and Boulders (Drillers Description) Arisings are fine to coarse angular clayey mudstone and siltstone Gravel				
1																		
2																		
3																		
4											4.20 - 5.10	D2						
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
17																		
18																		
19																		
20																		

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
17/01/2022 17:00	8.70	8.70		19.20	115.00			No ground water encountered		0.00 - 19.20	Air Mist	100
18/01/2022 08:00	8.70	8.70										

Plant: Comacchio MC600 tracked drilling rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-19.2mbgl

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Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence												Borehole No. BH19A	
Dates : 18/1/22 - 19/1/22 Location : Around washery area						Job Number : Q0652 Engineer : ARUP				Ground Level : 255.32 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 281399.06 E 211202.03 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Run Details						Fractures		Insitu Tests		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.				
21																		
22							22.2	SPT (C) 49/78mm (18-7/0mm-38-11/3mm--)	22.20 - 26.70	D2	22.20	Dense Colliery Spoil (Drillers Description). Arisings are fine to coarse angular mudstone and siltstone Gravel		233.12				
23											(4.50)							
24																		
25																		
26																		
27							26.7	SPT (C) 50/10mm (25/5mm-50/10mm--)	26.70 - 28.20	D3	26.70	Large Sandstone Boulders (Drillers Description)		228.62				
28							28.2	SPT (C) 50/75mm (25/15mm-41-9/0mm--)			28.20	Terminated at 28.20mbgl, unable to progress casing through boulders		227.12				
29																		
30																		
31																		
32																		
33																		
34																		
35																		
36																		
37																		
38																		
39																		
40																		
41																		

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
18/01/2022 17:00	22.20	22.20		28.20	115.00							
19/01/2022 08:00	22.20	22.20										

Plant: Comacchio MC600 tracked drilling rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-28.2mbgl

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Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence												Borehole No. BH20	
Dates : 14/1/22 - 17/1/22 Location : Around washery area						Job Number : Q0652 Engineer : ARUP				Ground Level : 251.05 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 281652.88 E 211668.60 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Run Details						Fractures		Insitu Tests		Samples		Strata				
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Water		
0																	
1																	
2																	
3																	
4							4.2	SPT (C) 50/15mm (25/10mm-50/15mm--)	4.20 - 8.70	D2							
5																	
6																	
7																	
8																	
9							8.7	SPT (C) 50/80mm (13-12/15mm-38-12/15mm--)	8.70 - 13.20	D3							
10																	
11																	
12																	
13							13.2	SPT (C) 50/90mm (21-4/0mm-31-19/15mm--)	13.20 - 17.70	D4							
14																	
15																	
16											(31.20)						
17																	
18									17.70 - 22.20	D5							
19																	
20																	

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
								No ground water encountered		0.00 - 40.20	Air Mist	100

Plant: Comacchio MC600 tracked drilling rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-40.2mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		G Blades	S Picton	1 Of 2	21		

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Contract : Global Centre of Rail Excellence											Borehole No.	
Client : Global Centre of Rail Excellence											BH20	
Dates : 14/1/22 - 17/1/22					Job Number : Q0652					Ground Level : 251.05 m A.O.D. Level to Ordnance Datum		
Location : Around washery area					Engineer : ARUP					Coordinates: 281652.88 E 211668.60 N Co-ordinates to National Grid		

m B.G.L.	Run Details						Insitu Tests		Samples		Strata				Water
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
21							22.2	SPT (C) 50/35mm (25/50mm-50/35mm--)	22.20 - 26.70	D6		Dense Colliery Spoil (Drillers Description). Arisings are fine to coarse angular mudstone and siltstone Gravel			
22															
23															
24															
25															
26							26.7	SPT (C) 50/115mm (10-15/55mm-24-26/40mm--)	26.70 - 31.20	D7					
27															
28															
29															
30															
31							31.2	SPT (C) 50/12mm (25/5mm-50/12mm--)	31.20 - 35.70	D8	31.20	Brown large Sandstone Boulders (Drillers Description)		219.85	
32															
33															
34															
35															
36															
37															
38															
39															
40							40.2	SPT (C) 50/15mm (25/10mm-50/15mm--)			40.20	Terminated at 40.20mbgl, unable to progress casing further		210.85	
41															

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
14/01/2022 15:30	31.20	31.20		40.20	115.00							
17/01/2022 08:00	31.20	31.20										

Plant: Comacchio MC600 tracked drilling rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-40.2mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		G Blades	S Picton	2 Of 2	21		

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Contract : Global Centre of Rail Excellence											Borehole No.		
Client : Global Centre of Rail Excellence											BH21		
Dates : 15/11/21 - 17/11/21					Job Number : Q0652					Ground Level : 228.23 m A.O.D. <i>Level to Ordnance Datum</i>			
Location :					Engineer : ARUP					Coordinates: 281893.75 E 211906.21 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Run Details						Fractures	Insitu Tests		Samples		Strata			
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Water
21												MADE GROUND - Soft to firm grey slightly sandy gravelly silty CLAY with low to medium cobble content and high boulder content. Gravel is fine to coarse angular siltstone, mudstone and occasional coal. Cobbles are angular siltstone.			
22															
23							22.5	SPT (C) 50/150mm (20-5/10mm-25-25-)							
24									24.00 - 25.50	B6					
25															
26															
27							27	SPT (C) 50/90mm (25/55mm-35-15/15mm-)							
28															
29															
30															
31															
32							31.5	SPT (C) 50/45mm (25/22mm-50/45mm-)							
33															
34											33.00	Terminated at 33.0mbgl on possible bedrock. Unable to progress casing further to prove		195.23	
35							35	SPT (C) 50/0mm (25/0mm-50/0mm-)							
36															
37															
38															
39															
40															
41															

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns

Plant:
Remarks:

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				2 Of 2	21		

Contract : Global Centre of Rail Excellence											Borehole No.	
Client : Global Centre of Rail Excellence											BH22	
Dates : 22/11/21 - 24/11/21					Job Number : Q0652			Ground Level : 213.01 m A.O.D. Level to Ordnance Datum				
Location : Around former opencast area					Engineer : ARUP			Coordinates: 282101.25 E 212011.30 N Co-ordinates to National Grid				

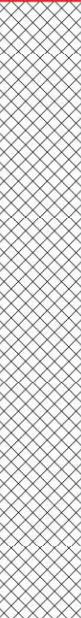
m B.G.L.	Run Details				Fractures		Insitu Tests		Samples		Strata				
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Water
0												MADE GROUND - Vegetation over dark grey black slightly sandy clayey GRAVEL with medium cobble content. Gravel is fine to coarse angular to sub-angular Mudstone with ash and coal. Cobbles are angular to sub-angular Mudstone and Siltstone			
1									1.50 - 3.00	B1					
2															
3															
4															
5								SPT (C) 37 (7-8-9-9-10)	4.5						
6									6.00	B					
7									6.00 - 7.50	B2					
8															
9															
10								SPT (C) 28 (5-6-6-7-7-8)	9		(18.00)				
11															
12															
13															
14								SPT (C) 34 (6-7-8-8-9-9)	13.5						
15															
16															
17															
18								SPT (C) 50/225mm (9-10-15-25-10-)	18		18.00	DRILLERS DESCRIPTION - Hard bands of Siltstone and boulders		195.01	
19															
20															
									19.50 - 21.00	B5					

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
22/11/2021 17:00	9.00	9.00		21.00	116.00			No ground water encountered				
23/11/2021 08:00	9.00	9.00										
23/11/2021 17:00	21.00	21.00										
24/11/2021 08:00	21.00	21.00										

Plant: Dando 3000 Sonic rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken

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		E Demaj	S Picton	1 Of 2	21		

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Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence											Borehole No. BH22						
Dates : 22/11/21 - 24/11/21 Location : Around former opencast area					Job Number : Q0652 Engineer : ARUP					Ground Level : 213.01 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 282101.25 E 212011.30 N <i>Co-ordinates to National Grid</i>							
m B.G.L.	Run Details				Fractures		Insitu Tests		Samples		Strata						
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Water		
21												DRILLERS DESCRIPTION - Hard bands of Siltstone and boulders					
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
31																	
32											31.50 (0.50)	DRILLERS DESCRIPTION - Dark grey SILTSTONE		181.51			
33											32.00	Terminated at 32.00mbgl unable to progress casing past 21.00mbgl, hole collapsing		181.01			
34																	
35																	
36																	
37																	
38																	
39																	
40																	
41																	
Hole Progress / Water Obs				Casing				Groundwater				Flush					
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour		Sealed	Depth	Type	Returns				
Plant: Dando 3000 Sonic rig Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken																	
 Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk						Operator: E Demaj		Logged By: S Picton		Sheet No. 2 Of 2		m Per Page 21		All measurements in metres unless otherwise stated			

Contract : Global Centre of Rail Excellence

Borehole No.

Client : Global Centre of Rail Excellence

BH22

Dates : 22/11/21 - 24/11/21

Job Number : Q0652

Ground Level : 213.01 m A.O.D.
Level to Ordnance Datum

Location : Around former opencast area

Engineer : ARUP

Coordinates: 282101.25E
212011.30 N
Co-ordinates to National Grid



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Sheet No.
1 Of 6

m Per Page
2

All measurements in metres unless otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH22

Dates : 22/11/21 - 24/11/21

Job Number : Q0652

Ground Level : 213.01 m A.O.D.
Level to Ordnance Datum

Location : Around former opencast area

Engineer : ARUP

Coordinates: 282101.25E
212011.30 N
Co-ordinates to National Grid



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Sheet No.
2 Of 6

m Per Page
2

All measurements in metres unless otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH22

Dates : 22/11/21 - 24/11/21

Job Number : Q0652

Ground Level : 213.01 m A.O.D.
Level to Ordnance Datum

Location : Around former opencast
area

Engineer : ARUP

Coordinates: 282101.25E
212011.30 N
Co-ordinates to National Grid



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Sheet No.
3 Of 6

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH22

Dates : 22/11/21 - 24/11/21

Job Number : Q0652

Ground Level : 213.01 m A.O.D.
Level to Ordnance Datum

Location : Around former opencast
area

Engineer : ARUP

Coordinates: 282101.25E
212011.30 N
Co-ordinates to National Grid



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Sheet No.
4 Of 6

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH22

Dates : 22/11/21 - 24/11/21

Job Number : Q0652

Ground Level : 213.01 m A.O.D.
Level to Ordnance Datum

Location : Around former opencast
area

Engineer : ARUP

Coordinates: 282101.25E
212011.30 N
Co-ordinates to National Grid



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Sheet No.
5 Of 6

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Borehole No.

Client : Global Centre of Rail Excellence

BH22

Dates : 22/11/21 - 24/11/21

Job Number : Q0652

Ground Level : 213.01 m A.O.D.
Level to Ordnance Datum

Location : Around former opencast area

Engineer : ARUP

Coordinates: 282101.25E
212011.30 N
Co-ordinates to National Grid



Core Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
		0.30 - 4.20	D1				Colliery Spoil (Drillers Description). Arisings are fine to coarse angular mudstone and siltstone							
		4.20 - 8.70	D2	4.2	SPT (C) 50/170mm (5-10-15-21-14/20mm-)									
		8.70 - 13.20	D3	8.7	SPT (C) 50/80mm (18-7/0mm-39-1/5mm-)	(21.40)								
		13.20 - 17.70	D4	13.2	SPT (C) 50/35mm (25/50mm-50/35mm-)									
		17.70 - 21.40	D5	17.7	SPT (C) 50/120mm (8-17/20mm-22-28/45mm-)									
Casing			Groundwater			Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-36.0mbgl, Rotary coring 36.0-37.0mbgl					
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				
					No ground water encountered		0.00 - 25.20	Air Mist	100	Grey				

Core Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description
						21.40 (0.80)	Grey weathered Mudstone (Drillers Description) Arisings are fine to coarse angular mudstone ... Vertical fracture from 22.00 - 22.30mbgl Strong dark grey MUDSTONE/SILTSTONE (SOUTH WALES COAL MEASURES)		178.36					Vertical discontinuity from 22.00 - 22.30mbgl Bedding fracture set, dipping 5°, 10°, and horizontal.
				22.2	SPT (C) 50/15mm (25/5mm-50/15mm-)	22.20			177.56	22.20	5	10	1	
60	16					(3.00)				3.00				
						25.20		Terminated at 25.20mbgl (Scheduled Depth)		174.56				
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-36.0mbgl, Rotary coring 36.0-37.0mbgl														
Casing			Groundwater			Flush								
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				
	22.20	115.00												

Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH23

Dates : 6/1/22 - 7/1/22

Job Number : Q0652

Ground Level : 199.76 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 282565.87E
211985.86 N
Co-ordinates to National Grid



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G Blades

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Sheet No.
1 Of 1

m Per
Page
2

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Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence												Borehole No. BH24					
Dates : 4/1/21 - 5/1/21 Location :						Job Number : Q0652 Engineer : ARUP				Ground Level : 258.67 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 283944.59 E 211545.58 N <i>Co-ordinates to National Grid</i>							
m B.G.L.	Run Details				Fractures		Insitu Tests		Samples		Strata				Water	Install/ Backfill	
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.			
0									0.00 - 0.90	D1	(0.90)	Topsoil and Clay (Drillers Description)					
1									0.90	D1	0.90	Colliery Spoil (Drillers Description). Arisings are fine to coarse angular mudstone and siltstone		257.77			
2																	
3																	
4							4.2	SPT (C) 50/15mm (25/10mm-50/15mm--)	4.20 - 8.70	D2							
5																	
6																	
7																	
8																	
9							8.7	SPT (C) 50/80mm (9-16/10mm-31-19/5mm--)	8.70 - 13.20	D3							
10																	
11																	
12																	
13																	
14							13.2	SPT (C) 50/65mm (25/50mm-50/65mm--)	13.20 - 17.70	D4							
15																	
16																	
17																	
18							17.7	SPT (C) 50/20mm (5-20/35mm-50/20mm--)	17.70 - 22.20	D5							
19																	
20																	
Hole Progress / Water Obs				Casing		Groundwater				Flush							
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour		Sealed	Depth	Type	Returns				
						15.00	14.00	Medium groundwater inflow below 15.0mbgl			0.00 - 50.70	Mist	100				
Plant: Commachio 600 Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-49.2mbgl, Rotary coring 49.2-50.2mbgl																	
		Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk				Operator: QGL		Logged By.		Sheet No. 1 Of 3		m Per Page 21		All measurements in metres unless otherwise stated			

Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence												Borehole No. BH24	
Dates : 4/1/21 - 5/1/21 Location :				Job Number : Q0652 Engineer : ARUP				Ground Level : 258.67 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 283944.59 E 211545.58 N <i>Co-ordinates to National Grid</i>					

m B.G.L.	Run Details						Fractures		Insitu Tests		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.				
21																		
22							22.2	SPT (C) 50/150mm (10-15/60mm-21-21-8/0mm-)	22.20 - 26.70	D6		Colliery Spoil (Drillers Description). Arisings are fine to coarse angular mudstone and siltstone						
23																		
24																		
25																		
26											(48.30)							
27							26.7	SPT (C) 50/150mm (10-15/60mm-21-21-8/0mm-)	26.70 - 31.20	D7								
28																		
29																		
30																		
31							31.2	SPT (C) 50/35mm (25/5mm-50/35mm-)	31.20 - 35.70	D8								
32																		
33																		
34																		
35																		
36							35.7	SPT (C) 50/85mm (6-19/45mm-35-15/10mm-)	35.70 - 40.20	D9								
37																		
38																		
39																		
40																		
41							40.2	SPT (C) 50/150mm (15-10/15mm-20-25-5/0mm-)	40.20 - 44.70 40.50	D10 C1								

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
04/01/2022 16:30	35.70	35.70	14.00									
05/01/2022 08:00	35.70	35.70	14.00									

Plant: Commachio 600
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-49.2mbgl, Rotary coring 49.2-50.2mbgl

 Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: QGL	Logged By:	Sheet No. 2 Of 3	m Per Page 21	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence												Borehole No.	
Client : Global Centre of Rail Excellence												BH24	
Dates : 4/1/21 - 5/1/21						Job Number : Q0652				Ground Level : 258.67 m A.O.D. Level to Ordnance Datum			
Location :						Engineer : ARUP				Coordinates: 283944.59 E 211545.58 N Co-ordinates to National Grid			

m B.G.L.	Run Details				Fractures		Insitu Tests		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.		
42												Colliery Spoil (Drillers Description). Arisings are fine to coarse angular mudstone and siltstone				
43																
44																
45																
46																
47																
48																
49	49.20															
50		33	33	0								...Unable to progress casing past 49.20mbgl Strong dark grey SILTSTONE BOULDER.		209.47		
51	50.7											Terminated at 50.7mbgl, unable to progress casing		207.97		
52																
53																
54																
55																
56																
57																
58																
59																
60																
61																
62																

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
05/01/2021 14:00	50.70	49.20	14.00	49.20 50.70	115.00 115.00							

Plant: Commachio 600
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-49.2mbgl, Rotary coring 49.2-50.2mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		QGL		3 Of 3	21		

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH24

Dates : 4/1/21 - 5/1/21

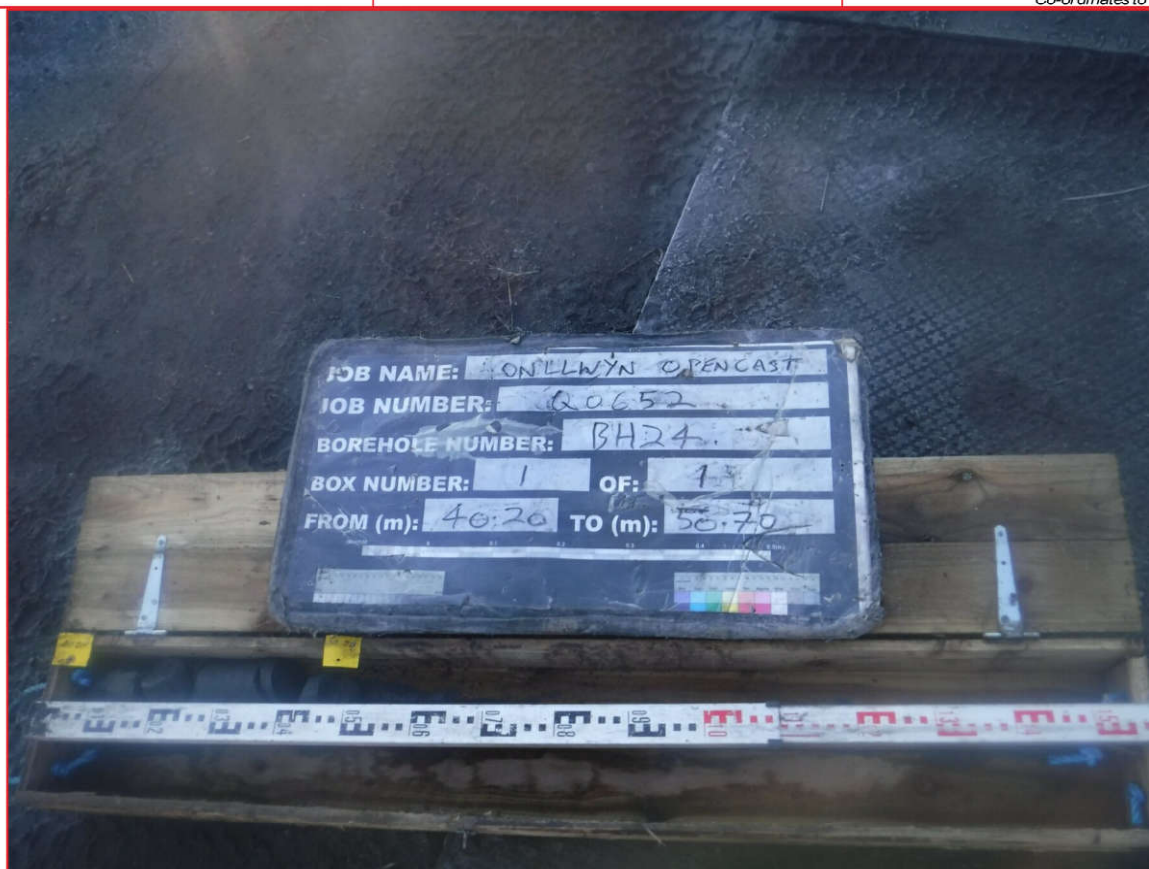
Job Number : Q0652

Ground Level : 258.67 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283944.59E
211545.58 N
Co-ordinates to National Grid



Contract : Global Centre of Rail Excellence												Borehole No.	
Client : Global Centre of Rail Excellence												BH25	
Dates : 10/1/21 - 11/1/21						Job Number : Q0652				Ground Level : 257.68 m A.O.D. Level to Ordnance Datum			
Location :						Engineer : ARUP				Coordinates: 283952.65 E 211213.21 N Co-ordinates to National Grid			

m B.G.L.	Run Details						Fractures		Insitu Tests		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.				
0																		
1																		
2																		
3																		
4							4.2	SPT (C) 50/80mm (5-20/60mm-39-11/5mm--)	4.20 - 8.70	D2								
5																		
6																		
7																		
8																		
9							8.7	SPT (C) 50/30mm (25/10mm-50/30mm--)	8.70 - 13.20	D3								
10																		
11																		
12																		
13							13.2	SPT (C) 50/165mm (12-17/35mm-19-21-10/15mm--)	13.20 - 17.70	D4								
14																		
15																		
16																		
17																		
18							17.7	SPT (C) 50/30mm (25/45mm-50/30mm--)	17.70 - 22.20	D5								
19																		
20																		

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
						14.00	14.00	Medium groundwater inflow		0.00 - 49.20	Mist	100

Plant: Commachio 600
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-49.2mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		QGL		1 Of 3	21		

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Contract : Global Centre of Rail Excellence												Borehole No.	
Client : Global Centre of Rail Excellence												BH25	
Dates : 10/1/21 - 11/1/21						Job Number : Q0652				Ground Level : 257.68 m A.O.D. Level to Ordnance Datum			
Location :						Engineer : ARUP				Coordinates: 283952.65 E 211213.21 N Co-ordinates to National Grid			

m B.G.L.	Run Details						Fractures		Insitu Tests		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.				
21																		
22							22.2	SPT (C) 50/160mm (16-9/40mm-15-15-20/10mm-)	22.20 - 26.70	D6								
23																		
24																		
25																		
26																		
27							26.7	SPT (C) 50/75mm (25/60mm-41-9/0mm-)	26.70 - 31.20	D7								
28																		
29																		
30																		
31							31.2	SPT (C) 50/10mm (25/50mm-50/10mm-)	31.20 - 35.70	D8								
32																		
33																		
34																		
35																		
36							35.7	SPT (C) 50/95mm (18-7/0mm-27-23/20mm-)	35.70 - 40.20	D9								
37																		
38																		
39																		
40							40.2	SPT (C) 50/40mm (20-5/0mm-50/40mm-)	40.20 - 44.70	D10								
41																		

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
10/01/2022 16:30	35.70	35.70	14.00									
11/01/2022 07:00	35.70	35.70	14.00									

Plant: Commachio 600
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-49.2mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		QGL		2 Of 3	21		

Form Name: ROTARY. Version 2.11.000, 22/05/15 Output By: Phil Darby. Library File: C:\USERS\PHIL DARBY\ONEDRIVE - QUANTUM GEOTECHNIC LTD\QUANTUM 4.GLB.

Contract : Global Centre of Rail Excellence											Borehole No.	
Client : Global Centre of Rail Excellence											BH25	
Dates : 10/1/21 - 11/1/21					Job Number : Q0652					Ground Level : 257.68 m A.O.D. Level to Ordnance Datum		
Location :					Engineer : ARUP					Coordinates: 283952.65 E 211213.21 N Co-ordinates to National Grid		

m B.G.L.	Run Details				Fractures		Insitu Tests		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.		
42												Colliery Spoil (Drillers Description). Arisings are fine to coarse angular mudstone and siltstone.				
43																
44																
45							44.7	SPT (C) 50/65mm (25/35mm-50/65mm--)	44.70 - 49.20	D11						
46																
47																
48																
49							49.2	SPT (C) 50/30mm (25/30mm-50/30mm--)			49.20	Terminated at 49.2mbgl. Unable to progress casing		208.48		
50																
51																
52																
53																
54																
55																
56																
57																
58																
59																
60																
61																
62																

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
11/01/2021 12:00	49.20	49.20	14.00	49.20	115.00							

Plant: Commachio 600
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-49.2mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		QGL		3 Of 3	21		

Core Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
		0.80	D1			(4.20)	Grass over MADE GROUND - brown CLAY (Drillers Description)							
		4.20	D2	4.2	SPT (C) 50/65mm (12-13/30mm-29-21/10mm-)	4.20	Black dark grey collery spoil (Drillers Description)		268.87					
		8.70	D3	8.7	SPT (C) 50/5mm (25/55mm-31/5mm-19/1mm-)									
		13.20	D4	13.2	SPT (C) 50/80mm (10-15/40mm-38-12/5mm-)									
		17.70	D5	17.7	SPT (C) 50/75mm (14-11/50mm-20-21/0mm-9/1mm)	(31.00)								

Borehole Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Des
		22.20	D6	22.2	SPT (C) 50/60mm (25/15mm-50/60mm--)									
		26.70	D7	26.7	SPT (C) 50/150mm (11-14/25mm-21-21-8/0mm--)									
		31.20	D8	31.2	SPT (C) 50/75mm (10-15/10mm-45-5/0mm--)									
10	6			35.7	SPT (C) 50/15mm (25/5mm-50/15mm--)	35.20 (0.50)	Grey weathered MUDSTONE (Drillers Description)		237.87					
	NI					35.70 (0.50)	Weak to strong grey MUDSTONE with some Siltstone bands (SOUTH WALES COAL MEASURES)		237.37	35.70	0	10	1	Bedding fracture set, dipping 0°, 10°, planar clay.
	NI					36.20 (1.00)	Weak black COAL (SOUTH WALES COAL MEASURES)		236.87					
30	NI					37.20 (3.00)	Strong dark grey SILTSTONE with Mudstone bands (SOUTH WALES COAL MEASURES)		235.87					
25	NI						...From 38.00 to 38.25mbgl iron pyrite conglomerate			4.50				
						40.20	Terminated at 40.20mbgl (Scheduled Depth)		232.87					
			Groundwater			Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug ODEX GL-35.7mbgl, Rotary coring 35.7-40.2mbgl					
Water	Casing		Struck	Behaviour		Sealed	Depth	Type	Returns	Colour				
	Depth	Diam.		Rose To										
	35.70	115.00												

Contract : Global Centre of Rail Excellence

Borehole No.

Client : Global Centre of Rail Excellence

BH26

Dates : 17/12/21 - 20/12/21

Job Number : Q0652

Ground Level : 273.07 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 283672.55 E
211574.00 N
Co-ordinates to National Grid



Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:
G Blades

Logged By:
S Picton

Sheet No.
1 Of 1

m Per Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence											Borehole No. BH27		
Dates : 25/11/21 - 9/12/21 Location : Around washery area					Job Number : Q0652 Engineer : ARUP					Ground Level : 283.50 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 282777.93 E 210976.89 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Run Details						Fractures	Insitu Tests		Samples		Strata				
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Water	
0												MADE GROUND - Grass over dark grey black slightly sandy clayey GRAVEL with medium cobble and boulder content. Gravel is fine to coarse angular to sub-angular Mudstone with ash and coal. Cobbles are angular to sub-angular Mudstone and Siltstone				
1									1.00	B1						
2									1.50 - 3.00	B2						
3																
4																
5							4.5	SPT (C) 50/210mm (18-7/10mm-28-22-)	4.50 - 6.00	B3						
6																
7																
8																
9							9	SPT (C) 11 (6-4-3-3-2-3)								
10																
11									10.50 - 12.00	B4						
12																
13																
14							13.5	SPT (C) 19 (2-3-4-3-5-7)								
15																
16																
17									16.50 - 18.00	B5						
18							18	SPT (C) 31 (4-6-7-8-8-8)								
19																
20																

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns

Plant: Mito
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken

 Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: S Picton	Logged By: S Picton	Sheet No. 1 Of 3	m Per Page 21	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence											Borehole No. BH27		
Dates : 25/11/21 - 9/12/21 Location : Around washery area				Job Number : Q0652 Engineer : ARUP				Ground Level : 283.50 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 282777.93 E 210976.89 N <i>Co-ordinates to National Grid</i>					

m B.G.L.	Run Details						Fractures	Insitu Tests		Samples		Strata			
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Water
42												MADE GROUND - Grass over dark grey black slightly sandy clayey GRAVEL with medium cobble and boulder content. Gravel is fine to coarse angular to sub-angular Mudstone with ash and coal. Cobbles are angular to sub-angular Mudstone and Siltstone			
43															
44							44	SPT (C) 50/150mm (18-7/10mm-19-26-5/0mm-)							
45															
46															
47															
48							48.5	SPT (C) 50/135mm (20-5/0mm-27-23/60mm-)	48.00 - 50.00	B9					
49															
50															
51															
52															
53							53	SPT (C) 50/0mm (19-6/0mm-50/0mm-)	53.00 - 54.00	B10					
54									54.00 - 55.00	B11					
55															
56															
57							57.5	SPT (C) 50/160mm (14-11/40mm-18-22-10/10mm-)			57.50	DRILLERS DESCRIPTION - Hard bands of Siltstone and boulders		226.00	
58											(4.00)				
59															
60															
61															
62											61.50	Terminated at 61.50mbgl unable to progress casing past 50.00mbgl, Borehole collapsing		222.00	

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns

Plant: Mito
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken

 Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: S Picton	Logged By: S Picton	Sheet No. 3 Of 3	m Per Page 21	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence												Borehole No. BH28	
Dates : 12/1/22 - 13/1/22 Location : Around washery area						Job Number : Q0652 Engineer : ARUP				Ground Level : 277.37 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 282572.65 E 210970.19 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Run Details						Fractures		Insitu Tests		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.				
0												(0.20)	Grass over Topsoil (Drillers Description)		277.17			
1												0.20	Brown Sandstone Boulders (Drillers Description)					
2												(4.90)						
3																		
4							4.2	SPT (C) 50/15mm (25/5mm-50/15mm--)	4.20 - 5.10	D2								
5												5.10	Dense Colliery Spoil (Drillers Description). Arisings are fine to coarse angular mudstone Gravel		272.27			
6																		
7																		
8																		
9							8.7	SPT (C) 40/175mm (5-5-11-11-18/25mm--)	8.70 - 13.20	D3								
10																		
11																		
12																		
13							13.2	SPT (C) 30/85mm (8-12-15-15/10mm--)	13.20 - 17.70	D4								
14																		
15																		
16																		
17																		
18							17.7	SPT (C) 50/83mm (15-10/5mm-29-21/8mm--)	17.70 - 22.20	D5								
19																		
20																		

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
								No ground water encountered		0.00 - 49.20	Air Mist	100

Plant: Comacchio MC600 tracked drilling rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-49.2mbgl

 Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: G Blades	Logged By: S Picton	Sheet No. 1 Of 3	m Per Page 21	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence											Borehole No.		
Client : Global Centre of Rail Excellence											BH28		
Dates : 12/1/22 - 13/1/22					Job Number : Q0652					Ground Level : 277.37 m A.O.D. Level to Ordnance Datum			
Location : Around washery area					Engineer : ARUP					Coordinates: 282572.65 E 210970.19 N Co-ordinates to National Grid			

m B.G.L.	Run Details						Fractures	Insitu Tests		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.			
21																	
22							22.2	SPT (C) 50/25mm (25/10mm-50/25mm--)	23.00 - 26.00	D6	23.00	Brown Sandstone Boulders (Drillers Description)		254.37			
23											(3.00)						
24																	
25																	
26							26.7	SPT (C) 50/150mm (6-19/40mm-21-22-7/0mm--)			26.00	Dense Colliery Spoil (Drillers Description). Arisings are fine to coarse angular mudstone and siltstone Gravel		251.37			
27																	
28																	
29																	
30																	
31							31.2	SPT (C) 50/0mm (25/60mm-41/0mm-9/mm--)	31.20 - 35.70	D7							
32																	
33																	
34																	
35																	
36							35.7	SPT (C) 49/160mm (10-15/55mm-20-21-8/10mm--)	35.70 - 40.20	D8							
37																	
38											(23.20)						
39																	
40							40.2	SPT (C) 50/30mm (25/25mm-50/30mm--)	40.20 - 44.70	D9							
41																	

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
12/01/2022 17:00	31.20	31.20										
13/01/2022 07:30	31.20	31.20										

Plant: Comacchio MC600 tracked drilling rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-49.2mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		G Blades	S Picton	2 Of 3	21		

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Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence												Borehole No. BH28	
Dates : 12/1/22 - 13/1/22 Location : Around washery area						Job Number : Q0652 Engineer : ARUP				Ground Level : 277.37 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 282572.65 E 210970.19 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Run Details				Fractures		Insitu Tests		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Test Results	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.		
42												Dense Colliery Spoil (Drillers Description). Arisings are fine to coarse angular mudstone and siltstone Gravel				
43																
44																
45							44.7	SPT (C) 50/25mm (25/30mm-50/25mm--)								
46																
47																
48																
49							49.2	SPT (C) 50/150mm (11-11-20-25-5/0mm-)			49.20	Terminated at 49.20mbgl. Unable to progress casing		228.17		
50																
51																
52																
53																
54																
55																
56																
57																
58																
59																
60																
61																
62																

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
				49.20	115.00							

Plant: Comacchio MC600 tracked drilling rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. ODEX GL-49.2mbgl

 Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: G Blades	Logged By: S Picton	Sheet No. 3 Of 3	m Per Page 21	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence										Borehole No.		
Client : Global Centre of Rail Excellence										BH29		
Dates : 26/11/21 - 29/11/21					Job Number : Q0652			Ground Level : 230.74 m A.O.D. Level to Ordnance Datum				
Location : Around washery area					Engineer : ARUP			Coordinates: 284719.48 E 210705.39 N Co-ordinates to National Grid				

m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
0	0.20	ES1				MADE GROUND - Grass over black dark grey slightly sandy silty clayey GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal		(3.40)	
	0.50 - 1.00	B2							
1	1.00	ES3							
	1.00 - 1.50	B5	1.20	SPT (C) 7 (1-1-2-1-2-2)	(3.40)				
2	2.00	ES6	2.00	SPT (C) 11 (1-2-3-3-2-3)					
	2.00 - 2.50	SPT7							
3	3.00	ES9	3.00	SPT (C) 12 (1-2-3-3-3-3)					
	3.00 - 3.40	B11							
4	3.70	U1 - /%			3.40	Soft brown to dark brown fibrous PEAT		227.34	
	4.00	SPT12	4.00	SPT (S) 7 (1-2-1-2-2-2)	(1.10)			(1.10)	
	4.00 - 4.50	ES13							
	4.50 - 4.80	B14							
5		B15	5.00	SPT (C) 50/100mm (9-15-39-11/25mm--)	4.50 (0.40)	Medium dense to dense dark grey slightly clayey slightly silty sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone		226.24 (0.40)	
					4.90 (0.10)	Weak to strong dark grey MUDSTONE. Recovered as fine to coarse angular to sub-angular GRAVEL. (SOUTH WALES COAL MEASURES)		225.84 (0.10)	
6					5.00	Terminated at 5.00mbgl upon refusal. Progressed using rotary drilling methods		225.74	
7									
8									
9									
10									
11									
12									
13									
14									

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
26/11/2021 15:00	3.00	3.00	0.50	10.00	150.00	0.70	0.50	Slight ground water seepage at 0.70mbgl		4.70	5.00	1:00
29/11/2021 08:00	3.00	3.00	0.50									

Equipment / plant used: Dando 2000 Cable Percussive drill rig

Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. Cable Percussive GL-5.0mbgl

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		P Osborn	S Picton	1 Of 1	15		

Form Name: SA/SPT. Version 2.11.000, 22/05/15 Output By: Phil Darby. Library File: C:\USERS\PHIL DARBY\ONEDRIVE - QUANTUM GEOTECHNIC LTD\QUANTUM 4.GLB.

Contract : Global Centre of Rail Excellence										Borehole No.	
Client : Global Centre of Rail Excellence										BH30	
Dates : 1/12/21 - 2/12/21				Job Number : Q0652				Ground Level : 239.10 m A.O.D. Level to Ordnance Datum			
Location : Around washery area				Engineer : ARUP				Coordinates: 284925.69 E 210549.41 N Co-ordinates to National Grid			

m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
0	0.20	ES ES1				MADE GROUND - Black dark grey slightly silty slightly clayey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal and ash			
	0.50 - 1.00	B2							
1	1.00	ES3							
	1.20 - 1.70	B5	1.20	SPT (C) 11 (2-3-3-2-3-3)					
2	2.00	ES6	2.00	SPT (C) 12 (1-2-2-3-3-4)	(4.00)			(4.00)	
	2.00 - 2.50	B8							
3	3.00	ES9	3.00	SPT (C) 13 (2-3-4-3-3-3)					
	3.00 - 3.50	B11							
4	4.00	ES12	4.00	SPT (C) 17 (2-2-4-4-4-5)	4.00	Firm to stiff grey brown mottled slightly sandy very gravelly silty CLAY with medium cobble and boulder content. Gravel is fine to coarse rounded to sub-rounded Siltstone and Sandstone. Cobbles and boulders are rounded to sub-rounded Sandstone		235.10	
	4.00 - 4.50	B14							
5	5.00	ES15	5.00	SPT (C) 31 (6-7-8-8-7-8)	(2.60)				(2.60)
	5.00 - 5.50	B17				...Slow drilling from 5.60-6.60mbgl			
6	6.00	ES18							
			6.50	SPT (C) 38 (12-10-9-9-10-10)					
7	7.00 - 7.50	B20			6.60	Weak to strong dark grey to grey SILTSTONE. Recovered as fine to coarse angular to sub-angular GRAVEL (SOUTH WALES COAL MEASURES)		232.50	
					(0.90)				(0.90)
			7.50	SPT (C) 50/125mm (9-16-28-22/50mm--)	7.50	Terminated at 7.50mbgl upon refusal. Progressed using rotary drilling methods		231.60	
8									
9									
10									

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
01/12/2021 16:00	4.00	4.00		7.00	150.00	6.60	3.50	Medium ground water strike at 6.60mbgl		5.60	6.60	3:50
02/12/2021 08:00	4.00	4.00								7.20	7.50	1:00

Equipment / plant used: Dando 2000 cable percussive drill rig

Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. Cable Percussive GL-7.5mbgl

	Plas Newydd Swansea Tel : 01554744880 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		Samson Drilling	S Picton	1 Of 1	11		

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Core Details				Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description	
						(4.00)	MADE GROUND - Black dark grey slightly silty clayey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal and ash. Progressed using Cable Percussive Drilling Techniques								
						4.00	Firm to stiff grey brown mottled slightly sandy very gravelly silty CLAY with medium cobble and boulder content. Gravel is fine to coarse rounded to sub-rounded Siltstone and Sandstone. Cobbles and boulders are rounded to sub-rounded Sandstone. Progressed using Cable Percussive Drilling Techniques		235.10						
						(2.60)	...Slow drilling from 5.60-6.60mbgl								
						6.60	Weak to strong dark grey to grey SILTSTONE. Recovered as fine to coarse angular to sub-angular GRAVEL (SOUTH WALES COAL MEASURES). Progressed using Cable Percussive Drilling Techniques		232.50						
						(0.90)									
						7.50	Weathered Mudstone (Drillers Description)		231.60						
						(0.70)									
						8.20	Medium strong grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)		230.90	8.20					Sub-horizontal discontinuity set (bedding) - spaced, rough planar, open, generally clean surface staining.
		8.70 - 8.80	C1			(1.50)	 between 8.48 and 8.8mbgl thinly laminated			1.50					
		9.35 - 9.42	C2												
						9.70	VOID		229.40						
						(2.00)									
				Groundwater			Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug Cable Percussive GL-7.5mbgl. ODEX 7.5-8.2mbgl. Rotary 'open hole' 20.2mbgl.					
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour					
			8.20	4.10	Fast groundwater inflow		0.00 - 20.10	Mist	100						

Details			Samples		Insitu Tests		Strata			Discontinuities					
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description	
450	22	13.10 - 13.15	C3			11.70	Medium strong grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)		227.40	11.70					
						(1.00)			1.00						
						12.70			Weak dark grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)	226.40	12.70				
						(0.94)				0.94					
	NI					13.64	Weak to medium strong black COAL. (SOUTH WALES COAL MEASURES)		225.46					Sub-horizontal discontinuity set (bedding) - spaced, smooth to rough planar. open, locally medium angular gravel upto 10mm penetration.	
						(0.56)									
						14.20			Weak dark grey MUDSTONE. (SOUTH WALES COAL MEASURES) Highly weathered to fine to coarse angular Gravel	224.90					
						(0.28)				224.62	14.48				
370	10	14.90 - 15.25 15.01	C4 C8			14.48	Medium strong grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES) between 15.45 and 15.65mbgl highly weathered to coarse angular Gravel between 15.9 and 16.25mbgl thinly laminated							Sub-horizontal discontinuity set (bedding) - spaced, smooth to rough planar, partly open.	
340	16	16.00 - 16.20	C5	(2.72)											
280	6	17.70 - 17.95	C6			17.20	Strong light grey SILTSTONE with two discontinuity sets. (SOUTH WALES COAL MEASURES)		221.90	17.20				Sub-horizontal discontinuity set (bedding) - spaced, smooth planar. open, locally with a degree discontinuity set (joint) medium spaced, partly open, with silt surface coating..	
300	5			(2.10)											
300	11	19.60 - 19.80	C7			19.30			Medium strong grey MUDSTONE with one discontinuity set. (SOUTH WALES COAL MEASURES)		219.80	19.30			
						20.10	VOID		219.00						
						(1.00)									
						21.10	Soft Drill (Drillers Description)		218.00						
						(0.90)									
									Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug Cable Percussive GL-7.5mbgl. ODEX 7.5-8.2mbgl. Rotary coring 8.2-20.2mbgl. Rotary 'open hole' 20.2-						

Borehole Details			Samples		Insitu Tests		Strata		Discontinuities					
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Ref. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description
						22.00	Hard Drill (Drillers Description)		217.10					
						(5.80)								
						27.80	Terminated at 27.8mbgl, unable to progress as borehole sides collapsing below 21.1mbgl		211.30					
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug Cable Percussive GL-7.5mbgl. ODEX 7.5-8.2mbgl. Rotary coring 8.2-20.2mbgl. Rotary 'open hole' 20.2-														
Casing			Groundwater			Flush								
Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour				

Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH30R

Dates : 7/12/21 - 8/12/21

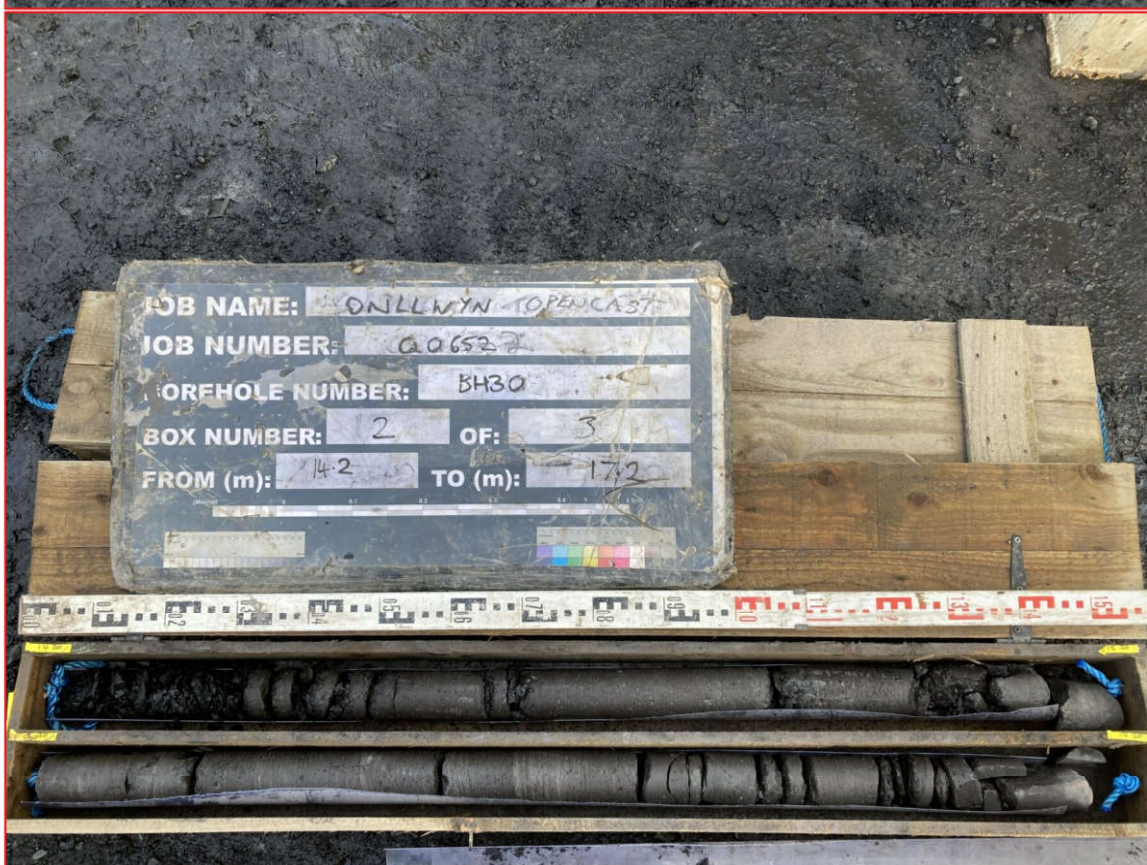
Job Number : Q0652

Ground Level : 239.10 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 284925.69E
210549.41 N
Co-ordinates to National Grid



Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:
Samson
Drilling

Logged By:
S Picton

Sheet No.
1 Of 2

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH30R

Dates : 7/12/21 - 8/12/21

Job Number : Q0652

Ground Level : 239.10 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 284925.69E
210549.41 N
Co-ordinates to National Grid



Contract : Global Centre of Rail Excellence										Borehole No.	
Client : Global Centre of Rail Excellence										BH31	
Dates : 29/11/21 - 1/12/21				Job Number : Q0652				Ground Level : 238.61 m A.O.D. Level to Ordnance Datum			
Location : Around washery area				Engineer : ARUP				Coordinates: 284880.77 E 210454.81 N Co-ordinates to National Grid			

m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
0	0.20	ES1			(0.70)	MADE GROUND - Grey sandy silty GRAVEL. Gravel is fine to coarse angular to sub-angular Limestone		(0.70)	
1	0.50 - 1.20	B2			0.70	MADE GROUND - Black dark grey slightly silty slightly clayey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal		237.91	
2	1.20	ES3	1.20	SPT (C) 10 (1-2-3-2-3)					
3	1.20 - 1.70	B5							
4	2.00	ES6	2.00	SPT (C) 7 (1-1-2-1-2-2)					
5	2.00 - 2.50	B8							
6	3.00	ES9	3.00	SPT (C) 10 (1-2-3-2-3)					
7	3.00 - 3.50	B11			(6.00)			(6.00)	
8	4.00	ES12	4.00	SPT (C) 11 (3-3-3-2-3-3)					
9	4.00 - 4.50	B14							
10	5.00	ES15	5.00	SPT (C) 14 (2-3-3-3-4-4)					
11	5.00 - 5.50	B17							
12	6.50	ES18	6.50	SPT (C) 9 (2-3-3-2-2-2)					
13	6.50 - 6.80	B20			6.70	Soft brown to dark brown fibrous PEAT		231.91	
14	6.70	B1			(1.10)			(1.10)	
15	6.80	U1 - /%							
16	6.80 - 7.30	D21							
17		B22							
18	7.80	D23	8.00	SPT (S) 14 (2-3-3-4-4-3)	7.80	Soft to firm brown grey slightly sandy slightly gravelly slightly silty CLAY with low to medium cobble content. Gravel is fine to coarse sub-angular to sub-rounded Mudstone, Siltstone and Sandstone. Cobbles are rounded to sub-rounded Sandstone		230.81	
19	8.00	SPT24			(1.70)			(1.70)	
20	8.00 - 8.50	B25							
21	9.50 - 10.00	B27	9.50	SPT (C) 37 (5-8-9-9-9-10)	9.50	Medium dense to dense dark grey silty sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone		229.11	
22	10.00 - 10.40	B29	10.00	SPT (C) 35 (5-7-8-8-10-9)	(0.90)			(0.90)	
23	10.60 - 10.80	B30	10.80	SPT (C) 50/40mm (25/45mm-50/40mm-)	10.40	Firm to stiff grey brown mottled slightly sandy gravelly CLAY with medium cobble and boulder content. Gravel is fine to coarse rounded to sub-rounded Siltstone and		228.21	
24					(0.20)			(0.20)	
25					10.60			228.01	

Hole Progress / Water Obs				Casing		Groundwater			Chiselling			
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
29/11/2021 16:00	3.00	3.00		10.60	150.00	6.80	3.50	Medium ground water strike at 3.50mbgl		9.60	10.00	1:00
30/11/2021 08:00	3.00	3.00								10.00	10.40	1:00
30/11/2021 16:00	10.00	10.00	4.20							10.60	10.80	1:00
01/12/2021 08:00	10.00	10.00	3.15									

Equipment / plant used: Dando 2000 cable percussive rig

Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. Cable Percussive GL-10.8mbgl

	Plas Newydd Swansea Tel: 01554744880 email: enquiries@quantumgeotech.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		P Osborn	S Picton	1 Of 2	11		

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Contract : Global Centre of Rail Excellence										Borehole No.		
Client : Global Centre of Rail Excellence										BH31		
Dates : 29/11/21 - 1/12/21				Job Number : Q0652				Ground Level : 238.61 m A.O.D. Level to Ordnance Datum				
Location : Around washery area				Engineer : ARUP				Coordinates: 284880.77 E 210454.81 N Co-ordinates to National Grid				

m B.G.L.	Samples		Insitu Test Results		Strata				Legend	Red. Level A.O.D.	Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description					
11					10.80	Sandstone. Cobbles and boulders are rounded to sub-rounded Sandstone Weak to strong dark grey SILTSTONE. Recovered as fine to coarse angular to sub-angular GRAVEL (SOUTH WALES COAL MEASURES) Terminated at 10.80mbgl upon refusal. Progressed using rotary drilling methods			227.81		
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours

Equipment / plant used: Dando 2000 cable percussive rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. Cable Percussive GL-10.8mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		P Osborn	S Picton	2 Of 2	11		

Contract : Global Centre of Rail Excellence										Borehole No. BH31R	
Client : Global Centre of Rail Excellence											
Dates : 6/12/21 - 6/12/21					Job Number : Q0652					Ground Level : 238.61 m A.O.D. Level to Ordnance Datum	
Location :					Engineer : ARUP					Coordinates: 284880.77 E 210454.81 N Co-ordinates to National Grid	

m B.G.L.	Run Details					Fractures		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Type No. Blows	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.			
0									(0.70)	MADE GROUND - Grey sandy silty GRAVEL. Gravel is fine to coarse angular to sub-angular Limestone. Progressed using Cable Percussive Drilling techniques		237.91			
1									0.70	MADE GROUND - Black dark grey slightly silty slightly clayey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal. Progressed using Cable Percussive Drilling techniques					
2															
3															
4									(6.10)						
5															
6															
7									6.80	Soft brown to dark brown fibrous PEAT. Progressed using Cable Percussive Drilling techniques		231.81			
8									(1.00)						
9									7.80	Soft to firm brown grey slightly sandy slightly gravelly slightly silty CLAY with low to medium cobble content. Gravel is fine to coarse sub-angular to sub-rounded Mudstone, Siltstone and Sandstone. Cobbles are rounded to sub-rounded Sandstone. Progressed using Cable Percussive Drilling techniques		230.81			
10									(1.70)						
11									9.50	Medium dense to dense dark grey silty sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone. Progressed using Cable Percussive Drilling techniques		229.11			
12									(0.90)						
13									10.40	Medium dense to dense dark grey silty sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone. Progressed using Cable Percussive Drilling techniques		228.21			
14									(0.20)			228.01			
15									10.60	Firm to stiff grey brown mottled slightly sandy gravelly CLAY with medium cobble and boulder content. Gravel is fine to coarse rounded to sub-rounded Siltstone and Sandstone. Cobbles and boulders are rounded to sub-rounded Sandstone. Progressed using Cable Percussive Drilling techniques		227.81			
16									(0.20)						
17									10.80	Weak to strong dark grey SILTSTONE. Recovered as fine to coarse angular to sub-angular GRAVEL (SOUTH WALES COAL MEASURES). Progressed using Cable Percussive Drilling techniques					
18									(5.20)						
19									16.00	Mudstone / Siltstone (Drillers Description)		222.61			
20									(1.10)	Coal (Drillers Description)					
									17.10	Dark grey Mudstone (Drillers Description)		221.51			

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
				11.70	115.00					10.80 - 35.00	Mist	100

Plant: Dando 2000 cable percussive rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. No Groundwater Strike Observed. Cable Percussive GL-10.8mbgl, ODEX 10.8-11.7mbgl, Rotary 'open hole' 11.7-35.0mbgl

	Plas Newydd Swansea Tel : 01554744880 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		P Osborn	S Picton	1 Of 2	21		

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Contract : Global Centre of Rail Excellence											Borehole No. BH31R	
Client : Global Centre of Rail Excellence												
Dates : 6/12/21 - 6/12/21					Job Number : Q0652					Ground Level : 238.61 m A.O.D. Level to Ordnance Datum		
Location :					Engineer : ARUP					Coordinates: 284880.77 E 210454.81 N Co-ordinates to National Grid		

m B.G.L.	Run Details					Fractures		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Type No. Blows	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.			
21										(8.40)	Dark grey Mudstone (Drillers Description)				
22															
23															
24															
25															
26										25.50 (1.00)	Coal (Drillers Description)		213.11		
27										26.50 (1.60)	Dark grey Mudstone (Drillers Description)		212.11		
28										28.10	Mudstone / Siltstone (Drillers Description)		210.51		
29															
30															
31															
32										(6.90)					
33															
34															
35										35.00	Terminated at 35.0mbgl (Scheduled Depth)		203.61		
36															
37															
38															
39															
40															
41															

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns

Plant: Dando 2000 cable percussive rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. No Groundwater Strike Observed. Cable Percussive GL-10.8mbgl, ODEX 10.8-11.7mbgl, Rotary 'open hole' 11.7-35.0mbgl

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		P Osborn	S Picton	2 Of 2	21		

Form Name: ROTARY. Version 2.11.000, 22/05/15 Output By: Phil Darby. Library File: C:\USERS\PHIL DARBY\ONEDRIVE - QUANTUM GEOTECHNIC LTD\QUANTUM 4.GLB.

Contract : Global Centre of Rail Excellence										Borehole No.	
Client : Global Centre of Rail Excellence										BH32	
Dates : 6/12/21 - 6/12/21				Job Number : Q0652				Ground Level : 244.73 m A.O.D. Level to Ordnance Datum			
Location : Around washery area				Engineer : ARUP				Coordinates: 284967.95 E 210230.01 N Co-ordinates to National Grid			

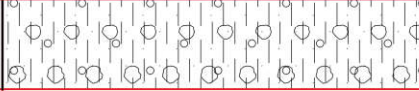
m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
0	0.20	ES1				Grass over soft to firm brown sandy gravelly silty CLAY with medium cobble content. Gravel is fine to coarse sub-angular to sub-rounded Mudstone, Siltstone and Sandstone. Cobbles are rounded to sub-rounded Sandstone		(3.60)	
	0.50 - 1.00	B2							
1	1.00	ES3							
	1.20 - 1.70	B5	1.20	SPT (C) 50/190mm (2-4-9-21-20/40mm--)	(3.60)				
2	2.00	ES6	2.00	SPT (C) 50/125mm (7-10-27-23/50mm--)		Stiff grey brown mottled slightly sandy very gravelly CLAY with medium cobble and boulder content. Gravel is fine to coarse rounded to sub-rounded Siltstone and Sandstone. Cobbles and boulders are rounded to sub-rounded Sandstone		241.13	
	2.00 - 2.50	B8						(0.70)	
3	3.00	ES9	3.00	SPT (C) 32 (4-7-7-8-8-9)					
	3.00 - 3.50	B11				Weak to strong dark grey black MUDSTONE with coal bands. Recovered as fine to coarse angular to sub-angular GRAVEL (SOUTH WALES COAL MEASURES)		240.43	
4	4.00	ES12	4.00	SPT (C) 50/225mm (8-10-12-15-23-)	3.60 (0.70)			(0.70)	
	4.30 - 5.00	B14			4.30 (0.70)	Terminated at 5.00mbgl upon refusal. Progressed using rotary drilling methods		239.73	
5			5.00	SPT (C) 50/100mm (22/55mm-36-14/25mm--)	5.00				
6									
7									
8									
9									
10									

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
				4.50	150.00	4.50	3.80	Medium ground water strike at 4.50mbgl		1.20	1.60	1:00
										2.40	2.80	1:00
										4.70	5.00	1:00

Equipment / plant used: Dando 2000 cable percussive drill rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. Cable Percussive GL-5.0mbgl

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		P Osborn	S Picton	1 Of 1	11		

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Core Details			Samples		Insitu Tests		Strata			Discontinuities				
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description
						(3.60)	Grass over soft to firm brown sandy gravelly silty CLAY with medium cobble content. Gravel is fine to coarse sub-angular to sub-rounded Mudstone, Siltstone and Sandstone. Cobbles are rounded to sub-rounded Sandstone. Progressed using Cable Percussive drilling methods							
						3.60	Stiff grey brown mottled slightly sandy very gravelly CLAY with medium cobble and boulder content. Gravel is fine to coarse rounded to sub-rounded Siltstone and Sandstone. Cobbles and boulders are rounded to sub-rounded Sandstone. Progressed using Cable Percussive drilling methods Weak to strong dark grey black MUDSTONE with coal bands. Recovered as fine to coarse angular to sub-angular GRAVEL (SOUTH WALES COAL MEASURES). Progressed using Cable Percussive drilling methods Weak dark grey MUDSTONE. Highly to completely weathered to fine to coarse angular gravel, locally sandy and clayey. (SOUTH WALES COAL MEASURES)		241.13					
						(0.70)								
						4.30			240.43					
						(0.70)				239.73				
						5.00								
						(6.80)								
							 below 10.6mgl with one discontinuity set							
										10.60				10 to 20 degree discontinuity set (bedding) spaced, smooth planar, tight to partly open
							Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug Groundwater Strike Observed. Cable Percussive GL-5.0mbgl, ODEX 5.0-5.7mbgl, Rotary coring 7.5-16.2-35.0mbgl				
			Groundwater			Casing								
Water		Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns	Colour			
		5.70	115.00					5.00 - 35.00	Mist	100				

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[illegible]

[illegible]

Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH32R

Dates : 9/12/21 - 14/12/21

Job Number : Q0652

Ground Level : 244.73 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 284967.95E
210230.01 N
Co-ordinates to National Grid



Plas Newydd
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P Osborn

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S Picton

Sheet No.
1 Of 2

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH32R

Dates : 9/12/21 - 14/12/21

Job Number : Q0652

Ground Level : 244.73 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 284967.95E
210230.01 N
Co-ordinates to National Grid



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Sheet No.
2 Of 2

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence										Borehole No.		
Client : Global Centre of Rail Excellence										BH33		
Dates : 25/11/21 - 26/11/21					Job Number : Q0652			Ground Level : 230.51 m A.O.D. Level to Ordnance Datum				
Location : Around washery area					Engineer : ARUP			Coordinates: 284397.04 E 210700.88 N Co-ordinates to National Grid				

m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
0	0.20	ES1				MADE GROUND - Grass over black dark grey slightly silty slightly clayey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal			
1	0.50 - 1.00	B2							
1	1.00	ES3			(2.00)				
	1.20	SPT4							
	1.20 - 1.70	B5	1.20	SPT (S) 6 (1-1-1-2-1-2)					
2	2.00	ES6			2.00	Soft brown to dark brown fibrous PEAT		228.51	
	2.00 - 2.50	SPT7 B8		SPT (S) 7 (1-1-2-2-2-1)					
	2.70	U1 - /%							
3	3.00	ES9			(2.00)				
	3.00 - 3.50	SPT10 B11	3.00	SPT (S) 6 (1-1-2-1-2-1)					
4	4.00	ES12			4.00	Medium dense to dense dark grey silty sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone		226.51	
	4.00 - 4.50	B14	4.00	SPT (C) 9 (1-2-2-2-2-3)	(0.90)				
5	4.90 - 5.00	D16	5.00	SPT (C) 50/100mm (14-9/30mm-39-11/25mm-)	4.90 (0.10) 5.00	Weak to strong dark grey MUDSTONE. Recovered as fine to coarse angular to sub-angular GRAVEL (SOUTH WALES COAL MEASURES) Terminated at 5.00mbgl upon refusal. Progressed using rotary drilling methods		225.61 (0.10) 225.51	
6									
7									
8									
9									
10									

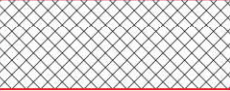
Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
25/11/2021 17:00	4.00	4.00	0.70	4.00	115.00	1.00	0.70	Medium ground water strike at 1.00mbgl		4.70	5.00	1:00
26/11/2021 08:00	4.00	4.00	2.60									

Equipment / plant used: Dando 2000 Cable Percussion rig

Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. Cable Percussive GL-5.0mbgl

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
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Sample Details				Samples		Insitu Tests		Strata		Discontinuities					
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description	
							MADE GROUND - Grass over black dark grey slightly silty slightly clayey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal. Progressed using Cable Percussive Drilling techniques								
						(2.00)									
						2.00	Soft brown to dark brown fibrous PEAT. Progressed using Cable Percussive Drilling techniques		228.51						
						(2.00)									
						4.00	Medium dense to dense dark grey silty sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone. Progressed using Cable Percussive Drilling techniques		226.51						
						(0.90)									
						4.90	Weak to strong dark grey MUDSTONE. Recovered as fine to coarse angular to sub-angular GRAVEL (SOUTH WALES COAL MEASURES). Progressed using Cable Percussive Drilling techniques		225.61						
						(0.10)			225.51						
						5.00									
						(0.70)									
						5.70	Weathered Mudstone (Drillers Description)		224.81						
						(1.50)	Weak grey SILTSTONE with one discontinuity set. between 5.7 and 5.95mbgl highly weathered to fine to coarse angular tabular Gravel			5.70					Sub-horizontal discontinuity set (bedding) spaced, smooth planar, partly open to open locally highly weathered to fine angular gravel penetration.
500	19			5.40 - 5.90	C1		 between 5.95 and 6.5mbgl thick sandstone laminations			1.50					
						7.20	Weak to medium strong dark grey MUDSTONE with one discontinuity set. Locally thinly laminated. (SOUTH WALES COAL MEASURES)		223.31	7.20					Sub-horizontal discontinuity set (bedding) spaced, smooth planar, tight to partly open locally highly weathered to fine to coarse angular tabular gravel penetration.
						(6.00)	 between 10.2 and 10.45mbgl highly weathered to coarse angular Gravel								Between 7.48 and 7.6mbgl sub-vertical discontinuity set (bedding) planar and undulating, tight to partly open, clay infill.
							 between 10.8 and 11.1mbgl highly weathered to fine to coarse								
				Groundwater			Flush		Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug Groundwater Strike Observed. Cable Percussive GL-5.0mbgl, ODEX 5.0-5.7mbgl, Rotary coring 5.7 - 16.2-35.0mbgl						
				Casing			Sealed	Depth	Type	Returns	Colour				
Water	2.00	5.70	115.00					5.00 - 35.00	Mist	100					

Core Details			Samples		Insitu Tests		Strata		Discontinuities					
Max	FI	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	Depth (Thickness)	Dip	Direction	Fracture Set	Discontinuity Description
						(11.90)								
						28.10 (0.80)	Coal (Drillers Description)		202.41					
						28.90	Mudstone / Siltstone (Drillers Description)		201.61					
						(6.10)								
Groundwater							Flush			Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug. Groundwater Strike Observed. Cable Percussive GL-5.0mbgl, ODEX 5.0-5.7mbgl, Rotary coring 5.7-16.2-35.0mbgl				
Casing			Groundwater				Sealed	Depth	Type	Returns	Colour			
Water			Struck	Rose To	Behaviour									

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH33R

Dates : 1/12/21 - 2/12/21

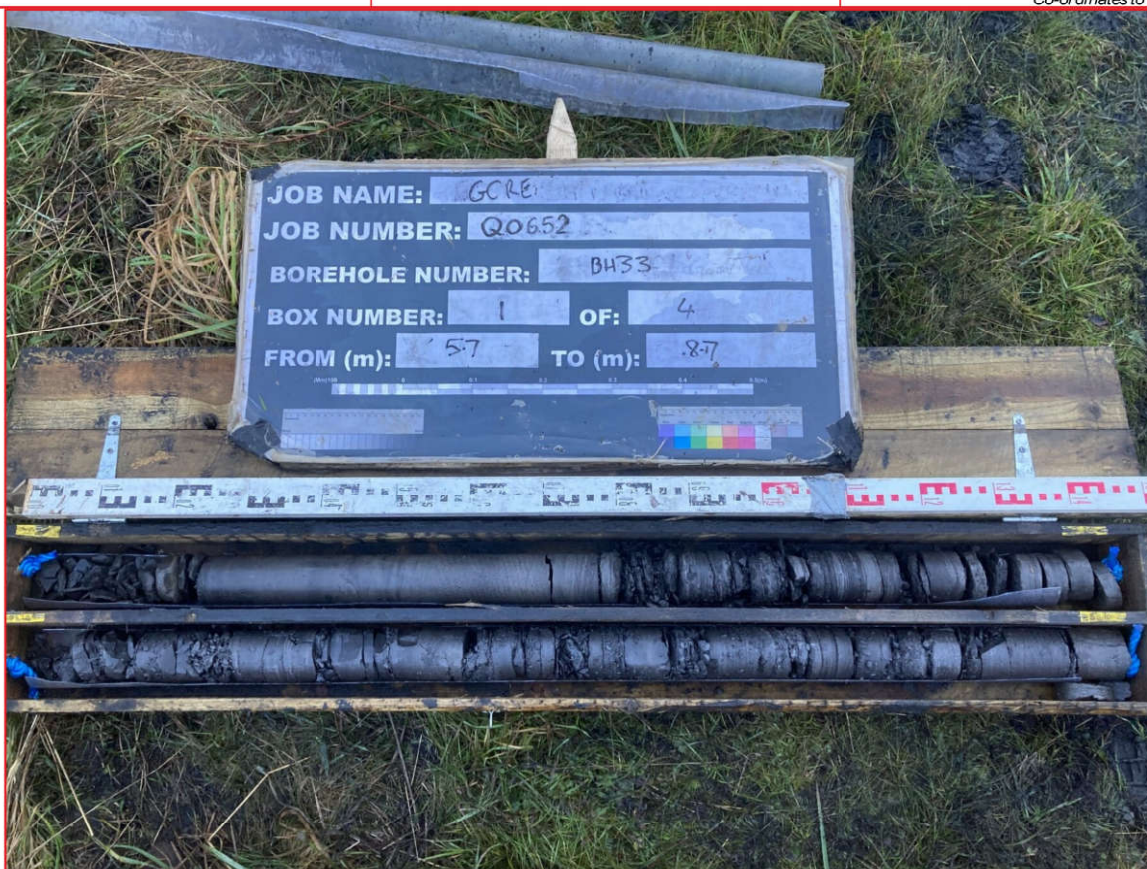
Job Number : Q0652

Ground Level : 230.51 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 284397.04E
210700.88 N
Co-ordinates to National Grid



Plas Newydd
Swansea
Tel: 01554744880
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Operator:
P Osborn

Logged By:
S Picton

Sheet No.
1 Of 2

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Borehole No.

BH33R

Dates : 1/12/21 - 2/12/21

Job Number : Q0652

Ground Level : 230.51 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 284397.04E
210700.88 N
Co-ordinates to National Grid



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2 Of 2

m Per
Page
2

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence										Borehole No.		
Client : Global Centre of Rail Excellence										BH34		
Dates : 24/11/21 - 25/11/21					Job Number : Q0652			Ground Level : 232.64 m A.O.D. Level to Ordnance Datum				
Location : Around washery area					Engineer : ARUP			Coordinates: 284419.61 E 210543.60 N Co-ordinates to National Grid				

m B.G.L.	Samples		Insitu Test Results		Strata				Water
	Depth	Type No. Blows	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
0	0.20	ES1				MADE GROUND - Grass over black dark grey slightly silty clayey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal			
	0.50 - 1.00	B2							
1	1.00	ES3							
	1.20	SPT4							
	1.20 - 1.70	B5	1.20	SPT (S) 9 (2-3-3-2-2-2)	(3.30)			(3.30)	
2	2.00	ES6							
		SPT7							
		B8	2.00	SPT (S) 11 (1-2-2-3-3-3)					
3	3.00	ES9							
		SPT10							
	3.30	D11							
	3.30 - 3.80	B12	3.00	SPT (S) 11 (1-2-3-3-2-3)	3.30	MADE GROUND - Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-angular Mudstone		229.34	
4	4.00	ES13							
	4.00 - 4.50	SPT14							
		B15	4.00	SPT (S) 7 (1-1-2-1-2-2)	(1.50)			(1.50)	
5	5.00	ES16							
		SPT17							
			5.00	SPT (S) 6 (1-2-1-2-1-2)	4.80 (0.15) 4.95	MADE GROUND - Soft grey silty CLAY with fibrous Peat MADE GROUND - Soft brown to dark brown fibrous PEAT		227.84 (0.15) 227.69	
6	6.00 - 6.50	B18							
	6.20	B1							
	6.50	U1 - %							
	6.50 - 6.90	SPT19							
		B20	6.50	SPT (S) 12 (2-3-4-3-2-3)	(1.95)			(1.95)	
7	7.50 - 8.00	B21							
			6.90		(1.10)	MADE GROUND - Soft to firm black brown sandy gravelly CLAY. Gravel is fine to coarse sub-angular to angular Mudstone and ash		225.74 (1.10)	
8	8.00	ES22							
	8.00 - 8.50	B24							
			8.00	SPT (C) 34 (4-6-8-8-9-9)	8.00	Grey light brown mottled slightly clayey slightly silty sandy GRAVEL with medium cobble and boulder content. Gravel is fine to coarse sub-rounded to sub-angular Siltstone and Sandstone. Cobbles are rounded to sub-rounded Sandstone		224.64	
9									
			9.50	SPT (C) 35 (5-7-8-8-9-10)	(1.90)			(1.90)	
10	9.90 - 10.00	B26							
			10.00	SPT (C) 50/100mm (10-15/35mm-36-14/25mm-)	9.90 (0.10) 10.00	Strong dark grey SILTSTONE (SOUTH WALES COAL MEASURES) Terminated at 10.00mbgl upon refusal. Progressed using rotary drilling methods		222.74 (0.10) 222.64	

Hole Progress / Water Obs				Casing		Groundwater				Chiselling		
Date / Time	H. Depth	C. Depth	Water	Depth	Cas. Dia.	Struck	Rose To	Behaviour	Sealed	From	To	Hours
24/11/2021 17:00	8.00	8.00	4.60	10.00	150.00	3.50	2.40	Medium ground water strike at 3.50mbgl				
25/11/2021 08:00	8.00	8.00	4.00									

Equipment / plant used: Dando 2000 Cable Percussive rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. Cable Percussive GL-10.0mbgl

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence										Borehole No. BH34R	
Dates : 1/12/21 - 1/12/21 Location :				Job Number : Q0652 Engineer : ARUP				Ground Level : 232.63 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 284419.61 E 210543.60 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Run Details				Fractures		Samples		Strata				Water	Install/Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Type No. Blows	Depth (Thickness)	Description	Legend	Red. Level A.O.D.		
0														
1									(3.30)	MADE GROUND - Grass over black dark grey slightly silty clayey sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal. Progressed using Cable Percussive drilling techniques				
2														
3									3.30	MADE GROUND - Soft brown slightly sandy slightly gravelly silty CLAY. Gravel is fine to coarse angular to sub-angular Mudstone. Progressed using Cable Percussive drilling techniques		229.33		
4									(1.50)					
5									4.80 (0.15)	MADE GROUND - Soft grey silty CLAY with fibrous Peat. Progressed using Cable Percussive drilling techniques		227.83		
6									4.95 (1.95)			227.68		
7									6.90	MADE GROUND - Soft brown to dark brown fibrous PEAT. Progressed using Cable Percussive drilling techniques		225.73		
8									(1.10)					
9									8.00	MADE GROUND - Soft to firm black brown sandy gravelly CLAY. Gravel is fine to coarse sub-angular to angular Mudstone and ash. Progressed using Cable Percussive drilling techniques		224.63		
10									(1.90)					
11									9.90 (0.10)	Grey light brown mottled slightly clayey slightly silty sandy GRAVEL with medium cobble and boulder content. Gravel is fine to coarse sub-rounded to sub-angular Siltstone and Sandstone. Cobbles are rounded to sub-rounded Sandstone. Progressed using Cable Percussive drilling techniques		222.73		
12									10.00 (1.70)			222.63		
13									11.70	Strong dark grey SILTSTONE (SOUTH WALES COAL MEASURES). Progressed using Cable Percussive drilling techniques		220.93		
14									(2.80)	Weathered Mudstone (Drillers Description)				
15										Mudstone (Drillers Description)				
16									14.50	Mudstone / Siltstone Bands (Drillers Description)		218.13		
17														
18														
19														
20									(7.60)					

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns
				11.70	115.00	14.00 19.50	6.40	Medium groundwater inflow at 14.0mbgl Fast Groundwater inflow at 19.5mbgl		0.00 - 30.00	Mist	100

Plant: Dando 2000 Cable Percussive rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. Cable Percussive GL-10.0mbgl, ODEX 10.0-11.7mbgl, Roatry 'open hole' 11.7-30.0mbgl

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Contract : Global Centre of Rail Excellence											Borehole No. BH34R		
Client : Global Centre of Rail Excellence													
Dates : 1/12/21 - 1/12/21						Job Number : Q0652				Ground Level : 232.63 m A.O.D. Level to Ordnance Datum			
Location :						Engineer : ARUP				Coordinates: 284419.61 E 210543.60 N Co-ordinates to National Grid			

m B.G.L.	Run Details					Fractures		Samples		Strata				Water	Install/ Backfill
	Core Run	TCR %	SCR %	RQD %	Min Avg Max	FI	Depth	Type No. Blows	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.			
21															
22									22.10	Weak Coal (Drillers Description)		210.53			
23									(1.90)						
24									24.00	Mudstone / Siltstone Bands (Drillers Description)		208.63			
25															
26															
27									(6.00)						
28															
29															
30									30.00	Terminated at 30.0mbgl (Scheduled Depth)		202.63			
31															
32															
33															
34															
35															
36															
37															
38															
39															
40															
41															

Hole Progress / Water Obs				Casing		Groundwater				Flush		
Date / Time	H. Depth	C. Depth	Water	Depth	Diam.	Struck	Rose To	Behaviour	Sealed	Depth	Type	Returns

Plant: Dando 2000 Cable Percussive rig
Remarks: BH set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken. Cable Percussive GL-10.0mbgl, ODEX 10.0-11.7mbgl, Roatry 'open hole' 11.7-30.0mbgl

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Unit 8
Orton Enterprise Centre
Orton Southgate
Peterborough
PE2 6XU

SPT Hammer Ref: SAM1
Test Date: 02/05/2021
Report Date: 02/05/2021
File Name: SAM1.spt
Test Operator: PR

Instrumented Rod Data

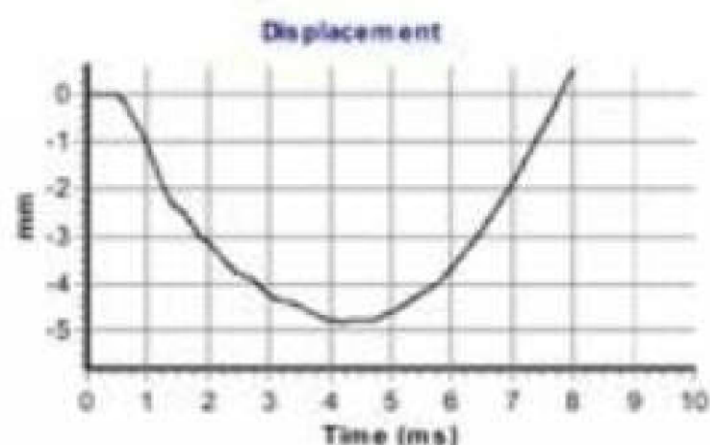
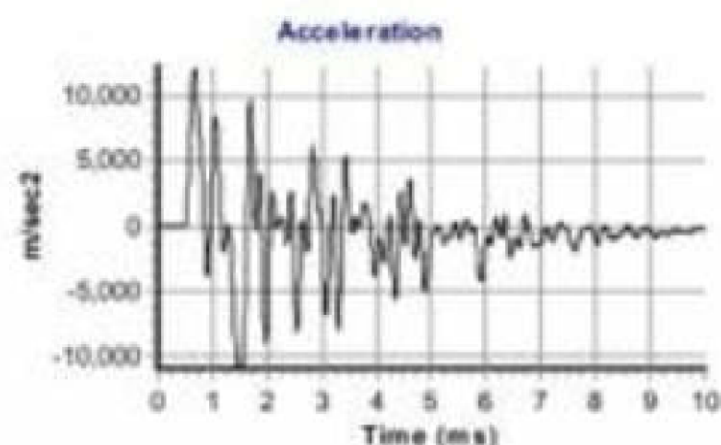
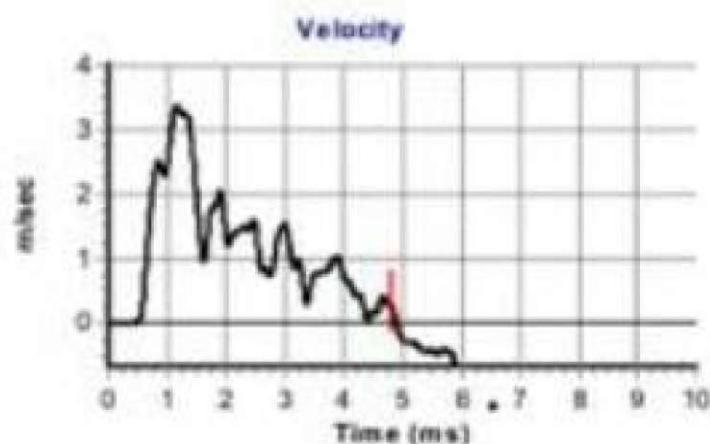
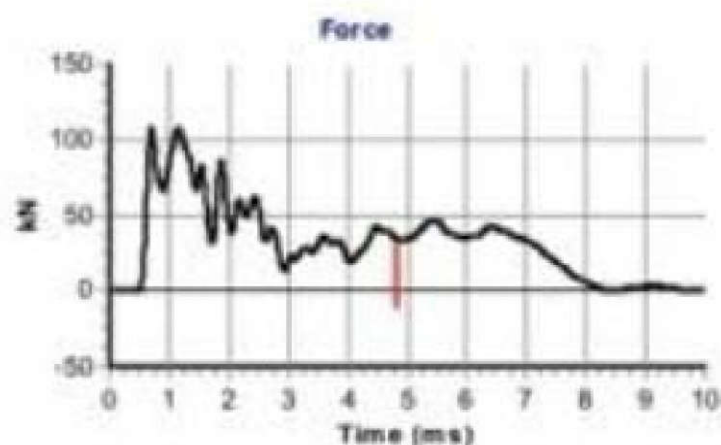
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.3
Assumed Modulus E_s (GPa): 208
Accelerometer No.1: 11853
Accelerometer No.2: 10332

SPT Hammer Information

Hammer Mass m (kg): 63.0
Falling Height h (mm): 760
SPT String Length L (m): 15.0

Comments / Location

Recommended calibration interval is 6 months, maximum 12



Calculations

Area of Rod A (mm^2): 944
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 358

Energy Ratio E_r (%): **76**

P. Rodgman
Signed: PR
Title: Operator

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

Unit 8
Orton Enterprise Centre
Orton Southgate
Peterborough
PE2 6XU

SPT Hammer Ref: XL140 (Sonic Dual Head)

Test Date: 28/12/2021

Report Date: 28/12/2021

File Name: XL140.spt

Test Operator: CR

Instrumented Rod Data

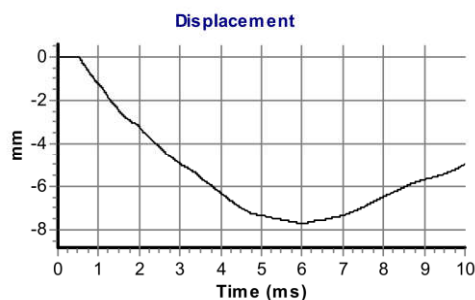
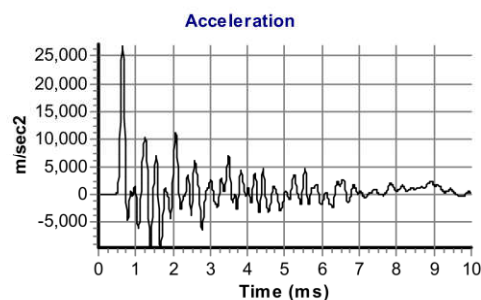
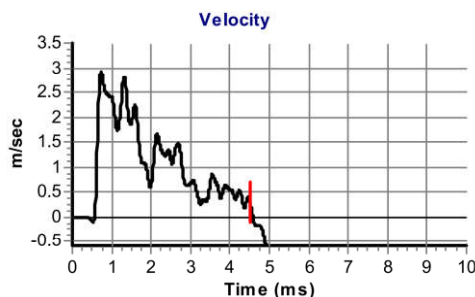
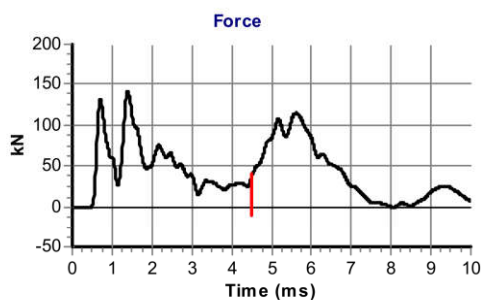
Diameter d_r (mm): 54
 Wall Thickness t_r (mm): 6.3
 Assumed Modulus E_a (GPa): 208
 Accelerometer No.1: 11941
 Accelerometer No.2: 11942

SPT Hammer Information

Hammer Mass m (kg): 63.5
 Falling Height h (mm): 760
 SPT String Length L (m): 15.0

Comments / Location

Recommended calibration interval is 6 months.
 Sonic CPT



Calculations

Area of Rod A (mm²): 944
 Theoretical Energy E_{theor} (J): 473
 Measured Energy E_{meas} (J): 382

Energy Ratio E_r (%): **71**

CR

Signed: CR

Title: Operator

Instrumented rod

$$d_r = 0.052 \text{ m}$$

$$L = 0.558 \text{ m}$$

$$A = 11.61 \text{ cm}^2$$

$$E = 206843 \text{ MPa}$$

Key

- 1 Anvil
- 2 Part of instrumented rod
- 3 Drive Rod
- 4 Strain Gauge
- 5 Accelerometer
- 6 Ground

F Force

d_r Diameter of rod

Fig. B.1 and B.2

BS EN ISO 22476-3 : 2005 + A1 : 2011

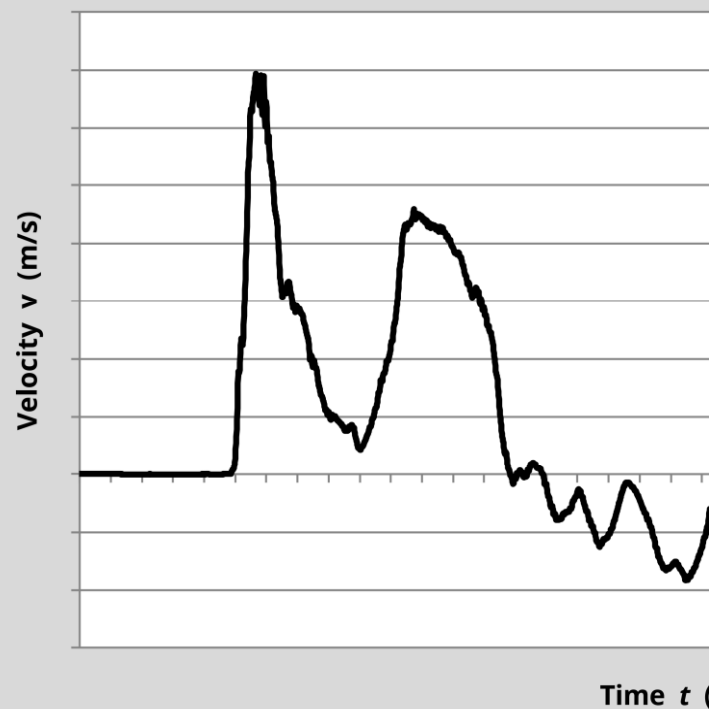
UNTIL HAMMER ID

2022

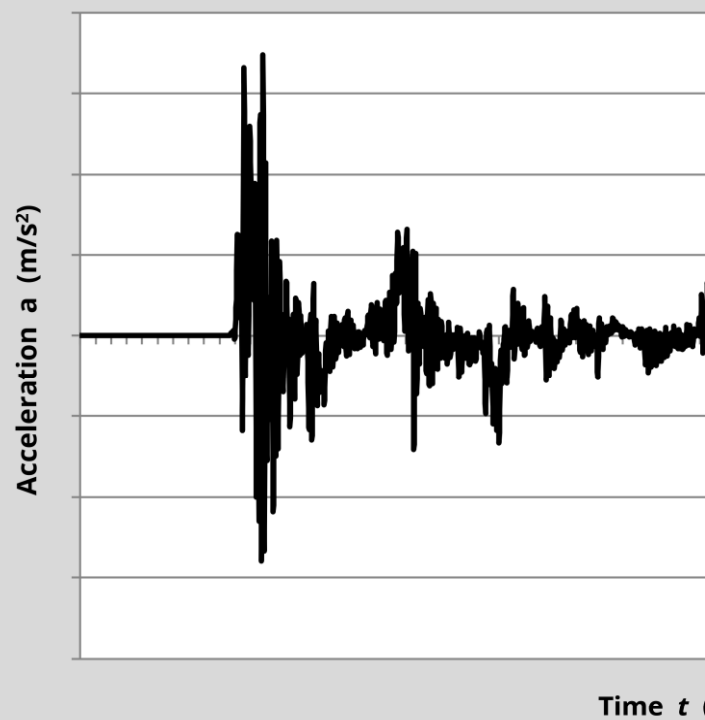
Q2 AR830

20 kN-m

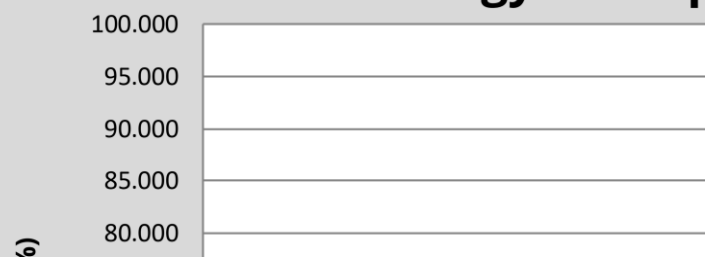
Particle



Acceler



Energy Ratio p



Instrumented rod

$d_r = 0.052 \text{ m}$

0.558 m

$A = 11.61 \text{ cm}^2$

$\sigma_a = 206843 \text{ MPa}$

Key

- 1 Anvil
- 2 Part of instrumented rod
- 3 Drive Rod
- 4 Strain Gauge
- 5 Accelerometer
- 6 Ground

F Force

d_r Diameter of rod

Fig. B.1 and B.2

BS EN ISO 22476-3 : 2005 + A1 : 2011

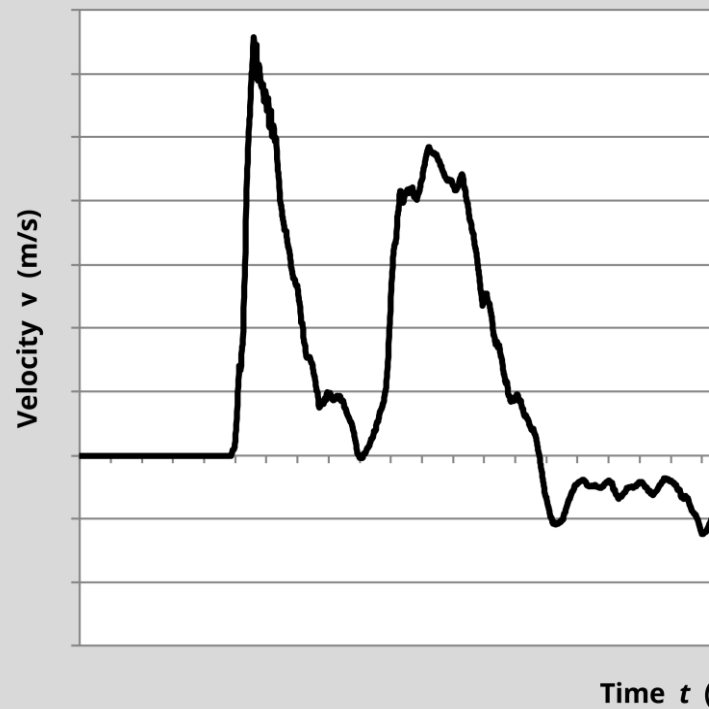
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2022

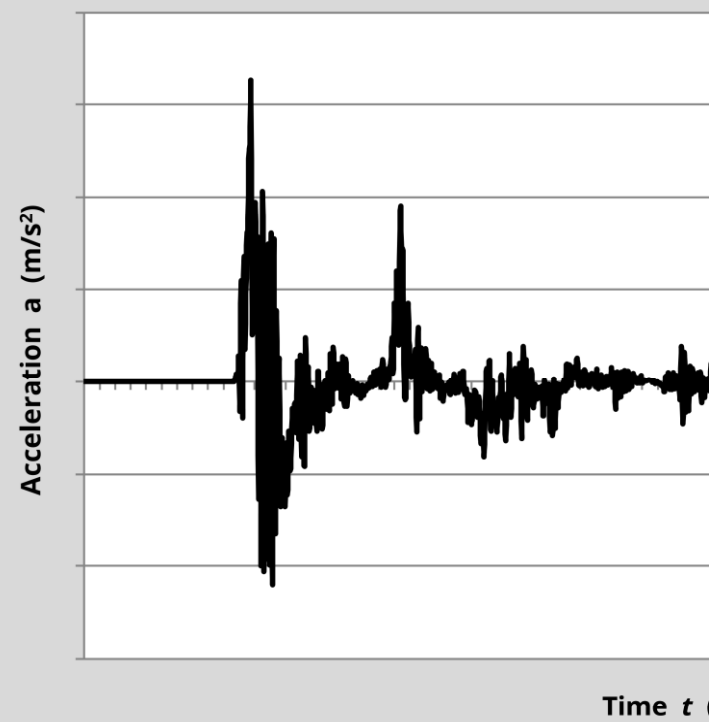
Q5

85 kN-m

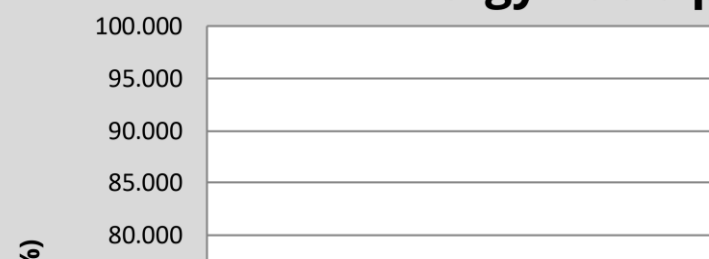
Particle



Acceler



Energy Ratio p



KEY TO BOREHOLE AND TRIAL PIT LOGS

MATERIAL LEGENDS

	Made Ground		Topsoil		Clay
	Gravel		Sand		Silt
	Peat		Boulders		Cobbles
	Chalk		Conglomerate		Volcaniclastic
	Asphalt		Void		Mudstone
	Siltstone		Sandstone		Limestone
	Ironstone		Mudstone / Siltstone		Breccia
	Coal		Coral		Bedrock
	Shale		Gypsum		Igneous (Coarse Grained)
	Igneous (Fine Grained)		Igneous (Medium Grained)		Metamorphic (Coarse Grained)
	Metamorphic (Fine Grained)		Metamorphic (Medium Grained)		

INSTALLATION / BACKFILL DETAILS

	Arisings		Concrete		Bentonite cement grout
	Bentonite seal		Filter		Pea Gravel
	Plain pipe		Slotted pipe		Piezometer / Standpipe tip

NOTE:
Legend symbols in accordance with BS 5930 (2015)

KEY TO BOREHOLE AND TRIAL PIT LOGS

m.A.O.D. metres Above Ordnance Datum.

SAMPLE AND TEST TYPES

U	Undisturbed driven tube sample - 102mm diameter, 450mm long.
P	Undisturbed pushed piston sample - 102mm diameter, 1000mm long.
TW	Undisturbed thin walled push in sample - 100mm diameter, 750mm long.
B	Bulk disturbed sample.
BLK	Block Sample
CBR	Heavy duty undisturbed sample - 154 mm diameter (CBR mould).
D	Small disturbed sample.
LB	Large Bulk disturbed sample (for earthworks testing)
C	Core sample
W	Water sample
G	Gas sample
ES	Environmental sample (soil)
j	Jar sample
t	Tub sample
p	Pot sample
s	Small sample
v	Vial sample
S	Standard Penetration Test using split spoon sampler. (See Note).
C	Standard Penetration Test using a solid 60 degree cone. (See Note).

NOTE: Where a single value is quoted this is the N value for 300 mm penetration following a seating drive of 150 mm. Where this full penetration is not achieved the number of blows is quoted for the penetration below the seating drive eg. 63/160 mm.

Where total penetration is less than the seating drive this is indicated by a + and the number of blows for total penetration is quoted eg. +50/75 mm.

HV	Hand Vane Test. Vane undrained shear strength, c_u , quoted in kPa.
V	Borehole Vane Test. Vane undrained shear strength, c_u , quoted in kPa.
FHT/RHT	Falling / Rising Head Permeability Test.

CORE RUN DETAILS

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
FI	Fracture Index. NI - Non intact where > 25 No. per metre length.

WATER COLUMN SYMBOLS

	First water strike, second water strike etc.
	Standing water level after first strike, second strike etc.
	Seepage.

NOTE:
Legend symbols in accordance with BS 5930 (2015)

APPENDIX III – ENGINEERS MACHINE EXCAVATED TRENCH & PIT LOGS

Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP01	
Dates : 7/1/22 - 7/1/22				Job Number : Q0652		Ground Level : 229.98 m A.O.D. <i>Level to Ordnance Datum</i>		
Location : Around washery area				Engineer : ARUP		Coordinates: 284246.92 E 210515.99 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.20 -	ES1			0.60	MADE GROUND - Grass over brown clayey sandy silty GRAVEL with high cobble and boulder content. Gravel is fine to coarse angular to sub-angular of Brick, Concrete and Mudstone. Cobbles are angular to sub-rounded Concrete and Brick with metal, glass and timber throughout.			
	0.50 -	B1			0.60	MADE GROUND - Loose black to dark grey slightly silty sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal, ash and clinker		229.38	
	1.00 -	B2 ES2			2.20				
	2.00 -	B3 ES3							
2	2.80 -	B4			2.80	Terminated at 2.80mbgl, sides unstable and collapsing. Unable to undertake soakaway test due to high ground water encountered		227.18	

PLAN 		Groundwater: High ground water strike at 1.80mbgl Stability: Unstable and collapsing below 1.00mbgl Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
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Equipment Used: 9 tonne tracked 360 excavator

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP01

Dates : 7/1/22 - 7/1/22

Job Number : Q0652

Ground Level : 229.98 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 284246.92 E
210515.99 N
Co-ordinates to National Grid



Plas Newydd
Swansea
Tel: 01554744890
email: enquiries@quantumgeotechnic.co.uk

Operator:
J Lewis

Logged By:
S Picton

Sheet No.
2 Of 2

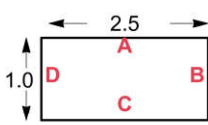
m Per
Page

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP02	
Dates : 7/1/22 - 7/1/22			Job Number : Q0652			Ground Level : 231.44 m A.O.D. <i>Level to Ordnance Datum</i>		
Location : Around washery area			Engineer : ARUP			Coordinates: 284410.81 E 210600.05 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1	0.20 -	B1			0.30	MADE GROUND - Black COAL		
	0.30 -	ES1			0.30	MADE GROUND - Red slightly sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Clinker and Slag with ash		231.14
	0.40 -	ES2			0.10			231.04
			B2			0.40	MADE GROUND - Loose black to dark grey slightly silty sandy GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal and ash	
	1.00 -	B3 ES3			1.90			
2	2.00 - 2.30	B4			2.30	Terminated at 2.80mbgl, sides unstable and collapsing. Unable to undertake soakaway test due to high ground water encountered		229.14
	2.00 -	ES4						

PLAN 	Groundwater: High ground water strike at 1.30mbgl Stability: Unstable and collapsing below 1.00mbgl Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
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Equipment Used: 9 tonne tracked 360 excavator

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence		Trial Pit No.	
Client : Global Centre of Rail Excellence		TP02	
Dates : 7/1/22 - 7/1/22	Job Number : Q0652	Ground Level :	231.44 m A.O.D. <i>Level to Ordnance Datum</i>
Location : Around washery area	Engineer : ARUP	Coordinates:	284410.81 E 210600.05 N <i>Co-ordinates to National Grid</i>



	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		J Lewis	S Picton	2 Of 2			

Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP03	
Dates : 10/1/22 - 10/1/22			Job Number : Q0652			Ground Level : 234.92 m A.O.D. Level to Ordnance Datum		
Location : Around washery area			Engineer : ARUP			Coordinates: 284554.78 E 210496.56 N Co-ordinates to National Grid		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.20 -	ES1			0.60	MADE GROUND - Grass over loose black to dark grey slightly sandy silty GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal, ash, bricks and concrete ...At 0.10mbgl row of bricks encountered within side wall of pit			
	0.50 -	B1							
	0.80 - 1.00	ES2			0.60	MADE GROUND - Loose black dark grey silty sandy GRAVEL with medium cobble content. Gravel is fine to coarse angular to sub-angular Mudstone. Cobbles are angular to sub-angular Mudstone		234.32	
	1.00 -	B2							
2	2.00 -	B3 ES3			2.70	 sample at 2.0mbgl slightly sandy gravelly CLAY			
3	3.00 - 3.30 3.00 -	B4 ES4							
					3.30	Terminated at 3.30mbgl, sides unstable and collapsing no progress being made		231.62	

PLAN 	Groundwater: Slight ground water seepage at 2.80mbgl	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
	Stability: Unstable and collapsing below 1.50mbgl	
	Shoring: N/A	

Equipment Used: 9 tonne tracked 360 excavator

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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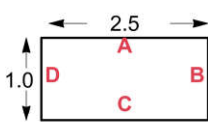
Contract : Global Centre of Rail Excellence		Trial Pit No.
Client : Global Centre of Rail Excellence		TP03
Dates : 10/1/22 - 10/1/22	Job Number : Q0652	Ground Level : 234.92 m A.O.D. <i>Level to Ordnance Datum</i>
Location : Around washery area	Engineer : ARUP	Coordinates: 284554.78 E 210496.56 N <i>Co-ordinates to National Grid</i>



	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		J Lewis	S Picton	2 Of 2			

Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP04	
Dates : 10/1/22 - 10/1/22			Job Number : Q0652		Ground Level : 239.16 m A.O.D. <i>Level to Ordnance Datum</i>			
Location : Around washery area			Engineer : ARUP		Coordinates: 284819.63 E 210502.79 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	
1	0.20 -	ES1				MADE GROUND - Grass over loose black to dark grey slightly clayey sandy silty GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal, ash and timber			
	0.50 -	B1							
	1.00 -	B2 ES2							
2					3.60				
	2.00 -	B3 ES3							
3									
	3.00 -	B4 ES4							
	3.60 -	B5			3.60	Terminated at 3.60mbgl, unable to proceed past cobbles/boulders at base of pit		235.56	

PLAN 		Groundwater: Medium ground water strike at 1.50mbgl Stability: Unstable below 1.80mbgl Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
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Equipment Used: 9 tonne tracked 360 excavator

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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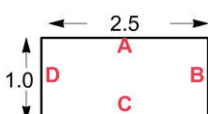
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Client : Global Centre of Rail Excellence		TP04
Dates : 10/1/22 - 10/1/22	Job Number : Q0652	Ground Level : 239.16 m A.O.D. <i>Level to Ordnance Datum</i>
Location : Around washery area	Engineer : ARUP	Coordinates: 284819.63 E 210502.79 N <i>Co-ordinates to National Grid</i>



	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		J Lewis	S Picton	2 Of 2			

Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP05	
Dates : 10/1/22 - 10/1/22			Job Number : Q0652		Ground Level : 240.57 m A.O.D. <i>Level to Ordnance Datum</i>			
Location : Around washery area			Engineer : ARUP		Coordinates: 284970.62 E 210390.89 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.20 -	ES1				MADE GROUND - Grass over loose black to dark grey slightly sandy slightly silty GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal, ash, bricks, roots and rootlets			
	0.50 -	B1 B2							
	1.00 -	B2 ES2							
2	2.00 -	B3 ES3				Terminated at 3.00mbgl, sides unstable and collapsing no progress being made		237.57	
	3.00 -	B4 ES4							

PLAN 		Groundwater: No ground water encountered Stability: Unstable and collapsing below 1.30mbgl Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
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Equipment Used: 9 tonne tracked 360 excavator

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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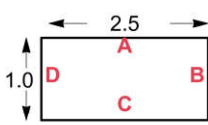
Contract : Global Centre of Rail Excellence		Trial Pit No.
Client : Global Centre of Rail Excellence		TP05
Dates : 10/1/22 - 10/1/22	Job Number : Q0652	Ground Level : 240.57 m A.O.D. Level to Ordnance Datum
Location : Around washery area	Engineer : ARUP	Coordinates: 284970.62 E 210390.89 N Co-ordinates to National Grid



	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		J Lewis	S Picton	2 Of 2			

Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP06	
Dates : 10/1/22 - 10/1/22			Job Number : Q0652			Ground Level : 237.14 m A.O.D. Level to Ordnance Datum		
Location : Around washery area			Engineer : ARUP			Coordinates: 285168.40 E 210396.23 N Co-ordinates to National Grid		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.20 -	ES1				MADE GROUND - Grass over loose black to dark grey slightly sandy silty GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal, ash, roots and rootlets			
	0.50 -	B1							
	1.00 -	B2 ES2			 sample at 1.0mbgl sandy gravelly CLAY				
2					1.60	Firm grey brown mottled slightly sandy very gravelly CLAY with medium cobble and boulder content. Gravel is fine to coarse sub-angular to sub-rounded Mudstone and Siltstone. Cobbles and boulders are rounded to sub-rounded Sandstone		235.54	
	2.00 -	B3 ES3			1.20				
	2.80 -	B4			2.80				
						Terminated at 2.80mbgl, unable to proceed past cobbles/boulders at base of pit		234.34	

PLAN 	Groundwater: No ground water encountered	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
	Stability: Unstable below 1.50mbgl	
	Shoring: N/A	

Equipment Used: 9 tonne tracked 360 excavator

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP06

Dates: 10/1/22 - 10/1/22

Job Number : Q0652

Ground Level : 237.14 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 285168.40 E
210396.23 N
Co-ordinates to National Grid



Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:
J Lewis

Logged By:
S Picton

Sheet No.
2 Of 2

m Per
Page

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP07	
Dates : 10/1/22 - 10/1/22			Job Number : Q0652			Ground Level : 232.57 m A.O.D. Level to Ordnance Datum		
Location : Around washery area			Engineer : ARUP			Coordinates: 285325.24 E 210402.83 N Co-ordinates to National Grid		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.20 -	ES1				MADE GROUND - Grass over loose black to dark grey slightly sandy silty GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal, ash, metal, rubber, roots and rootlets			
	0.50 -	B1							
	1.00 -	B2 ES2							
2	2.00 -	B3 ES3			3.80				
3	3.00 -	B4 ES4							
4	3.80 - 4.00	B5			3.80	Firm grey brown mottled slightly sandy very gravelly CLAY with medium cobble and boulder content. Gravel is fine to coarse sub-angular to sub-rounded Mudstone and Siltstone. Cobbles and boulders are rounded to sub-rounded Sandstone Terminated at 4.00mbgl specified depth		228.77	
					0.20				
	4.00 -	ES5			4.00				228.57

PLAN

Groundwater: Slight ground water seepage at 0.30mbgl,
Medium ground water strike at 2.60mbgl

Stability: Unstable and collapsing below 2.00mbgl

Shoring: N/A

Remarks: TP set out by QGL in liaison with ARUP.
Services checked and area CAT scanned

Equipment Used: 9 tonne tracked 360 excavator

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		J Lewis	S Picton	1 Of 2	5		

Form Name: TP LOG. Version 2.11.100, 27/11/20 Output By: Phil Darby. Library File: C:\USERS\PHIL DARBY\ONEDRIVE - QUANTUM GEOTECHNIC LTD\QUANTUM 4.GLB.

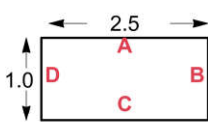
Contract : Global Centre of Rail Excellence		Trial Pit No.
Client : Global Centre of Rail Excellence		TP07
Dates : 10/1/22 - 10/1/22	Job Number : Q0652	Ground Level : 232.57 m A.O.D. <i>Level to Ordnance Datum</i>
Location : Around washery area	Engineer : ARUP	Coordinates: 285325.24 E 210402.83 N <i>Co-ordinates to National Grid</i>



	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		J Lewis	S Picton	2 Of 2			

Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP08	
Dates : 11/1/22 - 11/1/22			Job Number : Q0652		Ground Level : 243.46 m A.O.D. <i>Level to Ordnance Datum</i>			
Location : Around washery area			Engineer : ARUP		Coordinates: 284939.20 E 210661.10 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.20 -	ES1				MADE GROUND - Loose black to dark grey slightly silty sandy GRAVEL with medium to high cobble and boulder content. Gravel is fine to coarse angular to sub-angular Mudstone. Cobbles and boulders are sub-angular to sub-rounded Mudstone with coal, ash and railway sleepers			
	0.50 -	B1							
	1.00 -	B2 ES2							
2					3.00				
	2.00 -	B3 ES3							
3	3.00 -	B4 ES4			3.00	Terminated at 3.00mbgl, sides unstable and collapsing no progress being made		240.46	

PLAN 		Groundwater: Slight ground water seepage at 0.80mbgl Stability: Unstable and collapsing below 0.50mbgl Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
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Equipment Used: 9 tonne tracked 360 excavator

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence		Trial Pit No.	
Client : Global Centre of Rail Excellence		TP08	
Dates : 11/1/22 - 11/1/22	Job Number : Q0652	Ground Level :	243.46 m A.O.D. <i>Level to Ordnance Datum</i>
Location : Around washery area	Engineer : ARUP	Coordinates:	284939.20 E 210661.10 N <i>Co-ordinates to National Grid</i>



	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By.	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		J Lewis	S Picton	2 Of 2			

Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP09	
Dates : 11/1/22 - 11/1/22			Job Number : Q0652		Ground Level : 243.47 m A.O.D. Level to Ordnance Datum			
Location : Around washery area			Engineer : ARUP		Coordinates: 285134.98 E 210589.13 N Co-ordinates to National Grid			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.20 -	ES1				MADE GROUND - Grass over soft black to dark grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Gravel is fine to coarse angular to sub-angular Mudstone. Cobbles are sub-angular to angular Mudstone with coal, ash, roots and rootlets			
	0.50 -	B1							
2	1.00 -	B2 ES2			2.00	MADE GROUND - Loose black to dark grey slightly sandy silty GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal and ash		241.47	
	2.00 -	B3 ES3			2.00				
3	3.00 -	B4 ES4			2.00	Terminated at 4.00mbgl specified depth		239.47	
4	4.00 -	B5 ES5			4.00				

PLAN 		Groundwater: Slight ground water seepage at 0.20mbgl Stability: Unstable and collapsing below 2.00mbgl Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
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Equipment Used: 9 tonne tracked 360 excavator

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP09

Dates : 11/1/22 - 11/1/22

Job Number : Q0652

Ground Level : 243.47 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 285134.98 E
210589.13 N
Co-ordinates to National Grid



Plas Newydd
Swansea
Tel: 01554744890
email: enquiries@quantumgeotechnic.co.uk

Operator:
J Lewis

Logged By:
S Picton

Sheet No.
2 Of 2

m Per Page

All measurements in metres unless otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP10	
Dates : 7/12/21 - 7/12/21			Job Number : Q0652		Ground Level : 257.77 m A.O.D. Level to Ordnance Datum			
Location :			Engineer : ARUP		Coordinates: 283248.02 E 210699.94 N Co-ordinates to National Grid			

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1	0.10 -	D1			0.15	TOPSOIL: Brown very gravelly CLAY with many rootlets.		
	0.30 -	D2			0.15	MADE GROUND: Brown clayey slightly sandy GRAVEL. Gravel is angular to sub angular fine to coarse siltstone.		257.62
	0.30 - 0.50	LB3			0.45			
	1.00 - 1.50	B4			0.60	MADE GROUND: Dark grey slightly clayey slightly sandy GRAVEL with low cobble content of siltstone. Gravel is angular to sub angular fine to coarse siltstone.		257.17
2	2.00 -	B5			2.00			
	2.00 - 2.50	LB5						
	2.60 -	D6			2.60	Trial Pit terminated at 2.6mbgl, sides collapsing, pit unstable.		255.17

PLAN 		Groundwater: No groundwater encountered Stability: Sides collapsing from surface Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 9tonne tracked 360 excavator

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: JL	Logged By: A Jones	Sheet No. 1 Of 1	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

**Trial Pit No.
TP10**

Dates : 7/12/21 - 7/12/21

Job Number : Q0652

Ground Level :

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 283248.02 E
210699.94 N
Co-ordinates to National Grid



Plas Newydd, Llanedi, Pontarddulais, Swansea
SA4 0FQ
Tel: 01554 744880
email: enquiries@quantumgeotech.co.uk

Operator:
JL

Logged By:
A Jones

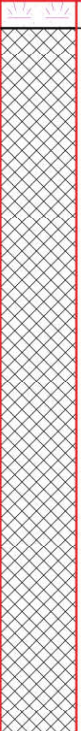
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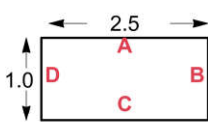
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metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP11	
Dates : 10/1/22 - 10/1/22			Job Number : Q0652		Ground Level : 251.09 m A.O.D. <i>Level to Ordnance Datum</i>			
Location :			Engineer : ARUP		Coordinates: 283484.77 E 210766.09 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1	0.01 -	D1			0.10	TOPSOIL: Brown clayey slightly sandy GRAVEL with many rootlets. Gravel is angular to sub angular fine to coarse siltstone. MADE GROUND: Dark grey slightly silty slightly sandy GRAVEL with medium cobble content and low boulder content of siltstone. Gravel is angular to sub angular fine to coarse siltstone, rare fine to medium coal and sub angular to sub rounded fine to coarse sandstone with plastic and timber.		250.99
	0.30 -	D2			0.10			
	0.50 - 1.00	LB3						
	1.50 - 2.00	LB4			2.60			
2					2.70	Trial pit terminated at 2.7mbgl, sides collapsing due to fast groundwater ingress.		248.39

PLAN 	Groundwater: Fast ground water ingress at 2.2mbgl Stability: Sides collapsing from 1.5mbgl. Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 15Tonne tracked 360						
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	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: AA	Logged By: A Jones	Sheet No. 1 Of 1	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP11

Dates : 10/1/22 - 10/1/22

Job Number : Q0652

Ground Level :

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 283484.77 E
210766.09 N
Co-ordinates to National Grid



Plas Newydd, Llanedi, Pontarddulais, Swansea
SA4 0FQ
Tel: 01554 744880
email: enquiries@quantumgeotech.co.uk

Operator:
AA

Logged By:
A Jones

Sheet No.
2 Of 2

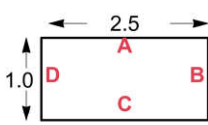
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metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP12	
Dates: 11/1/21 - 11/1/21			Job Number : Q0652			Ground Level : 242.24 m A.O.D. <i>Level to Ordnance Datum</i>		
Location :			Engineer : ARUP			Coordinates: 285143.13 E 210543.08 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1 2 3 4						Dense black slightly clayey sandy Gravel with medium cobble content, many wood fragments and occasional pockets of soft brown clay. Gravel is fine to coarse angular mudstone and siltstone. Cobbles are angular mudstone and occasional brick.			
					4.50	 at 2.3mbgl possible / suspected concrete railway sleeper			
					4.50	Terminated at 4.5mbgl		237.74	

PLAN 	Groundwater: Stability: Stable Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked, area CAT scanned No Groundwater Encountered
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Equipment Used: 13 tonne excavator	
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	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: QGL	Logged By: P Darby	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP12

Dates: 11/1/21 - 11/1/21

Job Number : Q0652

Ground Level : 242.24 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 285143.13 E
210543.08 N
Co-ordinates to National Grid



Plas Newydd
Swansea
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email: enquiries@quantumgeotechnic.co.uk

Operator:
QGL

Logged By:
P Darby

Sheet No.
2 Of 2

**m Per
Page**

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP13	
Dates : 11/1/21 - 11/1/21			Job Number : Q0652		Ground Level : 238.83 m A.O.D. <i>Level to Ordnance Datum</i>			
Location :			Engineer : ARUP		Coordinates: 285116.03 E 210469.73 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1						MADE GROUND - Dark grey to black very silty sandy GRAVEL with high cobble content. Gravel is fine to coarse angular mudstone. Cobbles are angular mudstone. At northern end of pit much cable, steel rope, metal sheeting, concrete cobbles and boulders, timber and occasional plastic bags.			
2					3.90				
3									
4					3.90 0.10 4.00	Grey slightly silty GRAVEL. Gravel is fine to coarse angular mudstone. Terminated at 4.0mbgl		234.93 234.83	

PLAN 	Groundwater: Moderate localised groundwater inflow between 3.8 and 3.9mbgl Stability: Signifint instability at norther end of pit Shoring: N/A	Remarks: Excavation restricted by nearby trees. Located approximately 1.5m from scheduled location
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Equipment Used: 13 tonne tracked excavator

	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: QGL	Logged By.	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP13

Dates: 11/1/21 - 11/1/21

Job Number : Q0652

Ground Level : 238.83 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 285116.03 E
210469.73 N
Co-ordinates to National Grid



Plas Newydd
Swansea
Tel: 01554744880
email: enquiries@quantumgeotechnic.co.uk

Operator:
QGL

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Sheet No.
2 Of 2

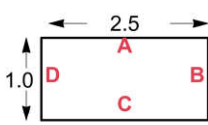
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otherwise stated



Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence							Trial Pit No. TP14	
Dates : 11/1/22 - 11/1/22 Location : Around washery area			Job Number : Q0652 Engineer : ARUP			Ground Level : 233.46 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 285232.47 E 210442.23 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1					2.30	MADE GROUND - Grass over loose black to dark grey slightly sandy silty GRAVEL with high cobble and boulder content. Gravel is fine to coarse angular to sub-angular Mudstone. Cobbles and boulders are sub-angular to angular Sandstone with coal, ash, metal, fabric, glass, clinker, bricks, bones, roots and rootlets			
2					2.30	Loose grey light brown mottled slightly sandy clayey GRAVEL with high cobble and boulder content. Gravel is fine to coarse sub-angular to sub-rounded Mudstone and Siltstone. Cobbles and boulders are rounded to sub-rounded Sandstone with iron staining		231.16	
3					1.20				
					3.50	Terminated at 3.50mbgl, sides unstable and collapsing		229.96	

PLAN 	Groundwater: Slight ground water seepage at 2.30mbgl Stability: Unstable and collapsing Shoring: N/A	Remarks: TT set out by QGL in liaison with ARUP. Services checked and area CAT scanned
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Equipment Used: 9 tonne tracked 360 excavator	
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	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 3	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP14

Dates: 11/1/22 - 11/1/22

Job Number : Q0652

Ground Level : 233.46 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

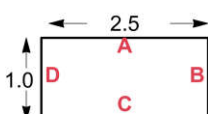
Coordinates: 285232.47 E
210442.23 N
Co-ordinates to National Grid



Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence				Trial Pit No. TP14	
Dates : 11/1/22 - 11/1/22 Location : Around washery area		Job Number : Q0652 Engineer : ARUP		Ground Level : 233.46 m A.O.D. <i>Level to Ordnance Datum</i>	
				Coordinates: 285232.47 E 210442.23 N <i>Co-ordinates to National Grid</i>	
					
 Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk		Operator: J Lewis		Logged By: S Picton	
		Sheet No. 3 Of 3		m Per Page	
				All measurements in metres unless otherwise stated	
					

Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP14A	
Dates : 11/1/22 - 11/1/22			Job Number : Q0652			Ground Level : 232.94 m A.O.D. <i>Level to Ordnance Datum</i>		
Location : Around washery area			Engineer : ARUP			Coordinates: 285233.98 E 210444.91 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1					1.70	MADE GROUND - Grass over loose black to dark grey slightly sandy silty GRAVEL with high cobble and boulder content. Gravel is fine to coarse angular to sub-angular Mudstone. Cobbles and boulders are sub-angular to angular Sandstone with coal, ash, metal,			
					1.70	Loose grey light brown mottled slightly sandy very clayey GRAVEL with high cobble and boulder content. Gravel is fine to coarse sub-angular to sub-rounded Mudstone and Siltstone. Cobbles and boulders are rounded to sub-rounded Sandstone with iron staining		231.24	
2					1.80				
3					3.50	Terminated at 3.50mbgl, sides unstable and collapsing		229.44	

PLAN 	Groundwater: No ground water encountered Stability: Unstable and collapsing Shoring: N/A	Remarks: TT set out by QGL in liaison with ARUP. Services checked and area CAT scanned
--	--	--

Equipment Used: 9 tonne tracked 360 excavator							
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	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP14A

Dates: 11/1/22 - 11/1/22

Job Number : Q0652

Ground Level : 232.94 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 285233.98 E
210444.91 N
Co-ordinates to National Grid



Plas Newydd
Swansea
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email: enquiries@quantumgeotechnic.co.uk

Operator:
J Lewis

Logged By:
S Picton

Sheet No.
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m Per
Page

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP15	
Dates : 12/1/22 - 12/1/22			Job Number : Q0652			Ground Level : 248.11 m A.O.D. Level to Ordnance Datum		
Location :			Engineer : ARUP			Coordinates: 284779.25 E 210390.75 N Co-ordinates to National Grid		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1					1.00	MADE GROUND - Dense black very silty sandy GRAVEL with high cobble content. Gravel is fine to coarse sub-angular coal. Cobbles are sub-angular coal.			
					1.00	MADE GROUND - Dense grey slightly silty sandy GRAVEL with high cobble content and medium boulder content. Gravel is fine to coarse angular gravel. Cobbles and boulders are mudstone.		247.11	
2						 below 1.6mbgl loose to medium dense very silty sandy Gravel with low cobble and boulder content.			
					3.50				
3									
4									
					4.50	Terminated at 4.5mbgl		243.61	

PLAN 		Groundwater: Stability: Stable Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked, area CAT scanned and hand dug pit to 1.20mbgl undertaken No groundwater encountered
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Equipment Used: 13 tonne tracked excavator							
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	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: QGL	Logged By: P Darby	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP15

Dates : 12/1/22 - 12/1/22

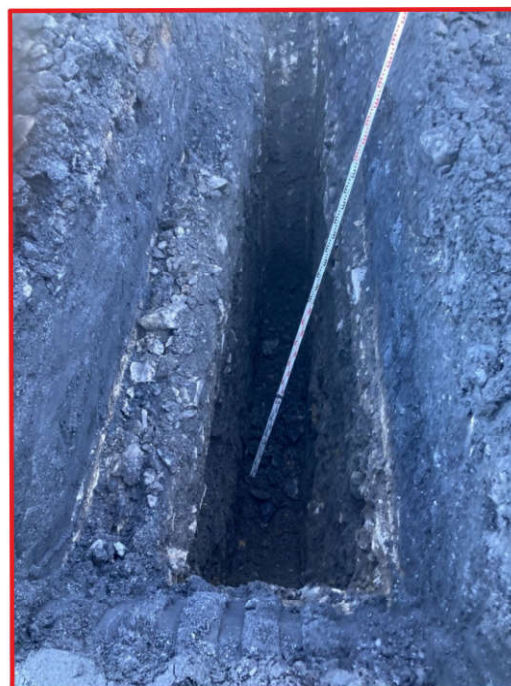
Job Number : Q0652

Ground Level : 248.11 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 284779.25 E
210390.75 N
Co-ordinates to National Grid



Plas Newydd
Swansea
Tel: 01554744890
email: enquiries@quantumgeotechnic.co.uk

Operator:
QGL

Logged By:
P Darby

Sheet No.
2 Of 2

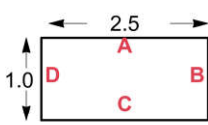
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All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP17	
Dates : 17/1/22 - 17/1/22			Job Number : Q0652			Ground Level : 247.22 m A.O.D. <i>Level to Ordnance Datum</i>		
Location : Around washery area			Engineer : ARUP			Coordinates: 284728.00 E 210394.00 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1					0.30	MADE GROUND - Dense dark grey slightly silty sandy GRAVEL with high cobble content and medium boulder content. Gravel is fine to coarse angular gravel. Cobbles and boulders are mudstone		
					0.30	MADE GROUND - Dense black very silty sandy GRAVEL with medium to high cobble content. Gravel is fine to coarse sub-angular coal. Cobbles are sub-angular coal and Mudstone		246.92
2					3.70			
3								
4					4.00	Terminated at 4.00mbgl specified depth		243.22

PLAN 	Groundwater: No ground water encountered	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
	Stability: Unstable below 2.50mbgl	
	Shoring: N/A	

Equipment Used: 9 tonne tracked 360 excavator

 Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: G Jones	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP17

Dates : 17/1/22 - 17/1/22

Job Number : Q0652

Ground Level : 247.22 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 284728.00 E
210394.00 N
Co-ordinates to National Grid



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Swansea
Tel: 01554744890
email: enquiries@quantumgeotechnic.co.uk

Operator:
G Jones

Logged By:
S Picton

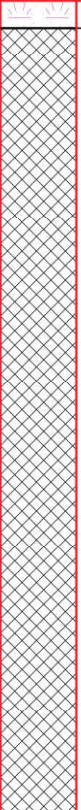
Sheet No.
2 Of 2

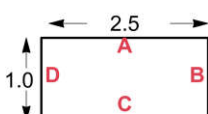
m Per
Page

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Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP18	
Dates : 6/12/21 - 6/12/21			Job Number : Q0652		Ground Level : 221.20 m A.O.D. <i>Level to Ordnance Datum</i>			
Location :			Engineer : ARUP		Coordinates: 283467.81 E 210253.53 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1	0.50 - 1.00	B1			0.10	TOPSOIL - Dark brown SILT / CLAY with many rootlets		221.10
	0.50 -	D1			0.10	MADE GROUND - Dark grey gravelly CLAY with low cobble content. Gravel is fine to coarse angular mudstone and rare coal. Cobbles are sub-angular mudstone. (COLLIERY SPOIL)		
2	1.50 - 2.00	B2			2.90			
	1.50 -	D2						
3	2.50 - 3.00	B3			3.00	Terminated at 3.0mbgl due to significant instability		218.20
	2.50 -	D3						

PLAN 	Groundwater: Stability: Significant Instability Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked, area CAT scanned Damp between 1.5 and 2.5mbgl
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Equipment Used: 9 tonne tracked excavator							
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP18

Dates : 6/12/21 - 6/12/21

Job Number : Q0652

Ground Level : 221.20 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283467.81 E
210253.53 N
Co-ordinates to National Grid



Plas Newydd
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QGL

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P Darby

Sheet No.
2 Of 3

**m Per
Page**

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metres unless
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP18

Dates : 6/12/21 - 6/12/21

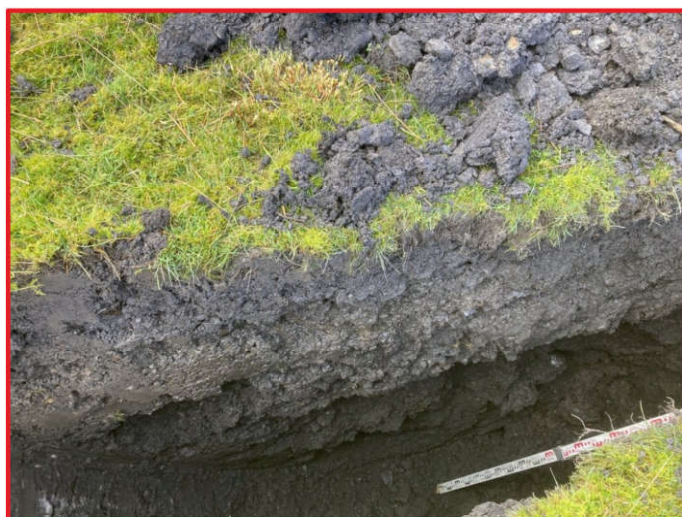
Job Number : Q0652

Ground Level : 221.20 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 283467.81 E
210253.53 N
Co-ordinates to National Grid



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Operator:
QGL

Logged By:
P Darby

Sheet No.
3 Of 3

**m Per
Page**

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP19	
Dates : 8/12/21 - 8/12/21			Job Number : Q0652			Ground Level : 247.39 m A.O.D. Level to Ordnance Datum		
Location :			Engineer : ARUP			Coordinates: 282624.08 E 210468.10 N Co-ordinates to National Grid		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.00 - 0.10	D1	0.3	Vane - P=36 - R=18kN/m2 Vane - P=40 - R=20kN/m2 Vane - P=32 - R=16kN/m2	0.20	TOPSOIL: Black slightly silty slightly sandy organic CLAY.		247.19	
	0.30 -	D2			0.20	Soft to firm yellowish brown grey sandy gravelly CLAY with low cobble content of sandstone. Gravel is sub angular to sub rounded fine to coarse sandstone.			
	0.50 - 1.00	LB3			0.85				
	1.50 -	B4			1.05	Firm dark grey slightly sandy gravelly CLAY with low cobble content of sandstone. Gravel is angular to sub rounded fine to coarse sandstone, angular to sub angular fine to coarse siltstone.			246.34
2	2.50 - 3.00	LB5	2.95	 at 1.5mbgl very silty / clayey slightly sandy Gravel					
	3.20 -	D6	with low boulder content of siltstone from 2.4mbgl						
	3.50 - 4.00	B7							
4					4.00	Trial Pit terminated at scheduled depth of 4.0mbgl		243.39	

PLAN 		Groundwater: No groundwater encountered Stability: Stable Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. Soakaway test carried out within pit. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
Equipment Used: 9tonne tracked 360 excavator			

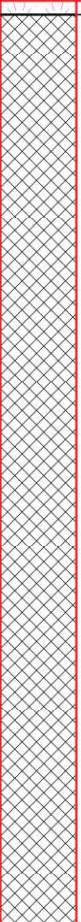
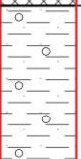
	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: JL	Logged By: A Jones	Sheet No. 1 Of 1	m Per Page 5	All measurements in metres unless otherwise stated	
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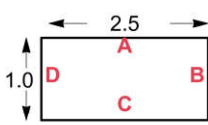
Contract : Global Centre of Rail Excellence Client : GCRE Limited		Trial Pit No. TP19
Dates : 8/12/21 - 8/12/21 Location :	Job Number : Q0652 Engineer : Ove Arup and Partners Ltd	Ground Level : 247.39 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 282624.08 E 210468.10 N <i>Co-ordinates to National Grid</i>



	Plas Newydd, Llanedi, Pontarddulais, Swansea SA4 0FQ Tel: 01554 744880 email: enquiries@quantumgeotech.co.uk	Operator: JL	Logged By: A Jones	Sheet No. 2 Of 2	m Per Page	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence							Trial Pit No. TP20	
Dates : 8/12/21 - 8/12/21 Location :			Job Number : Q0652 Engineer : ARUP			Ground Level : 275.01 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 283231.19 E 211035.80 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1	0.00 - 0.05	D1			0.05	TOPSOIL: Brown clayey GRAVEL with many rootlets. Gravel is angular fine to coarse siltstone. MADE GROUND: Dark grey clayey slightly sandy GRAVEL with low cobble content and low boulder content of siltstone. Gravel is angular to sub angular fine to coarse siltstone and sandstone.		274.96
	0.30 -	D2			0.05			
	0.50 - 1.00	B3						
2	1.50 - 1.50 - 2.00	B4 LB4			3.35			
	2.50 - 3.00	B5						
3	3.50 - 4.00	B6			3.40	Firm brown slightly sandy gravelly silty CLAY. Gravel is sub angular to sub rounded fine to coarse sandstone.		271.61
	4.00 -	D7			0.60			
4					4.00	Trial Pit terminated at scheduled depth of 4.0mbgl		271.01

PLAN 		Groundwater: No groundwater encountered Stability: Stable Shoring: None		Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. Soakaway test carried out within pit. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.	
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Equipment Used: 9tonne tracked 360 excavator

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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP20

Dates : 8/12/21 - 8/12/21

Job Number : Q0652

Ground Level : 275.01 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 283231.19 E
211035.80 N
Co-ordinates to National Grid



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JL

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Sheet No.
2 Of 2

m Per
Page

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP21	
Dates : 9/12/21 - 9/12/21			Job Number : Q0652		Ground Level : 230.34 m A.O.D. Level to Ordnance Datum			
Location :			Engineer : ARUP		Coordinates: 283037.70 E 211907.98 N Co-ordinates to National Grid			

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1	0.10 -	D1			0.15	TOPSOIL: Brown slightly sandy gravelly CLAY with many rootlets. Gravel is angular to sub angular fine to coarse siltstone.		230.19
	0.30 -	D2			0.15			
	0.50 - 1.00	B3				MADE GROUND: Brownish grey clayey slightly sandy GRAVEL with low cobble content of siltstone. Gravel is angular to sub angular fine to coarse siltstone and sandstone.		
	1.00 - 1.00 - 1.50	B4 LB4			1.45			
2					1.60	MADE GROUND: Brownish grey slightly clayey slightly sandy GRAVEL with low cobble content of siltstone. Gravel is angular to sub angular fine to coarse siltstone, sandstone and fine to medium coal.		228.74
	2.00 - 2.50	LB5			1.00			
	2.60 - 2.70	D6			2.60	Soft grey slightly sandy organic CLAY with rootlets		
3					0.10	Firm orange brown with grey mottling slightly sandy very gravelly silty CLAY with low cobble content of sandstone.		227.64
	3.00 - 3.50	B7			2.70			
4					1.30			
	4.00 -	D8			4.00	Trial Pit terminated at scheduled depth of 4.0mbgl		226.34

PLAN 		Groundwater: No groundwater encountered Stability: Sides collapsing 0-2.6mbgl Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. Soakaway test carried out within pit. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 9tonne tracked 360 excavator

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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP21

Dates : 9/12/21 - 9/12/21

Job Number : Q0652

Ground Level : 230.34 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 283037.70 E
211907.98 N
Co-ordinates to National Grid



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Operator:
GJ

Logged By:
A Jones

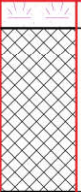
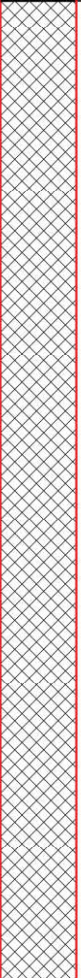
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2 Of 2

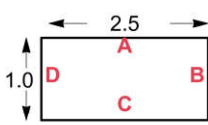
**m Per
Page**

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Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP22	
Dates : 8/12/21 - 8/12/21			Job Number : Q0652		Ground Level : 279.12 m A.O.D. <i>Level to Ordnance Datum</i>			
Location :			Engineer : ARUP		Coordinates: 282687.91 E 210984.95 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1	0.00 - 0.10	D1			0.10	TOPSOIL: Brown clayey sandy GRAVEL with many rootlets. Gravel is angular fine to coarse siltstone. MADE GROUND: Brown clayey slightly sandy GRAVEL. Gravel is angular to sub angular fine to coarse siltstone and sandstone.		279.02
	0.20 - 0.50	LB2			0.10			
	0.60 -	D3			0.60			
	1.00 - 1.50	B4			0.70	MADE GROUND: Dark grey slightly clayey slightly sandy GRAVEL with low cobble content and low boulder content of siltstone. Gravel is angular to sub angular fine to coarse siltstone, sub angular sandstone and rare fine to medium coal.		278.42
2	2.00 - 2.50	LB5			3.60			
	3	3.00 - 3.50	B6					
4.00 - 4.20		B7			4.30	Trial Pit terminated at 4.3mbgl, sides collapsing, pit unstable.		

PLAN 	Groundwater: No groundwater encountered Stability: Sides collapsing Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 9tonne tracked 360 excavator						
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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP22

Dates : 8/12/21 - 8/12/21

Job Number : Q0652

Ground Level : 279.12 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 282687.91 E
210984.95 N
Co-ordinates to National Grid



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Sheet No.
2 Of 2

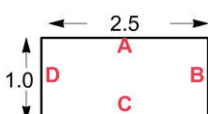
**m Per
Page**

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otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP23	
Dates : 11/1/22 - 11/1/22			Job Number : Q0652		Ground Level : 248.13 m A.O.D. <i>Level to Ordnance Datum</i>			
Location : Around washery area			Engineer : ARUP		Coordinates: 281381.91 E 211314.37 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.50 - 0.50 - 1.00	B1 D1				MADE GROUND - Dense black to dark grey slightly sandy silty GRAVEL with high cobble and boulder content. Gravel is fine to coarse angular to sub-angular Mudstone. Cobbles and boulders are sub-angular to sub-rounded Mudstone and Siltstone			
	1.00 -	B2							
2	2.00 -	D2 B3			4.00				
3	3.00 -	D3 B4							
4	4.00 -	D4 B5			4.00	Terminated at 4.00mbgl specified depth		244.13	

PLAN 		Groundwater: No ground water encountered Stability: Unstable and collapsing below 2.00mbgl Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
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Equipment Used: 30 tonne tracked 360 excavator

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP23

Dates : 11/1/22 - 11/1/22

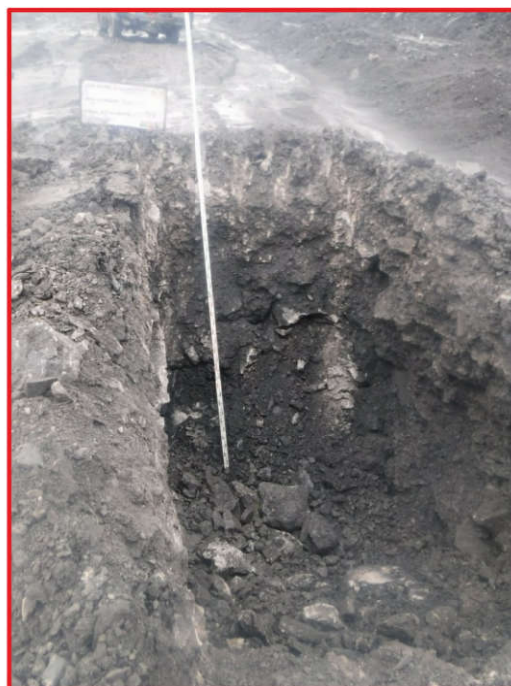
Job Number : Q0652

Ground Level : 248.13 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 281381.91 E
211314.37 N
Co-ordinates to National Grid



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C E

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Sheet No.
2 Of 2

**m Per
Page**

All measurements in
metres unless
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Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP24	
Dates : 7/1/22 - 7/1/22			Job Number : Q0652		Ground Level : 228.44 m A.O.D. Level to Ordnance Datum			
Location :			Engineer : ARUP		Coordinates: 281948.55 E 211934.42 N Co-ordinates to National Grid			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
	0.10 - 0.30	B2				MADE GROUND: Dark grey brown slightly clayey slightly sandy GRAVEL with low cobble content of siltstone. Gravel is angular to sub angular fine to coarse siltstone, sandstone, and red brick with rare fine coal and many rootlets.			
	0.20 -	D1			0.40				
1	1.00 - 1.50	LB3			0.40	MADE GROUND: Grey slightly clayey slightly silty slightly sandy GRAVEL with low cobble and low boulder content of siltstone. Gravel is angular to sub angular fine to coarse siltstone and rare fine to medium coal.		228.04	
2	2.00 - 2.50	B4			4.10				
3	3.00 - 3.50	LB5							
4	4.00 - 4.50	B6							
					4.50	Trial Pit terminated at scheduled depth of 4.5mbgl		223.94	

PLAN 	Groundwater: Slow groundwater ingress at 4.5mbgl Stability: Sides collapsing on removal of boulders Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 15Tonne tracked 360

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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP24

Dates : 7/1/22 - 7/1/22

Job Number : Q0652

Ground Level : 228.44 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 281948.55 E
211934.42 N
Co-ordinates to National Grid



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AA

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A Jones

Sheet No.
2 Of 2

**m Per
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All measurements in
metres unless
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Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP25	
Dates : 10/1/22 - 10/1/22			Job Number : Q0652		Ground Level : 255.63 m A.O.D. <i>Level to Ordnance Datum</i>			
Location :			Engineer : ARUP		Coordinates: 283990.42 E 211456.97 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.00 - 0.01 0.10 - 0.30	D1 B2			0.30	MADE GROUND: Brown slightly sandy gravelly CLAY with many rootlets.			
	0.50 - 1.00	LB3			0.30	MADE GROUND: Grey clayey slightly sandy GRAVEL with low cobble content of siltstone. Gravel is angular to sub angular fine to coarse siltstone and rare coal, sub angular to sub rounded fine to coarse sandstone.		255.33	
2	1.50 - 2.00	B4				...with low boulder content of siltstone from 1.3mbgl			
	2.50 - 2.50 - 3.00	B5 LB5			4.20				
3	3.50 - 4.00	B6							
					4.50	Trial Pit terminated at scheduled depth of 4.5mbgl.			251.13

PLAN 	Groundwater: Seepage at 0.3mbgl Stability: Stable Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 15Tonne tracked 360

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: AA	Logged By: A Jones	Sheet No. 1 Of 1	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP25

Dates : 10/1/22 - 10/1/22

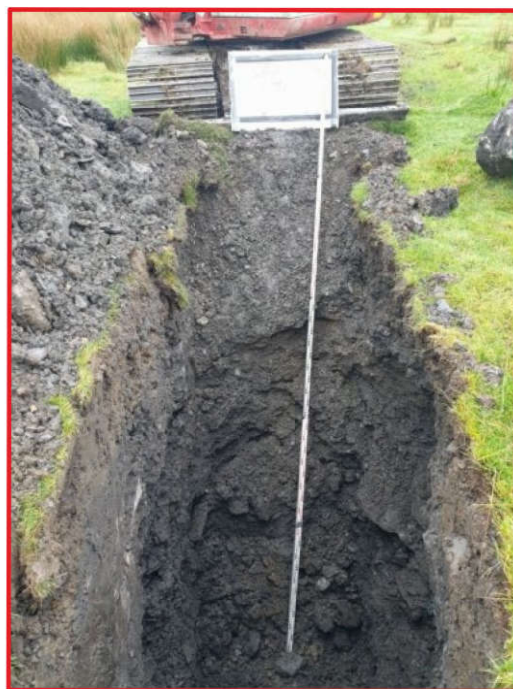
Job Number : Q0652

Ground Level : 255.63 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 283990.42 E
211456.97 N
Co-ordinates to National Grid



Plas Newydd, Llanedi, Pontarddulais, Swansea
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Sheet No.
2 Of 2

**m Per
Page**

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP26	
Dates : 7/12/21 - 7/12/21			Job Number : Q0652		Ground Level : 286.05 m A.O.D. <i>Level to Ordnance Datum</i>			
Location :			Engineer : ARUP		Coordinates: 282977.92 E 210985.14 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1	0.00 - 0.05	D1			0.10	TOPSOIL: Brown clayey sandy GRAVEL with many rootlets. Gravel is angular fine to coarse siltstone.		285.95
	0.20 - 0.40	LB2			0.10	MADE GROUND: Brown clayey slightly sandy GRAVEL. Gravel is angular to sub angular fine to coarse siltstone with rare angular coarse red brick.		
	0.30 -	D3			0.30			
	0.50 - 1.00	B4			0.40	MADE GROUND: Dark grey slightly clayey slightly sandy GRAVEL with low cobble content and low boulder content of siltstone. Gravel is angular to sub angular fine to coarse siltstone, sub angular sandstone and rare fine to medium coal.		
2	1.50 -	B5			3.40			
	1.50 - 2.00	LB5						
	2.50 - 3.00	B6						
3	3.50 -	D7			3.80	Trial Pit terminated at 3.8mbgl, sides collapsing, pit unstable.		282.25

PLAN 	Groundwater: No groundwater encountered Stability: Sides collapsing Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 9tonne tracked 360 excavator						
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	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: JL	Logged By: A Jones	Sheet No. 1 Of 1	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP26

Dates : 7/12/21 - 7/12/21

Job Number : Q0652

Ground Level : 286.05 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 282977.92 E
210985.14 N
Co-ordinates to National Grid



Plas Newydd, Llanedi, Pontarddulais, Swansea
SA4 0FQ
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Operator:
JL

Logged By:
A Jones

Sheet No.
2 Of 2

**m Per
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All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP27	
Dates : 7/12/21 - 7/12/21			Job Number : Q0652		Ground Level : 239.62 m A.O.D. Level to Ordnance Datum			
Location :			Engineer : ARUP		Coordinates: 282341.17 E 210344.22 N Co-ordinates to National Grid			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.10 - 0.20	D1	1.2	Vane - P=12 - R=4kN/m2 Vane - P=10 - R=2kN/m2 Vane - P=14 - R=4kN/m2	0.15	TOPSOIL: Brown slightly sandy gravelly CLAY with many rootlets.		239.47	
	0.20 - 0.50	B2			0.15	MADE GROUND: Brown gravelly sandy slightly organic CLAY			
	0.60 - 0.80	D3			0.60	Dark brown very fibrous PEAT.			
		B4			0.75				
		D5			0.15				
	0.80 - 1.00	B6			0.90	Very soft yellow brown slightly silty slightly sandy slightly gravelly CLAY.		238.72	
	1.00 - 1.20	B6			0.35				
	1.20 - 1.50	D7			1.25	Firm dark grey slightly sandy gravelly CLAY with low cobble and low boulder content of siltstone. Gravel is angular to sub angular fine to coarse siltstone and sandstone,		238.37	
1.50 - 2.00	B8	3.25							
2	2.50 - 3.00		LB10						
				3	3.50 - 4.00	B11			
4.50 -	D9	4.50	Trial Pit terminated at scheduled depth of 4.5mbgl					235.12	

PLAN 		Groundwater: No groundwater encountered Stability: Stable Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 9tonne tracked 360 excavator

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: JL	Logged By: A Jones	Sheet No. 1 Of 1	m Per Page 5	All measurements in metres unless otherwise stated	
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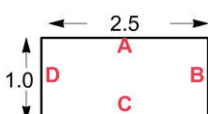
Contract : Global Centre of Rail Excellence		Trial Pit No.	
Client : GCRE Limited		TP27	
Dates : 7/12/21 - 7/12/21	Job Number : Q0652	Ground Level :	239.62 m A.O.D. <i>Level to Ordnance Datum</i>
Location :	Engineer : Ove Arup and Partners Ltd	Coordinates:	282341.17 E 210344.22 N <i>Co-ordinates to National Grid</i>



	Plas Newydd, Llanedi, Pontarddulais, Swansea SA4 0FQ Tel : 01554 744880 email: enquiries@quantumgeotech.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		JL	A Jones	2 Of 2			

Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP28	
Dates : 11/1/22 - 11/1/22			Job Number : Q0652		Ground Level : 251.05 m A.O.D. <i>Level to Ordnance Datum</i>			
Location : Around washery area			Engineer : ARUP		Coordinates: 281604.40 E 211639.77 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.50 -	B1 D1				MADE GROUND - Dense black to dark grey slightly sandy silty GRAVEL with high cobble and boulder content. Gravel is fine to coarse angular to sub-angular Mudstone. Cobbles and boulders are sub-angular to sub-rounded Mudstone and Siltstone			
	1.00 -	B2 D2							
2	2.00 -	B3 D3			4.00				
3	3.00 -	B4 D4							
4	4.00 -	B5 D5			4.00	Terminated at 4.00mbgl specified depth		247.05	

PLAN 		Groundwater: No ground water encountered Stability: Stable Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
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Equipment Used: 30 tonne tracked 360 excavator

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP28

Dates: 11/1/22 - 11/1/22

Job Number : Q0652

Ground Level : 251.05 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 281604.40 E
211639.77 N
Co-ordinates to National Grid



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Operator:
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S Picton

Sheet No.
2 Of 2

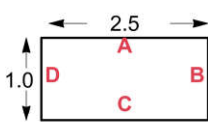
m Per
Page

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otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP29	
Dates : 7/1/22 - 7/1/22			Job Number : Q0652		Ground Level : 230.74 m A.O.D. <i>Level to Ordnance Datum</i>			
Location :			Engineer : ARUP		Coordinates: 282282.62 E 212062.10 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.50 - 1.00	B1				MADE GROUND: Grey slightly clayey slightly silty slightly sandy GRAVEL with medium cobble and low boulder content of siltstone. Gravel is angular to sub angular fine to coarse siltstone and rare fine to medium coal.			
						with high boulder content from 1.0-2.0mbgl (difficult dig)			
2	1.50 - 2.00	LB2							
3	2.50 - 3.00	B3			4.50				
4	3.50 - 4.00	LB4							
	4.50 -	D5			4.50	Trial Pit terminated at scheduled depth of 4.5mbgl - Collapsed back to 4.0mbgl		226.24	

PLAN 	Groundwater: Slight seepage at 0.5mbgl. Stability: Sides collapsing from 3.0mbgl Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 15Tonne tracked 360

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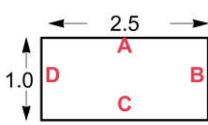
Contract : Global Centre of Rail Excellence Client : GCRE Limited		Trial Pit No. TP29
Dates : 7/1/22 - 7/1/22 Location :	Job Number : Q0652 Engineer : Ove Arup and Partners Ltd	Ground Level : Coordinates:



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Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP30	
Dates : 10/1/22 - 10/1/22			Job Number : Q0652			Ground Level : 252.69 m A.O.D. <i>Level to Ordnance Datum</i>		
Location :			Engineer : ARUP			Coordinates: 284010.55 E 211327.16 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1	0.00 - 0.10	D1			0.10	TOPSOIL: Brown clayey slightly sandy GRAVEL with many rootlets. Gravel is angular to sub angular fine to coarse siltstone. MADE GROUND: Brown slightly clayey slightly sandy GRAVEL. Gravel is angular to sub angular fine to coarse siltstone.		252.59
	0.30 - 0.80	LB3			0.10			
	0.50 -	D2			0.80			
2	1.00 - 1.50	B4			0.90	MADE GROUND: Grey clayey slightly sandy GRAVEL with low cobble and low boulder content of siltstone. Gravel is angular to sub angular fine to coarse siltstone and rare coal, sub angular to sub rounded fine to coarse sandstone.		251.79
	2.00 - 2.50	LB5						
3	3.00 - 3.50	B6						
4	4.00 - 4.50	B7						
					4.50	Trial Pit terminated at scheduled depth of 4.5mbgl.		248.19

PLAN 	Groundwater: No groundwater encountered Stability: Stable Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 15Tonne tracked 360

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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP30

Dates : 10/1/22 - 10/1/22

Job Number : Q0652

Ground Level : 252.69 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 284010.55 E
211327.16 N
Co-ordinates to National Grid



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SA4 0FQ
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Operator:
AA

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A Jones

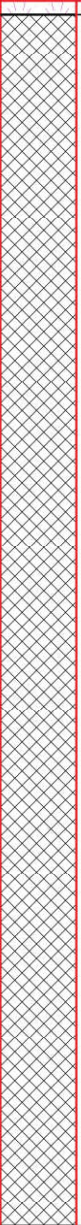
Sheet No.
2 Of 2

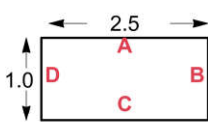
**m Per
Page**

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Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP31	
Dates : 9/12/21 - 9/12/21			Job Number : Q0652		Ground Level : 232.41 m A.O.D. Level to Ordnance Datum			
Location :			Engineer : ARUP		Coordinates: 282490.13 E 211876.52 N Co-ordinates to National Grid			

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1	0.00 - 0.05	D1			0.05	TOPSOIL: Brown slightly sandy gravelly CLAY with many rootlets. Gravel is angular to sub angular fine to coarse siltstone.		232.36
	0.50 - 1.00	B2			0.05	MADE GROUND: Brown and grey slightly sandy gravelly CLAY with low cobble content and low boulder content of siltstone and sandstone. Gravel is angular to sub angular fine to coarse siltstone, sandstone and fine to medium coal with timber.		
	1.50 - 2.00	LB3				 sample between 1.5 and 2.0mbgl clayey silty slightly sandy Gravel		
2					4.45	very clayey from 2.2mbgl		
	2.50 - 3.00	B4						
3								
	3.50 - 4.00	LB5						
4								
	4.50 -	D6			4.50	Trial Pit terminated at scheduled depth of 4.5mbgl		227.91

PLAN 	Groundwater: No groundwater encountered Stability: Sides collapsing 0-2.2mbgl Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 9tonne tracked 360 excavator

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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP31

Dates : 9/12/21 - 9/12/21

Job Number : Q0652

Ground Level : 232.41 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 282490.13 E
211876.52 N
Co-ordinates to National Grid



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Operator:
GJ

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Sheet No.
2 Of 2

m Per
Page

All measurements in
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otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP32	
Dates : 8/12/21 - 8/12/21			Job Number : Q0652		Ground Level : 235.63 m A.O.D. <i>Level to Ordnance Datum</i>			
Location :			Engineer : ARUP		Coordinates: 282814.33 E 211902.59 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata			WATER	
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend		
1	0.00 - 0.10	D1			0.10	TOPSOIL: Brown clayey GRAVEL with many rootlets. Gravel is angular to sub angular fine to coarse siltstone.		235.53	
	0.10 - 0.50	B2			0.10	MADE GROUND: Dark grey very clayey slightly sandy GRAVEL with low cobble content and low boulder content of siltstone. Gravel is angular to sub angular fine to coarse siltstone, sandstone and brick.			
					with steel wire at 1.0-1.1mbgl				
2	2.00 - 2.50	B4				from 2.0mbgl with fine to coarse coal.			
					4.40				
3	2.80 - 3.00	D5							
	3.00 - 3.50	B6							
4	4.00 - 4.50	LB7							
					4.50	Trial Pit terminated at scheduled depth of 4.5mbgl			

PLAN 	Groundwater: No groundwater encountered Stability: Slight collapse of sides. Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 9tonne tracked 360 excavator

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: JL	Logged By: A Jones	Sheet No. 1 Of 1	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP32

Dates : 8/12/21 - 8/12/21

Job Number : Q0652

Ground Level : 235.63 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 282814.33 E
211902.59 N
Co-ordinates to National Grid



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Sheet No.
2 Of 2

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All measurements in
metres unless
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Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence							Trial Pit No. TP33	
Dates : 9/12/21 - 9/12/21 Location :			Job Number : Q0652 Engineer : ARUP		Ground Level : 236.29 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 283304.69 E 211902.41 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.10 -	D1	3.5	Vane - P=48 - R=14kN/m2 Vane - P=56 - R=16kN/m2 Vane - P=54 - R=16kN/m2	0.45	TOPSOIL: Brown slightly sandy gravelly CLAY with many rootlets. Gravel is angular to sub angular fine to coarse siltstone.			
	0.50 - 1.00	LB2			0.45	MADE GROUND: Black slightly silty slightly clayey slightly sandy GRAVEL with low cobble content of siltstone and brick. Gravel is angular to sub angular fine to coarse siltstone.		235.84	
					0.70				
2	1.50 - 2.00	LB3			1.15	MADE GROUND: Brown and grey slightly sandy very gravelly CLAY with low cobble content of siltstone and sandstone. Gravel is angular to sub angular fine to coarse siltstone, sandstone and fine to medium coal. sample between 1.5 and 2.0mbgl clayey silty slightly snady Gravel		235.14	
					1.25				
	2.30 -	D4			2.40	Soft to firm black slightly sandy organic CLAY with rootlets.		233.89	
3	2.50 -	D5			0.25				
	2.80 - 3.20	B6			2.65	Firm pale brownish grey sandy slightly gravelly silty CLAY.		233.64	
			0.95						
4	3.50 -	D7	3.60	Grey clayey slightly sandy GRAVEL with low cobble content of sandstone. Gravel is sub angular to sub rounded fine to coarse sandstone.		232.69			
	3.80 - 4.20	B8	0.90						
			4.50	Trial Pit terminated at scheduled depth of 4.5mbgl		231.79			

PLAN

Groundwater: Seepage at 3.4mbgl

Stability: Stable

Shoring: None

Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.

Equipment Used: 9tonne tracked 360 excavator

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		GJ	A Jones	1 Of 1	5		

Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP33

Dates : 9/12/21 - 9/12/21

Job Number : Q0652

Ground Level : 236.29 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 283304.69 E
211902.41 N
Co-ordinates to National Grid



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Sheet No.
2 Of 2

m Per
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All measurements in
metres unless
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Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP34	
Dates : 10/1/22 - 10/1/22			Job Number : Q0652		Ground Level : 253.80 m A.O.D. <i>Level to Ordnance Datum</i>			
Location :			Engineer : ARUP		Coordinates: 283918.94 E 211654.19 N <i>Co-ordinates to National Grid</i>			

m B.G.L.	Samples		Tests		Strata			WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	
1	0.10 -	D1			0.20	TOPSOIL: Brown clayey slightly sandy GRAVEL with many rootlets. Gravel is angular to sub angular fine to coarse siltstone.		253.60
	0.50 - 0.90	LB2			0.20	MADE GROUND: Brown slightly clayey slightly sandy GRAVEL. Gravel is angular to sub angular fine to coarse siltstone.		
					0.75			
2	1.50 - 2.00	B3			0.95	MADE GROUND: Grey clayey slightly sandy GRAVEL with low cobble content of siltstone. Gravel is angular to sub angular fine to coarse siltstone and rare coal, sub angular to sub rounded fine to coarse sandstone.		252.85
	3	2.50 - 3.00	LB4			3.55		
4		3.50 - 4.00	B5					
					4.50	Trial Pit terminated at scheduled depth of 4.5mbgl.		249.30

PLAN 		Groundwater: Very wet at 0.5mbgl Stability: Stable Shoring: None	Remarks: Position marked out using co-ordinates supplied by the engineer. Area CAT and GENNY scanned with permit to excavate issued by QGL prior to starting work. On completion hole backfilled with arisings, compacted in layers in reverse order of excavation.
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Equipment Used: 15Tonne tracked 360

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Contract : Global Centre of Rail Excellence

Client : GCRE Limited

Trial Pit No.

TP34

Dates : 10/1/22 - 10/1/22

Job Number : Q0652

Ground Level : 253.80 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : Ove Arup and Partners
Ltd

Coordinates: 283918.94 E
211654.19 N
Co-ordinates to National Grid



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Operator:
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A Jones

Sheet No.
2 Of 2

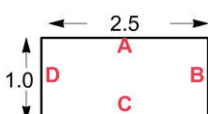
**m Per
Page**

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP34A	
Dates : 7/1/22 - 7/1/22				Job Number : Q0652		Ground Level : 230.76 m A.O.D. Level to Ordnance Datum		
Location : Around washery area				Engineer : ARUP		Coordinates: 284641.85 E 210699.97 N Co-ordinates to National Grid		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1	0.20 -	ES1				MADE GROUND - Loose black to dark grey slightly sandy silty GRAVEL. Gravel is fine to coarse angular to sub-angular Mudstone with coal, ash, metal and wooden railway sleepers			
	0.50 -	B1							
	1.00 -	B2 ES2							
2	2.00 - 2.50 2.00 -	B3 ES3							
					2.50	Terminated at 2.50mbgl, sides unstable and collapsing. Unable to undertake soakaway test due to high ground water encountered		228.26	

PLAN 		Groundwater: Slight ground water seepage at 0.30mbgl, High ground water strike at 1.00mbgl Stability: Unstable and collapsing below 1.00mbgl Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
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Equipment Used: 9 tonne tracked 360 excavator

	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence		Trial Pit No.
Client : Global Centre of Rail Excellence		TP34A
Dates : 7/1/22 - 7/1/22	Job Number : Q0652	Ground Level : 230.76 m A.O.D. <i>Level to Ordnance Datum</i>
Location : Around washery area	Engineer : ARUP	Coordinates: 284641.85 E 210699.97 N <i>Co-ordinates to National Grid</i>



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		J Lewis	S Picton	2 Of 2			

Contract : Global Centre of Rail Excellence Client : Global Centre of Rail Excellence							Trial Pit No. TP35	
Dates : 12/1/22 - 12/1/22 Location : Around washery area			Job Number : Q0652 Engineer : ARUP			Ground Level : 234.77 m A.O.D. <i>Level to Ordnance Datum</i> Coordinates: 285316.16 E 210289.51 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1					0.05	Grass/vegetation over MADE GROUND - brown sandy SILT with roots and rootlets	x x	234.72	
					0.05	MADE GROUND - Grass over loose black to dark grey slightly sandy silty GRAVEL with high cobble and boulder content. Gravel is fine to coarse angular to sub-angular Mudstone. Cobbles and boulders are sub-angular to angular Sandstone with coal, ash, and metal			
					1.45				
2					1.50	Loose grey light brown mottled slightly sandy very clayey GRAVEL with high cobble and boulder content. Gravel is fine to coarse sub-angular to sub-rounded Mudstone and Siltstone. Cobbles and boulders are rounded to sub-rounded Sandstone with iron staining		233.27	
					2.50				
3									
4					4.00	Terminated at 4.00mbgl specified depth		230.77	

PLAN

Groundwater: High ground water strike at 2.00mbgl

Stability: Sides unstable and collapsing

Shoring: N/A

Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned

Equipment Used: 9 tonne tracked 360 excavator

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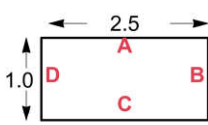
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Contract : Global Centre of Rail Excellence		Trial Pit No.	
Client : Global Centre of Rail Excellence		TP35	
Dates : 12/1/22 - 12/1/22	Job Number : Q0652	Ground Level :	234.77 m A.O.D. <i>Level to Ordnance Datum</i>
Location : Around washery area	Engineer : ARUP	Coordinates:	285316.16 E 210289.51 N <i>Co-ordinates to National Grid</i>



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP36	
Dates : 12/1/22 - 12/1/22			Job Number : Q0652			Ground Level : 239.90 m A.O.D. <i>Level to Ordnance Datum</i>		
Location : Around washery area			Engineer : ARUP			Coordinates: 285090.03 E 210482.14 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1						MADE GROUND - Grass/vegetation over loose black to dark grey slightly sandy silty GRAVEL with high cobble and boulder content. Gravel is fine to coarse angular to sub-angular Mudstone. Cobbles and boulders are sub-angular to angular Sandstone with coal, ash, metal, timber, brick, plastic and rubber			
2					4.00	...At 2.00mbgl old rubber conveyor belt encountered			
3									
4					4.00	Terminated at 4.00mbgl		235.90	

PLAN 	Groundwater: Slight ground water seepage at 0.30mbgl Stability: Sides unstable and collapsing below 2.00mbgl Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
--	---	--

Equipment Used: 9 tonne tracked 360 excavator						
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	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: J Lewis	Logged By: S Picton	Sheet No. 1 Of 3	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence		Trial Pit No.
Client : Global Centre of Rail Excellence		TP36
Dates : 12/1/22 - 12/1/22	Job Number : Q0652	Ground Level : 239.90 m A.O.D. <i>Level to Ordnance Datum</i>
Location : Around washery area	Engineer : ARUP	Coordinates: 285090.03 E 210482.14 N <i>Co-ordinates to National Grid</i>



	Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		J Lewis	S Picton	2 Of 3			

Contract : Global Centre of Rail Excellence		Trial Pit No.	
Client : Global Centre of Rail Excellence		TP36	
Dates : 12/1/22 - 12/1/22	Job Number : Q0652	Ground Level :	239.90 m A.O.D. <i>Level to Ordnance Datum</i>
Location : Around washery area	Engineer : ARUP	Coordinates:	285090.03 E 210482.14 N <i>Co-ordinates to National Grid</i>



	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator:	Logged By:	Sheet No.	m Per Page	All measurements in metres unless otherwise stated	
		J Lewis	S Picton	3 Of 3			

Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP37	
Dates : 11/1/22 - 11/1/22			Job Number : Q0652			Ground Level : 239.19 m A.O.D. <i>Level to Ordnance Datum</i>		
Location :			Engineer : ARUP			Coordinates: 284931.98 E 210605.04 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1 2 3 4					4.50	MADE GROUND - Loose dark grey slightly clayey slightly silty slightly sandy Gravel with high cobble content and rare wood / timber fragments. Gravel is fine to coarse angular mudstone. Cobbles are angular mudstone.			
					4.50	Terminated at 4.5mbgl		234.69	

PLAN 	Groundwater: Rapid groundwater inflow below 3.0mbgl Stability: Significant instability throughout Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked, area CAT scanned
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Equipment Used: 13 tonne tracked excavator							
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	Plas Newydd Swansea Tel : 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: QGL	Logged By: P Darby	Sheet No. 1 Of 3	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP37

Dates : 11/1/22 - 11/1/22

Job Number : Q0652

Ground Level : 239.19 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 284931.98 E
210605.04 N
Co-ordinates to National Grid



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**m Per
Page**

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP37

Dates : 11/1/22 - 11/1/22

Job Number : Q0652

Ground Level : 239.19 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 284931.98 E
210605.04 N
Co-ordinates to National Grid



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3 Of 3

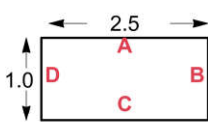
**m Per
Page**

All measurements in
metres unless
otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP37A	
Dates : 17/1/22 - 17/1/22			Job Number : Q0652			Ground Level : 243.46 m A.O.D. <i>Level to Ordnance Datum</i>		
Location : Around washery area			Engineer : ARUP			Coordinates: 284953.00 E 210658.00 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thick-ness)	Description	Legend	Red. Level A.O.D.	
1					2.00	MADE GROUND - Grass/vegetation over loose black to dark grey slightly sandy silty GRAVEL with medium to high cobble and boulder content. Gravel is fine to coarse angular to sub-angular Mudstone. Cobbles and boulders are sub-angular to sub-rounded Mudstone with coal, ash, roots, rootlets and railway sleepers			
2					2.00	...Yellow tape encountered at 2.00mbgl Terminated at 2.00mbgl, yellow tape encountered at 2.00mbgl possible service		241.46	

PLAN 	Groundwater: No ground water encountered	Remarks: TP set out by QGL in liaison with ARUP. Services checked and area CAT scanned
	Stability: Unstable and collapsing below 1.50mbgl	
	Shoring: N/A	

Equipment Used: 9 tonne tracked 360 excavator

 Plas Newydd Swansea Tel: 01554744890 email: enquiries@quantumgeotechnic.co.uk	Operator: G Jones	Logged By: S Picton	Sheet No. 1 Of 2	m Per Page 5	All measurements in metres unless otherwise stated	
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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP37A

Dates : 17/1/22 - 17/1/22

Job Number : Q0652

Ground Level : 243.46 m A.O.D.
Level to Ordnance Datum

Location : Around washery area

Engineer : ARUP

Coordinates: 284953.00 E
210658.00 N
Co-ordinates to National Grid



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Swansea
Tel: 01554744890
email: enquiries@quantumgeotechnic.co.uk

Operator:
G Jones

Logged By:
S Picton

Sheet No.
2 Of 2

m Per Page

All measurements in metres unless otherwise stated



Contract : Global Centre of Rail Excellence							Trial Pit No.	
Client : Global Centre of Rail Excellence							TP38	
Dates : 12/1/22 - 12/1/22			Job Number : Q0652			Ground Level : 238.95 m A.O.D. <i>Level to Ordnance Datum</i>		
Location :			Engineer : ARUP			Coordinates: 284921.93 E 210557.02 N <i>Co-ordinates to National Grid</i>		

m B.G.L.	Samples		Tests		Strata				WATER
	Depth	Type No.	Depth	Test Results	Depth (Thickness)	Description	Legend	Red. Level A.O.D.	
1						MADE GROUND - Dense black very silty sandy GRAVEL with high cobble content. Gravel is fine to coarse sub-angular coal. Cobbles sub-angular coal. below 0.3mbgl gravel and cobbles are Mudstone			
2					3.50	 armored cable at 2.2mbgl below 2.5mbgl many timber fragments			
3					3.50	Firm light brown slightly gravelly silty CLAY with pockets of fibrous peat. Gravel is fine to coarse angular mudstone.		235.45	
4					0.50				
					4.00	Terminated at 4.0mbgl		234.95	

PLAN 		Groundwater: Moderate groundwater inflow at 3.45mbgl Stability: Stable Shoring: N/A	Remarks: TP set out by QGL in liaison with ARUP. Services checked, area CAT scanned
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Equipment Used: 13 tonne tracked excavator

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Contract : Global Centre of Rail Excellence

Client : Global Centre of Rail Excellence

Trial Pit No.

TP38

Dates : 12/1/22 - 12/1/22

Job Number : Q0652

Ground Level : 238.95 m A.O.D.
Level to Ordnance Datum

Location :

Engineer : ARUP

Coordinates: 284921.93 E
210557.02 N
Co-ordinates to National Grid



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QGL

Logged By:
P Darby

Sheet No.
2 Of 2

m Per
Page

All measurements in
metres unless
otherwise stated



KEY TO BOREHOLE AND TRIAL PIT LOGS

MATERIAL LEGENDS

	Made Ground		Topsoil		Clay
	Gravel		Sand		Silt
	Peat		Boulders		Cobbles
	Chalk		Conglomerate		Volcaniclastic
	Asphalt		Void		Mudstone
	Siltstone		Sandstone		Limestone
	Ironstone		Mudstone / Siltstone		Breccia
	Coal		Coral		Bedrock
	Shale		Gypsum		Igneous (Coarse Grained)
	Igneous (Fine Grained)		Igneous (Medium Grained)		Metamorphic (Coarse Grained)
	Metamorphic (Fine Grained)		Metamorphic (Medium Grained)		

INSTALLATION / BACKFILL DETAILS

	Arisings		Concrete		Bentonite cement grout
	Bentonite seal		Filter		Pea Gravel
	Plain pipe		Slotted pipe		Piezometer / Standpipe tip

NOTE:
Legend symbols in accordance with BS 5930 (2015)

KEY TO BOREHOLE AND TRIAL PIT LOGS

m.A.O.D. metres Above Ordnance Datum.

SAMPLE AND TEST TYPES

U	Undisturbed driven tube sample - 102mm diameter, 450mm long.
P	Undisturbed pushed piston sample - 102mm diameter, 1000mm long.
TW	Undisturbed thin walled push in sample - 100mm diameter, 750mm long.
B	Bulk disturbed sample.
BLK	Block Sample
CBR	Heavy duty undisturbed sample - 154 mm diameter (CBR mould).
D	Small disturbed sample.
LB	Large Bulk disturbed sample (for earthworks testing)
C	Core sample
W	Water sample
G	Gas sample
ES	Environmental sample (soil)
j	Jar sample
t	Tub sample
p	Pot sample
s	Small sample
v	Vial sample
S	Standard Penetration Test using split spoon sampler. (See Note).
C	Standard Penetration Test using a solid 60 degree cone. (See Note).

NOTE: Where a single value is quoted this is the N value for 300 mm penetration following a seating drive of 150 mm. Where this full penetration is not achieved the number of blows is quoted for the penetration below the seating drive eg. 63/160 mm.

Where total penetration is less than the seating drive this is indicated by a + and the number of blows for total penetration is quoted eg. +50/75 mm.

HV	Hand Vane Test. Vane undrained shear strength, c_u , quoted in kPa.
V	Borehole Vane Test. Vane undrained shear strength, c_u , quoted in kPa.
FHT/RHT	Falling / Rising Head Permeability Test.

CORE RUN DETAILS

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
FI	Fracture Index. NI - Non intact where > 25 No. per metre length.

WATER COLUMN SYMBOLS

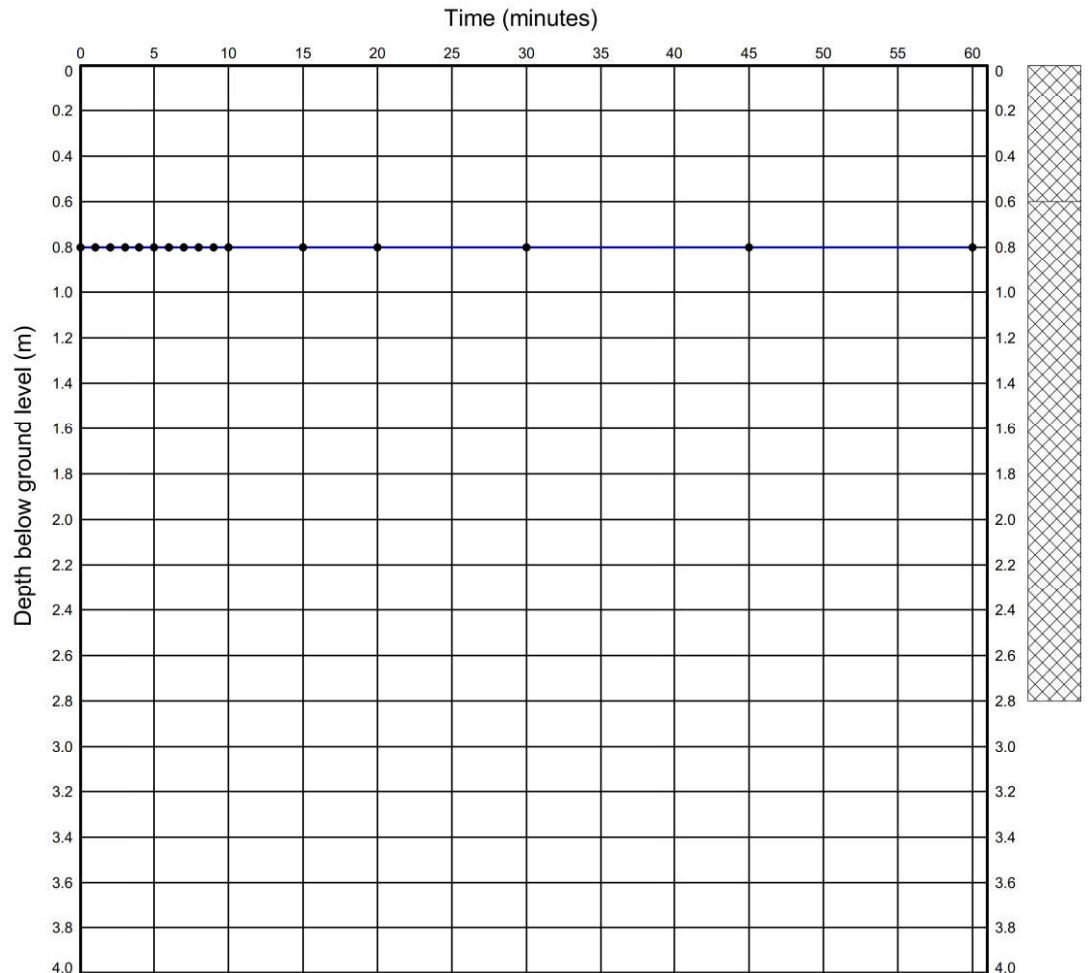
	First water strike, second water strike etc.
	Standing water level after first strike, second strike etc.
	Seepage.

NOTE:
Legend symbols in accordance with BS 5930 (2015)

APPENDIX IV – SOAKAWAY TEST RECORDS

SOAKAWAY TEST CALCULATION SHEET

Field Observations from soakaway trial pit

[illegible]

Remarks: Failed to soakaway

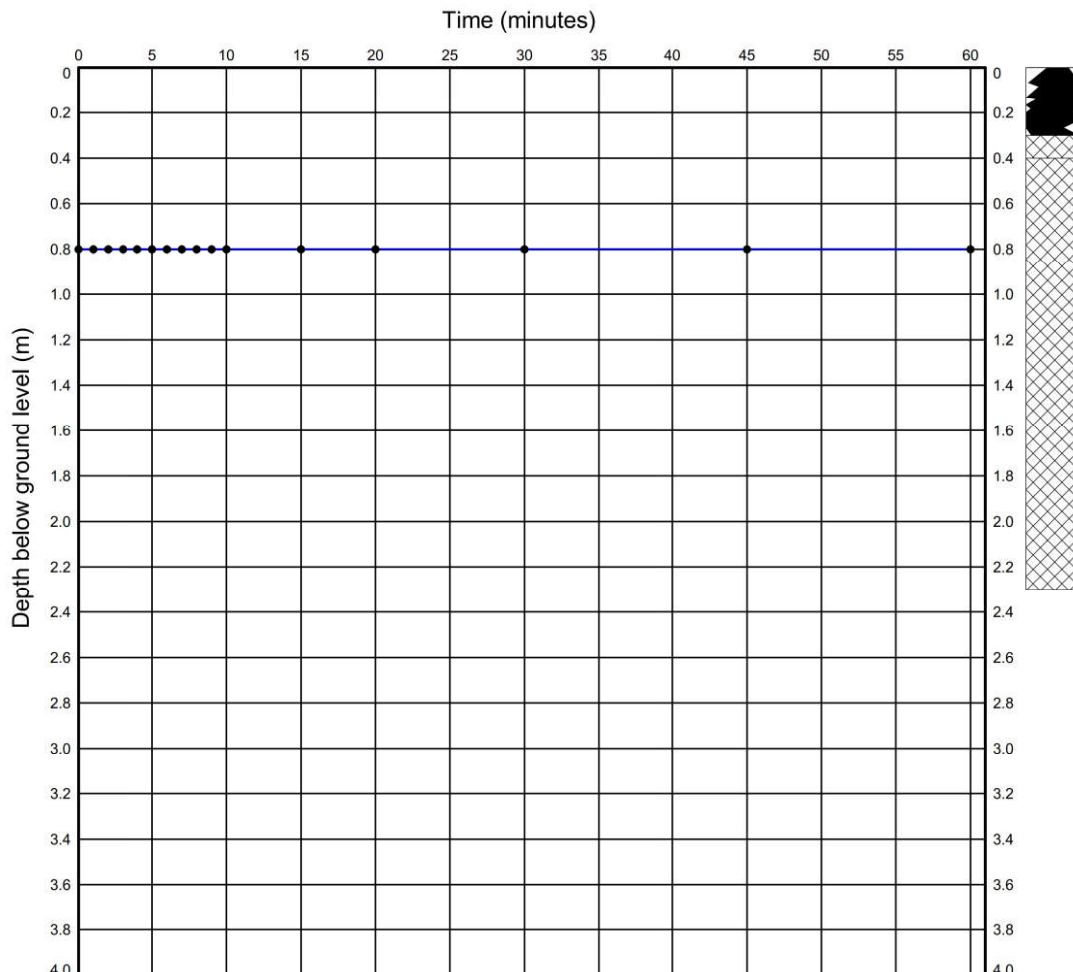
Soakaway test for soil infiltration rate design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	2.800 m	$V_{p75-25} =$	m^3
Trial Pit Length	2.800 m	$a_{p50} =$	m^2
Trial Pit Width	0.500 m	$t_{p75-25} =$	minutes
Effective Depth	m		
Outflow Time	mins from 75% to 25% full		

f = m/sec

Field Observations from soakaway trial pit

[illegible]

Remarks: Failed to soakaway

Soakaway test for soil infiltration rate design method based on BRE Digest 365

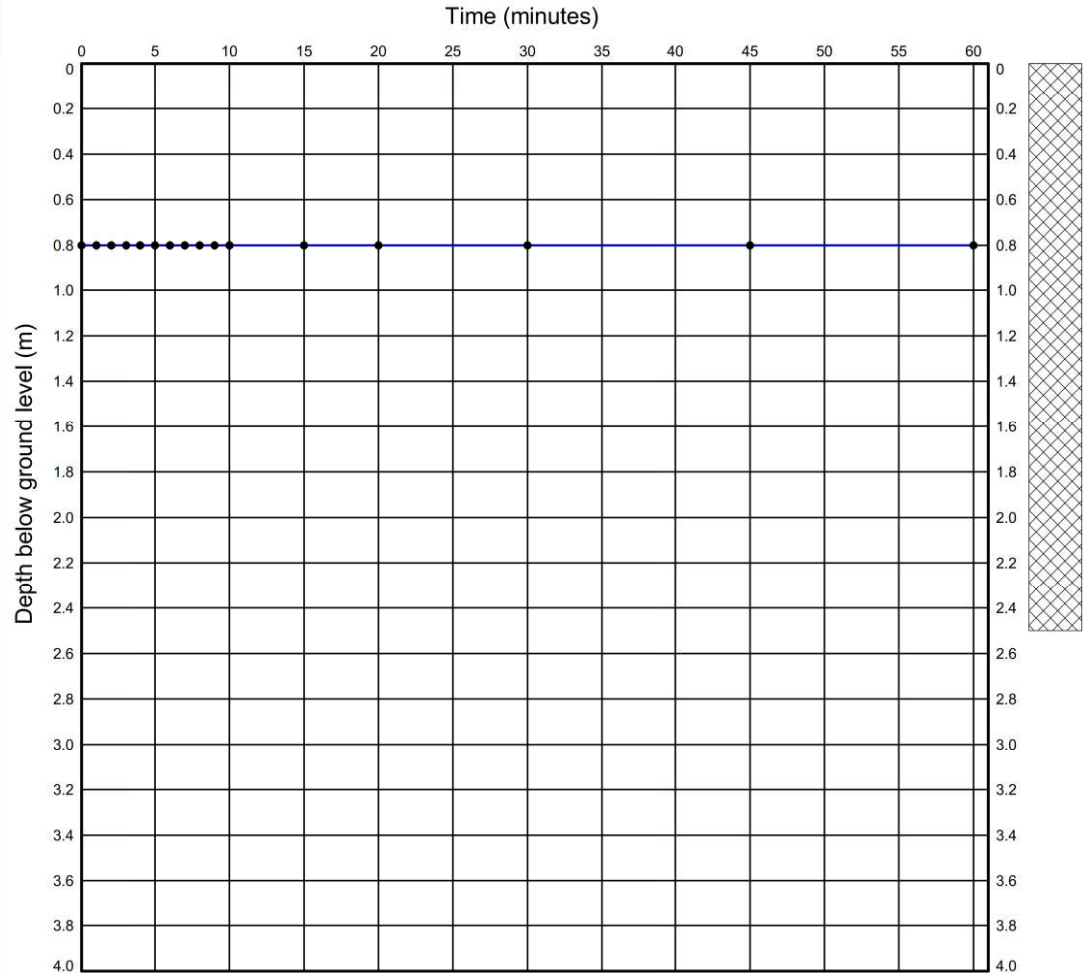
Permeability Test on Strata

Trial Pit Depth	2.300 m	$V_{p75-25} =$	m^3
Trial Pit Length	2.800 m	$a_{p50} =$	m^2
Trial Pit Width	0.500 m	$t_{p75-25} =$	minutes
Effective Depth	m		
Outflow Time	mins from 75% to 25% full		

f = m/sec

SOAKAWAY TEST CALCULATION SHEET

Field Observations from soakaway trial pit

[illegible]

Remarks: Failed to soakaway

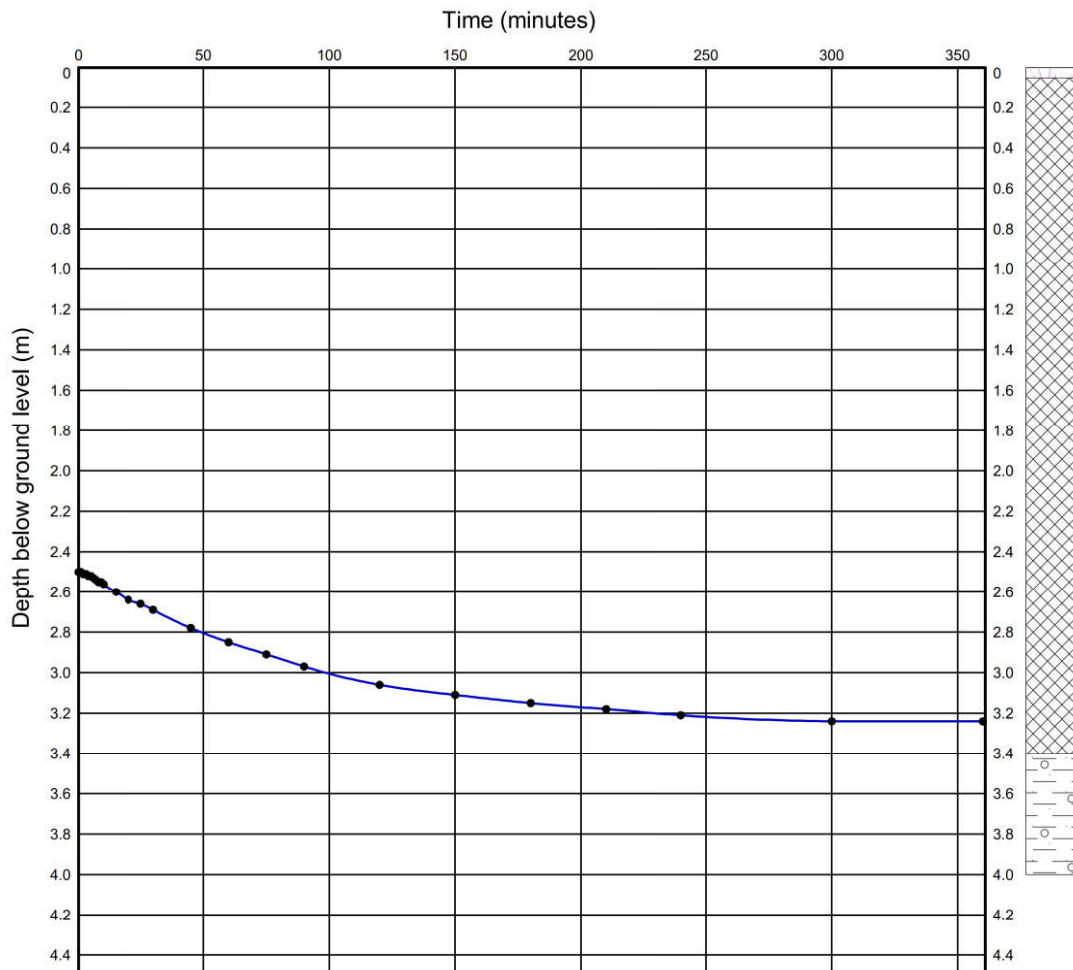
Soakaway test for soil infiltration rate design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	2.500 m	$V_{p75-25} =$	m^3
Trial Pit Length	2.800 m	$a_{p50} =$	m^2
Trial Pit Width	0.500 m	$t_{p75-25} =$	minutes
Effective Depth	m		
Outflow Time	mins from 75% to 25% full		

f = m/sec

Field Observations from soakaway trial pit

[illegible]

Remarks: Insufficient outflow to calculate permeability

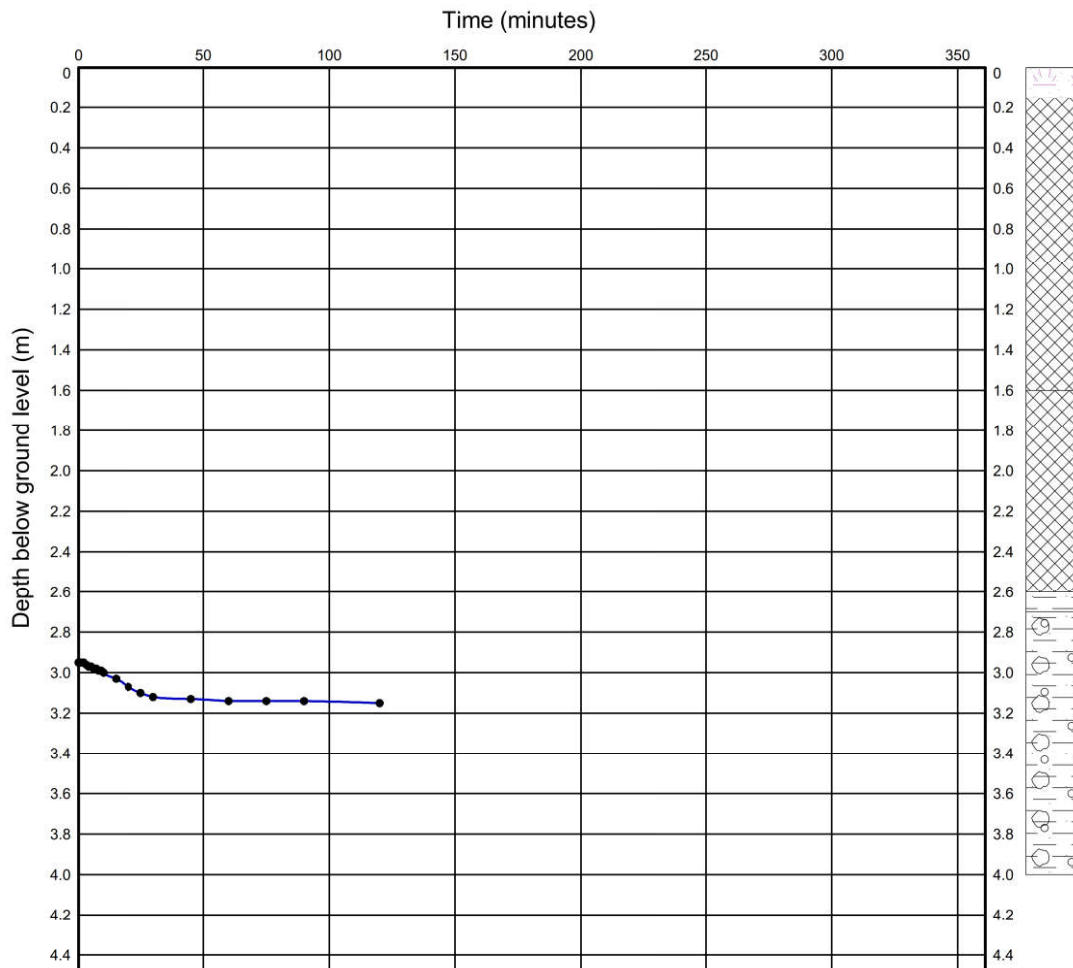
Soakaway test for soil infiltration rate design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	4.000 m	$V_{p75-25} =$	2.160 m ³
Trial Pit Length	4.800 m	$a_{p50} =$	10.980 m ²
Trial Pit Width	0.600 m	$t_{p75-25} =$	minutes
Effective Depth	1.500 m		
Outflow Time	mins from 75% to 25% full		

f = m/sec

Field Observations from soakaway trial pit

[illegible]

Remarks: Insufficient outflow to calculate permeability

Soakaway test for soil infiltration rate design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	4.000 m	$V_{p75-25} =$	0.977 m ³
Trial Pit Length	3.100 m	$a_{p50} =$	5.745 m ²
Trial Pit Width	0.600 m	$t_{p75-25} =$	minutes
Effective Depth	1.050 m		
Outflow Time	mins from 75% to 25% full		

f = m/sec

Contract : Global Centre of Rail Excellence

Point Plotted
TP18,1

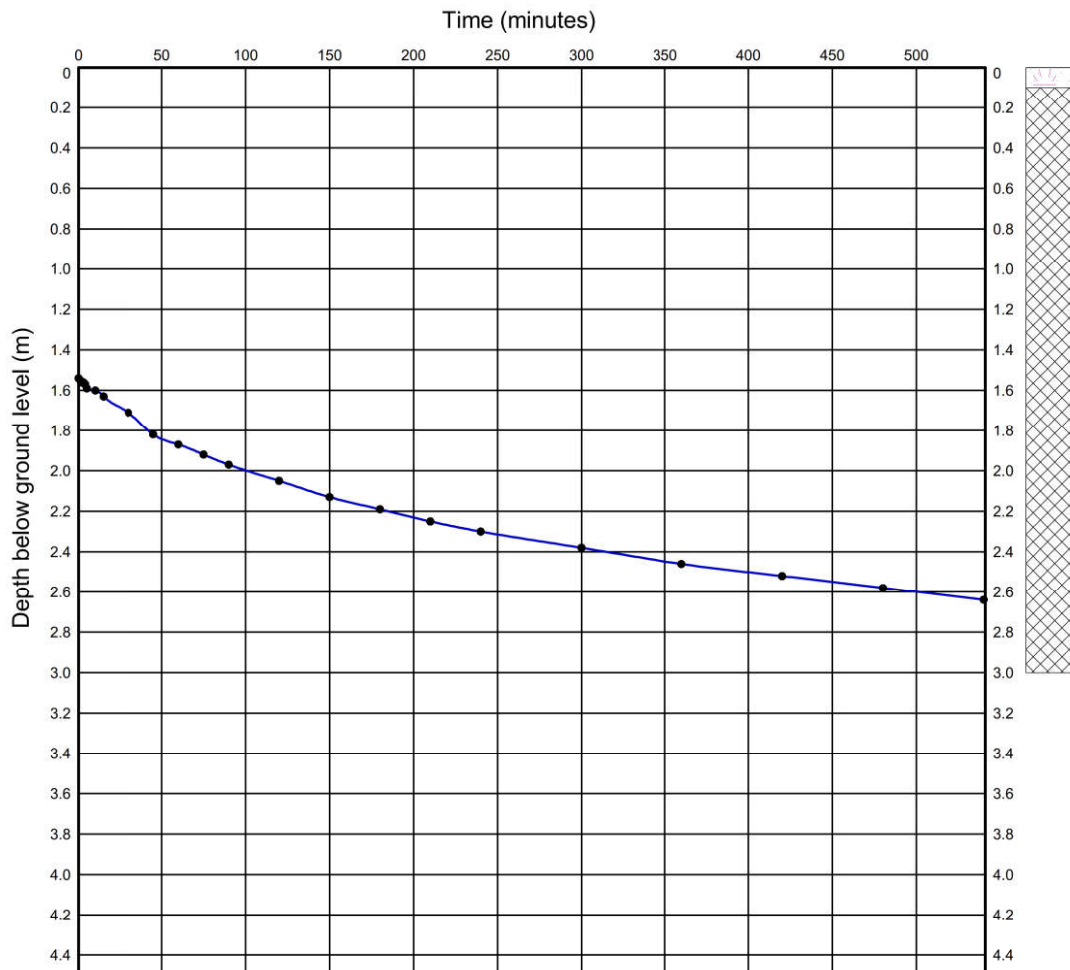
Client : Welsh Government

Job Number : Q0652

Engineer : ARUP

SOAKAWAY TEST CALCULATION SHEET**Field Observations from soakaway trial pit**

Time (Minutes)	Depth of water from ground level (m)
0.0	1.54
1.0	1.55
2.0	1.56
3.0	1.56
4.0	1.57
5.0	1.59
10.0	1.6
15.0	1.63
30.0	1.71
45.0	1.82
60.0	1.87
75.0	1.92
90.0	1.97
120.0	2.05
150.0	2.13
180.0	2.19
210.0	2.25
240.0	2.3
300.0	2.38
360.0	2.46
420.0	2.52
480.0	2.58
540.0	2.64



Remarks:

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	3.000 m	$V_{p75-25} =$	1.073 m ³
Trial Pit Length	2.500 m	$a_{p50} =$	5.933 m ²
Trial Pit Width	0.600 m	$t_{p75-25} =$	160.000 minutes
Effective Depth	1.430 m		
Outflow Time	160 mins from 75% to 25% full		

f = 1.8830E-5 m/sec

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Tel:
email: enquiries@quantumgeotechnic.co.uk

Date of Test:

Project File: Q0652 - PD.GPJ

All measurements in
metres unless
otherwise stated

Figure No.

1

Contract : Global Centre of Rail Excellence

Point Plotted
TP18,2

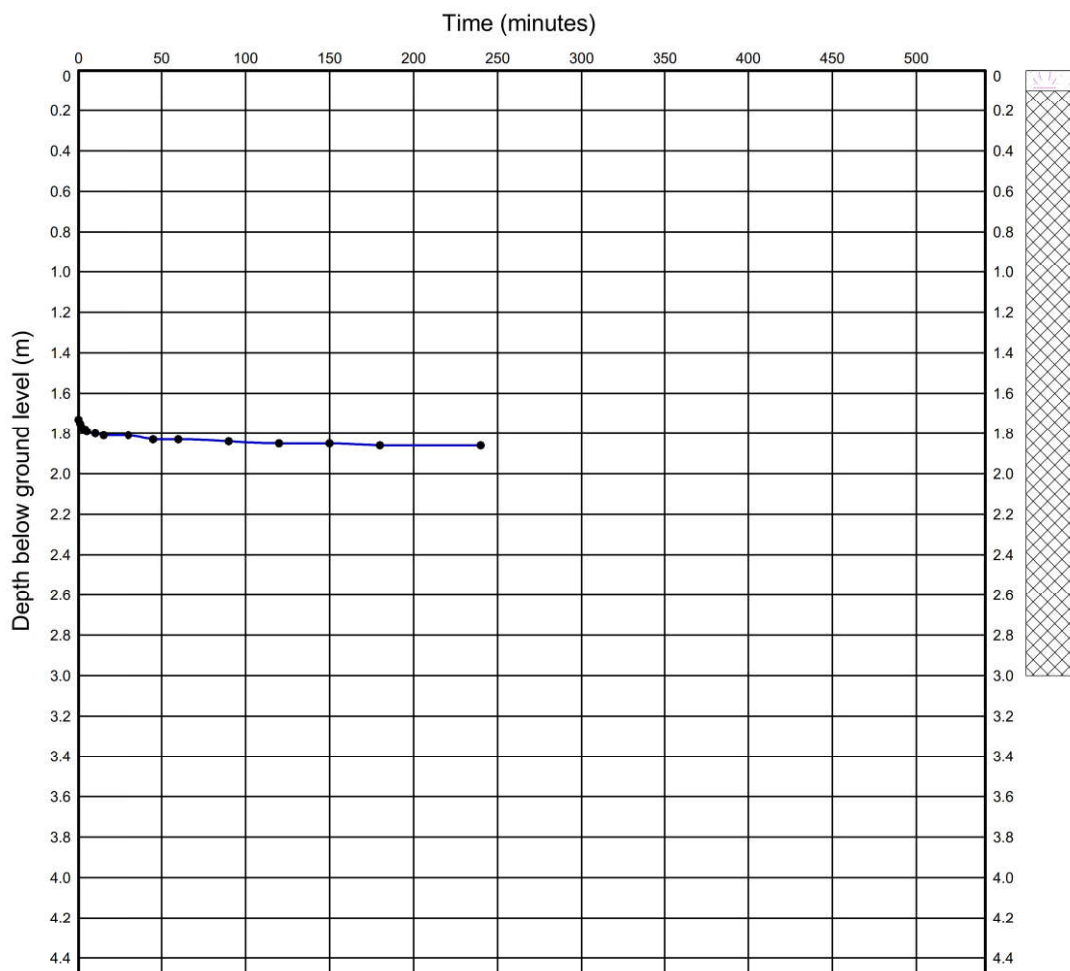
Client : Welsh Government

Job Number : Q0652

Engineer : ARUP

SOAKAWAY TEST CALCULATION SHEET**Field Observations from soakaway trial pit**

Time (Minutes)	Depth of water from ground level (m)
0.0	1.73
1.0	1.75
2.0	1.77
3.0	1.78
4.0	1.78
5.0	1.79
10.0	1.8
15.0	1.81
30.0	1.81
45.0	1.83
60.0	1.83
90.0	1.84
120.0	1.85
150.0	1.85
180.0	1.86
240.0	1.86



Remarks: Insufficient outflow to calculate permeability

Soakaway test for soil infiltration rate
design method based on BRE Digest 365

Permeability Test on Strata

Trial Pit Depth	3.000 m	$V_{p75-25} =$	0.953 m ³
Trial Pit Length	2.500 m	$a_{p50} =$	5.437 m ²
Trial Pit Width	0.600 m	$t_{p75-25} =$	minutes
Effective Depth	1.270 m		
Outflow Time	mins from 75% to 25% full		

f = m/sec

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Tel:
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Date of Test:

Project File: Q0652 - PD.GPJ

All measurements in
metres unless
otherwise stated

Figure No.

2

APPENDIX V – GRATICULE RESULTS

FIELD DESCRIPTION OF GRADING USING GRATICULE			
Hole ID	Depth Range (m)	Proportion of material with any length from 125mm -300mm (%)	Proportion of material with any length greater than 300mm (%)
TP22	0.7-4.3	15	10
TP24	0.5-4.5	10	5
TP25	0.3-4.5	15	5
TP26	0.1-0.4	5	0
TP26	0.4-3.8	10	10
TP27	1.25-4.5	10	5
TP29	0.5-4.5	20	10
TP30	0.9-4.5	10	0
TP31	0.05-4.5	15	15
TP32	0.1-4.5	15	10
TP33	0.45-1.15	5	0
TP33	1.15-2.4	2	0
TP34	0.95-4.5	10	0

APPENDIX VI – ARCHEOLOGIST REPORT



**WATCHING BRIEF REPORT
WBR/779/21**

**ONLLWYN WASHERY
NEATH
SOUTH WALES**

Ordnance Survey NGR: SN 83704 10894



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Report Information

Report Type:	Archaeological Watching Brief
Report Date:	12th February 2022
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Illustrations:	Jim Stewart-Turner <i>PIfA</i>
Site Address	Onllwyn Washery Neath SA10 9HN
OS NGR	SN 83704 10894
Client	Quantum Geotech Ltd. Plas Newydd Farm Llanedi Swansea SA4 0FQ
Report Number	WBR/779/21
Site Code	OWN21
Project Number	260/21

Contents

		Page
1	Summary/Crynodeb	2
2	Introduction	3
3	The Site	4
4	Methodology	4
5	Reporting & Archive Deposition	6
6	Publication	6
7	Archaeological Background	6
8	Maps & Plans	10
	Figure 8.1 Site Location 1	10
	Figure 8.2 Site Location 2	10
	Figure 8.3 Area A Trench Locations	11
9	Results	12
10	Results Analysis	41
11	Conclusion	41
12	References & Bibliography	42
Appendix 1	Photographic Record	43
Appendix 2	Borehole Log Sheets	46
Appendix 3	Trial Pit Record Sheets	75
Appendix 4	Written Scheme of Investigation WSI/776/21	79

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The results of the project will be made publicly available in both digital and hard copy formats, as appropriate, in a range of journals and publications.

1. Summary

Quantum Geotech Limited commissioned Cardiff Archaeology to provide a programme of archaeological work to comply with the requirements of both the Glamorgan Gwent and Clwyd Powys Archaeological Trusts to protect the archaeological resource of the site during ground investigation works at Onllwyn Washery, Neath, SA10 9HN, South Wales.

Watching Brief Report (WBR/779/21) details the archaeological background of the site and methodology employed for the project. The results of site monitoring and recording during the works and post fieldwork analysis are set within archaeological and historical contexts and a conclusion reached. Details of the publication and dissemination of the report and the deposition of the archive are also included.

Analysis of the results of site monitoring and recording concluded that no significant archaeological artefacts, features or contexts were discovered by Cardiff Archaeology during ground investigation works at Onllwyn Washery, Neath, SA10 9HN, South Wales.

1. Crynodeb

Comisiynodd Quantum Geotech Limited Cardiff Archaeology i ddarparu rhaglen o waith archeolegol i gydymffurfio â gofynion Ymddiriedolaethau Archeolegol Morgannwg Gwent a Chlwyd Powys i ddiogelu adnodd archeolegol y safle yn ystod gwaith archwilio tir yng Nolgchfa Onllwyn, Castell-nedd, SA10 9HN, De Cymru.

Mae'r Adroddiad Gwyllo (WBR/779/21) yn manylu ar gefndir archeolegol y safle a'r fethodoleg a ddefnyddiwyd ar gyfer y prosiect. Gosodir canlyniadau monitro a chofnodi safle yn ystod y gwaith a'r dadansoddiad ar ôl gwaith maes o fewn cyd-destunau archeolegol a hanesyddol a daethpwyd i gasgliad. Cynhwysir hefyd fanylion cyhoeddi a dosbarthu'r adroddiad a dyddodiad yr archif.

Daeth dadansoddiad o ganlyniadau monitro a chofnodi safle i'r casgliad na ddarganfuwyd unrhyw arteffactau, nodweddion neu gyd-destunau archeolegol arwyddocaol gan Archeoleg Caerdydd yn ystod gwaith archwilio tir yng Nolgchfa Onllwyn, Castell-nedd, SA10 9HN, De Cymru.

2. Introduction

2.1 Cardiff Archaeology was commissioned by Quantum Geotech Limited¹ to undertake an archaeological watching brief as part of a programme of archaeological work during ground investigation works at Onllwyn Washery, Neath.

2.2 In order to mitigate the effects of proposed groundwork activities on the archaeological resource of the Onllwyn Washery site an archaeological Watching Brief, as part of the programme of archaeological work, was a requirement of both the Clwyd Powys² and Glamorgan Gwent³ Archaeological Trusts.

A Written Scheme of Investigation (WSI/776/21) was produced by Cardiff Archaeology prior to undertaking the watching brief at the site and was approved by both the Clwyd Powys and Glamorgan Gwent Archaeological Trusts. It details the methodology and mitigation strategy for the project in order to protect the archaeological resource and is included as Appendix 4 of this report. It also covers health and safety policy, insurance documentation and risk assessment relating to the project.

2.3 The archaeological watching brief, undertaken by Cardiff Archaeology between November 2021 and January 2022, observed ground investigation works at Onllwyn Washery, Neath.

2.4 This watching brief report (WBR/779/21) details the results of site monitoring and recording during the ground investigation works and sets post fieldwork analysis of the results within a historical/archaeological context.

2.5 The project follows the Code of Conduct, Code of Approved Practice for the regulation of contractual arrangements in archaeology and other relevant by-laws of the Chartered Institute for Archaeologists, and as specified in Standard & Guidance for an Archaeological Watching Brief (2014).

An archaeological watching brief is defined by the Chartered Institute of Archaeologists as *'a programme of observation, investigation and recording conducted during any operation carried out for non-archaeological reasons within a specified area or site, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme of work will result in the preparation of a report and ordered archive'*.

Acknowledgements

Cardiff Archaeology would like to thank Mr Phil Darby and his team at Quantum Geotech Limited for their kind assistance on site with this project.

¹ **Quantum Geotech Limited:** Plas Newydd Farm, Llanedi, Swansea SA4 0FQ Tel: 01554 744880

² **Clwyd Powys Archaeological Trust:** Y Swyddfeydd, Coed y Dinas, Welshpool, SY21 8RP Tel: 01938 552035 Email: trust@cpat.org.uk

³ **Glamorgan Gwent Archaeological Trust:** Sa12 Business Centre, Seaway Parade Industrial Estate, Baglan, Port Talbot SA12 7BR Tel: 01792 655208 Email: enquiries@ggat.org.uk

3. The Site

3.1 Location

The site is located at Onllwyn Washery, Neath, South Wales. It lies within a triangular piece of common land between the A4221, A4109 and Onllwyn Road at the head of the Dulais valley. Onllwyn is a small village in Neath Port Talbot near to the village of Seven Sisters with over 200 years of mining history (7. Archaeological Background) including five coal pits of which the washery is now the only remaining working site. Along the route of the former Neath & Brecon Railway there is a freight only line to the washery from the South Wales Main Line at Neath. The city of Swansea lies approximately 24km to the south west.

3.2 Ordnance Survey National Grid Reference

NGR: SN 83704 10894.

What3Words: eagles.migrants.countries.

3.3 Geology

The geology of the site consists of South Wales Lower Coal Measures Formation - mudstone, siltstone and sandstone; sedimentary bedrock formed 318-319 million years ago during the Carboniferous Period.

3.4 Topography & Ordnance Datum

Situated 259m (850 ft) OD above sea level on the southern edge of the Brecon Beacons mountain range, ground investigations are taking place on open grassland in close proximity to Onllwyn Washery. The washery is situated at the top of the Dulais Valley which runs north from the town of Neath and further south the town of Port Talbot on the South Wales coast.

3.5 Description of Works (Fig.8.3)

Investigation of the substrate across the site will inform the design plan for future development. Two looped sections of land, drainage infrastructure and natural habitats are to be constructed over the next 5 years. This will create flexible and adaptable land for various uses such as farming, conservation, tourism and leisure, to be determined at a later date. Celtic Energy and Welsh Government are keen to position The Global Centre of Rail Excellence at the site; a train, infrastructure and technology testing facility.

An archaeological watching brief was required during excavation of:

- Machine excavated trial pits. TP10, TP11, TP16, TP19, TP20, 21, TP27, TP32, TP33
- Hand dug starter pits for machine boring. BH01-BH14 & BH17-BH18

Machine excavation of pits took place using a toothless bucket, where appropriate, to allow controlled reduction of soils and maximum opportunity to record features in both plan and profile. The starter pits for machine coring were excavated by hand.

Where possible a representative section of the pits were to be cleaned and recorded adhering to Health & Safety guidelines. Trial pits suffered from section collapse in the majority of cases and deemed dangerous to enter. Further details are contained in the Written Scheme of Investigation WSI/776/21, Appendix 3.

4. Methodology

4.1 A detailed methodology for an archaeological watching brief (Written Scheme of Investigation WSI/776/21, Appendix 4) was produced by Cardiff Archaeology prior to undertaking site monitoring and recording during the groundworks which was approved by both the Clwyd Powys and Glamorgan Gwent Archaeological Trusts.

4.2 Excavations for the groundworks were undertaken by hand and with an excavator fitted with a toothless bucket where ground conditions allowed.

4.3 Site monitoring and recording of groundworks by Cardiff Archaeology taking the form of a watching brief comprised the compilation of a digital photographic record, drawn plan, section and contextual site notes.

4.4 A limited number of trial pits and boreholes were monitored due to ongoing coal processing activity on the site or their position on known deep deposits of colliery waste/open cast backfill. Further groundworks may be undertaken at a future date on the remaining boreholes and trial pits. Only trial pits TP10, TP11, TP16, TP19, TP20, 21, TP27, TP32, TP33 and boreholes BH01-BH14 & BH17-BH18 were monitored for this project.

4.5 A programme of post fieldwork analysis and research was carried out and the results placed within a historical and archaeological context. A copy of this final report detailing the results (WBR/779/21) will be forwarded to the client/agent for submission to both the Clwyd Powys and Glamorgan Gwent Archaeological Trusts for approval.

4.6 A copy of the Final Report and Archive Index will also be deposited by Cardiff Archaeology with the regional Historic Environment Records held by both the Glamorgan-Gwent and Clwyd Powys Archaeological Trusts following Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs) 2018 (<http://www.ggat.org.uk/her/her.html>).

4.7 The archaeological archive for the work will be prepared to the specifications laid out in the Chartered Institute for Archaeologists, Standard and Guidance for the Creation, Compilation, Transfer and Deposition of Archaeological Archives (2013).

4.8 The project archive, where appropriate, consists of site plans and sections, photographic records, context information, indices, research notes, recovered artefacts and reports stored by Cardiff Archaeology as drafting film, paper and digital records. will be deposited with the National Monuments Record Wales, Aberystwyth⁴, or if artefacts are recovered the National Museum of Wales, Cardiff⁵. The archive will be deposited following National Standard and Guidance to Best Practice for Collecting and Depositing Archaeological Archives in Wales 2017 (<http://www.welshmuseumsfederation.org/en/news-archive/resources-landing/Collections/national-standard-and-guidance-for-collecting-and-depositing-archaeological-archives-in-wales-2017.html>)

⁴ **National Monuments Record Wales**, Ffordd Penglais, Aberystwyth SY23 3BU (01970) 621200

⁵ **National Museum of Wales**, Cathays Park, Cardiff, South Glamorgan CF10 3NP. ☎: (029) 2039 7951

5. Reporting & Archive Deposition

5.1 The project archive consisting of planning information, research notes, context information, site plans, photographic record, project design and final report stored by Cardiff Archaeology as paper and digital (CD) records will be deposited with the National Monuments Record, Aberystwyth⁶ as stated in the project Methodology above.

5.2 No significant artefacts were recovered during the watching brief and therefore no arrangements were required for the deposition of a finds archive with a suitable museum.

5.3 Copies of the Written Scheme of Investigation, Final Report and Archive Index will be deposited with the regional Historic Environment Records held by both the Glamorgan-Gwent and Clwyd Powys Archaeological Trusts as stated in the project Methodology above.

6 Publication

6.1 Publication of the project results will be made available in a range of publications as appropriate.

⁶ **Royal Commission**

The Royal Commission on the Ancient and Historical Monuments of Wales,
Library and Enquiries Service, National Monuments Record of Wales, Plas Crug, Aberystwyth, SY23 1NJ
☎: +44(0)1970 621200 ✉ nmr.wales@rcahmw.gov.uk
www.rcahmw.gov.uk/coflein.

7. Archaeological Background

The development site at Onllwyn Washery is situated mainly in the unitary authority of Powys and partially in Neath Port Talbot, therefore Historic Environment Record information has been sought from both the Clwyd Powys and Glamorgan Gwent Archaeological Trusts (CPAT enquiry ref. E6696 & GGAT enquiry ref. 6694) and also from Historic Wales (RCAHMW). A number of other sources of historic information have also been consulted and are included in the bibliography.

The village of Onllwyn is located in Neath Port Talbot at the head of the Dulais Valley within an area with over 200 years of mining history. The Dulais Valley lies within the modern unitary authority of Neath Port Talbot and formed part of the ancient parish of Cadoxten-juxta-Neath.

Prior to the industrialisation of south Wales from the middle of the 18th century the area was mainly rural in nature with evidence of six rural buildings remaining at Onllwyn;

- Blaenant Melyn Farm
- Blaenantcellwen Farm
- Rhos-y-gelynen Cottage
- Rhyd-y-Pwlla Farm
- Tir-Lan Cottage
- Yr Hen Waun Farm

The Brecon Beacons National Park is located immediately to the north of Onllwyn and was established in 1957 as the UK's tenth National Park. It is one of three in Wales, including the Snowdonia and Pembrokeshire Coast National Parks, having special protection and management by the National Park Authority.

Information from the Historic Environment Record provides evidence of early human settlement and activity in the area from the Prehistoric Period.

Mynydd-y-Drum is located close to the site with evidence of prehistoric settlement (prn 12495, SN82851080) recorded. A series of clearance features of indeterminate age of a possible hut site are associated with two burial cairns and excavation produced two flint tools, now in the care of Brecon Museum.

Clwyd Powys Archaeological Trust carried out an assessment of Round Huts in Brecknock, published 2008 (prn 115451, SO 0512725679). The study includes analysis of a desk top assessment and brief overviews of fieldwork with limited attempt at classification of authentic round huts or hut circles visited. A full gazetteer of authentic and possible hut sites in the county is also included.

At Nant Helen a series of Bronze Age clearance cairns (.prn 6174 & 6177-6182, SN82811110) are recorded as well as evidence of post medieval clearance cairns prn 12496, SN82901085).

Evidence of Roman activity in the area includes Sarn Helen a Roman road linking Neath (Nidum) in south Wales to Caernarfon (Segontium) 150 miles to the north. Running along a high ridge between the Neath and Dulais Valleys a 1.3 km long section of the road lies to the north east of Coelbren Fort is a Scheduled Ancient Monument (ID BR074). Coelbren Roman Fort is a medium sized auxilliary fort (ID GM146) built circa AD 75 (ID GM146), south east of the fort lies a Roman Marching Camp (ID GM343) constructed circa AD 74-78 during the Roman conquest of Britain.

The remains of an Early Christian Monument; a stone shaft fragment of a Medieval Cross were discovered on Cefn Hirfynydd nearby (prn 00934w, SN8410) and are now in the collections of Swansea Museum.

Two Post Medieval enclosures have also been excavated at Nant Helen (prn 5947, SN82921116 & prn 6183, SN82851080).

Prior to the Industrial Revolution Wales was still largely rural in character but by 1851 it had become the world's second industrial nation after England. The availability of raw materials such as limestone and coal, manufacture of iron and copper together with engineering and transport developments and its geographical location meant that Wales' economy developed significantly during this time. By 1800 all the main valleys in the South Wales coalfields were linked to sea ports by canals and the early railway age also provided a real boost to the Welsh economy. The population expanded significantly during this time with the majority of immigrant workers coming from rural Wales initially. Alongside the development of industry came a rapid expansion of housing, schools, places of worship and community support for the influx of workers.

Industrial development was significant in the Llanelli-Swansea-Neath area of which the Dulais Valley is part and many features from the industrial period have been recorded including Mynydd-y-Drum Railway Cutting (prn 1001895, SN83021050) and Mynydd-y-Drum Coal Patch (prn1001892, SN83781057). The Drum Colliery (prns 1001888, 1001891, 1001890) has coal mining features of shafts and levels recorded at SN83931077, SN83921067 & SN83971066 respectively.

A tramroad at Ystradgynlais (SAM ID GM399) was built 1832-37 as a 6.4 km link to the Brecon Forest Tramroad (prn1001889, SN83961066) bringing limestone to Ynyscedwyn Ironworks, a well preserved and impressive monument with masonry engine house and cable tunnel runs still visible (SN80130942).

Buildings associated with a significant population expansion in the area due to industrialisation are also recorded, such as Price's Row at Coelbren and Dickson's Row (prn 1001887, SN84481135) which are Post Medieval workers cottages.

At Onllwyn a railway station on the Neath & Brecon Railway is recorded (prn 02818.6w, SN84081050).

Onllwyn Iron Works (prn 05957w) was built in the 1840s and had a brief existence but at the height of production during the 1860s included two furnaces, lime kilns, a smithy, shop, post office and two rows of workers houses now all extant; removed by open cast coal mining activities in the 1970s and later landscaping in 1985.

Three anglican churches are located within the Dulais Valley; St Margarets', Crynant, St Mary's, Seven Sisters (1910) and St David's, Banwen (1925) but during the mid 19th century chapels were already becoming more common places of worship and centres of community activity as industrial communities turned to Non-conformity. Four chapels are known in Seven Sisters alone; Salem (1899), Soar (1878), Seion (1890) and Bethany.

Two public houses are known in the Onllwyn area; the Halfway Inn an old farmhouse granted a licence to sell alcohol in 1863 and rebuilt in 1912 serving miners from Onllwyn Colliery. It closed in 1973 and now no longer exists.

The Travellers's Rest located on Onllwyn No.3 Colliery served travellers between Swansea and the Rhondda Valley and dates to at least 1853, it was later renamed The Greyhound due to dog training taking place there. In 1911 the tenants moved out and the building was converted into stables for the colliery.

Onllwyn School replaced 'Y Tae', a makeshift schoolhouse in 1892 responding to both growing pupil numbers in the area and new government legislation. Extended in 1907 pupils numbers began to decline after the 2nd World War and it finally closed in 1964. Crynant National School was established in 1857 with Crynant Infants School added in 1907 due to increasing pupil numbers.

A Miners Welfare Hall at Onllwyn (prn 414833, SN8439610289) opened in 1955 and is still in use as a social club today.

The development site is located at Onllwyn Coal Washery (prn 306037, SN84571053) built for local drift mines in 1932 then substantially altered and re-equipped in 1950. It services two open cast sites; Nant Helen & Derlwyn with coal delivered by road and exported through Swansea, Neath Abbey & Briton Ferry, and by rail to France and Norway. In 1998 Celtic Energy built a new 'state of the art' plant at the site and in 2005 a Froth Flotation Plant was added to process slurry supplied from Nant Helen, Selar and Margam. Many associated coal shafts are recorded in the area including Onllwyn Colliery Shaft Bft 3 (prn 80162, SN84261042) and Onllwyn Colliery Shaft Bft. 2 (prn 80169, SN84261021). Onllwyn Colliery Western Incline (prn 1001893, SN 83611053).

8. Location Maps & Plans

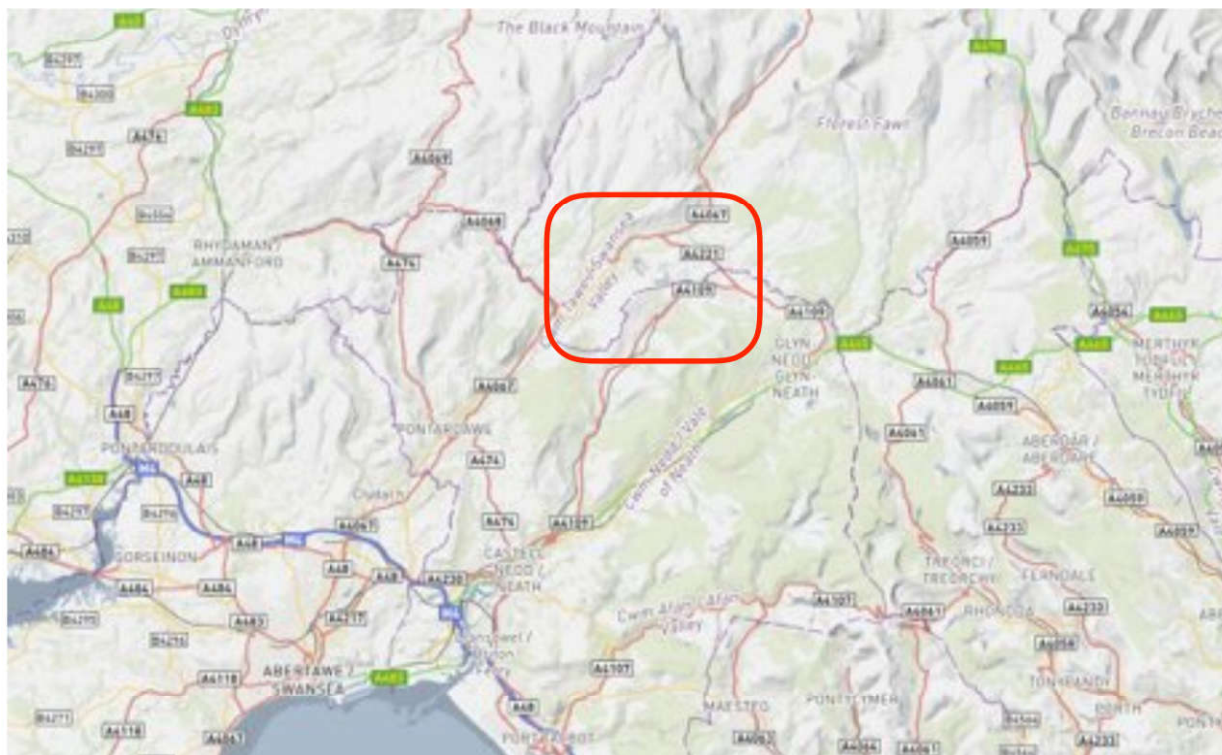


Figure 8.1 Site Location: Dulais Valley, South Wales

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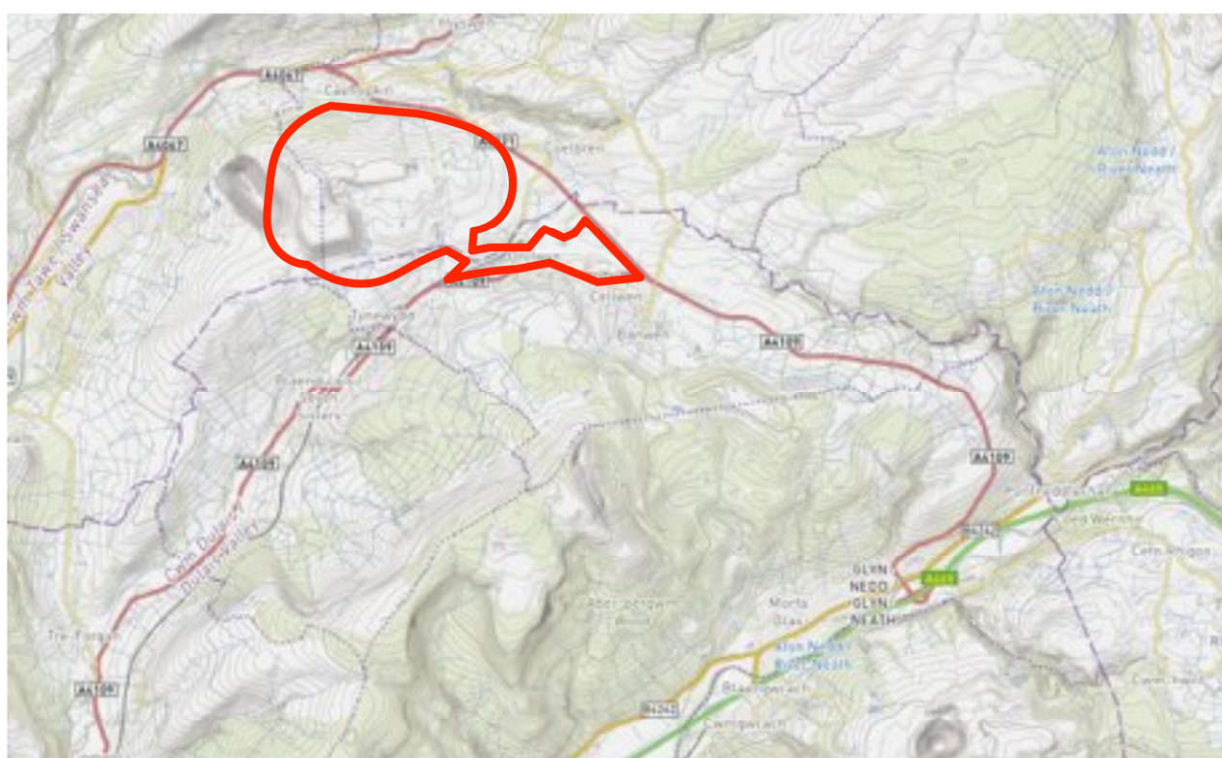


Figure 8.2 Site Location: Onllwyn Washery, Neath

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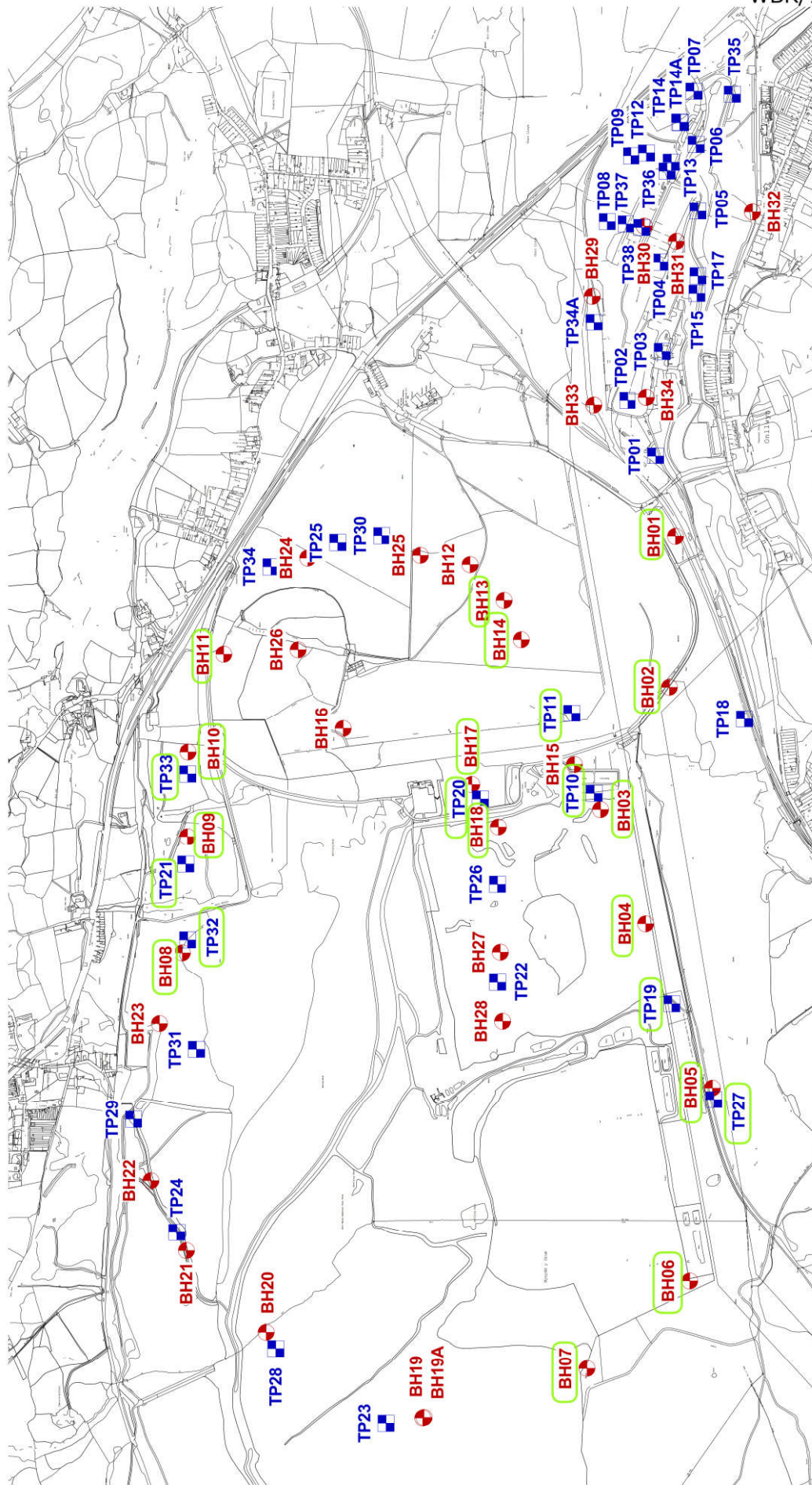


Figure 8.3 Locations of Monitored Trial Pits and Boreholes
 (outlined in green)
 Original Scale 1:12000
 © Quantumgeotechnique

9. Results

9.1 Borehole Records: BH01-BH14 & BH17-BH18

Borehole starter pits were excavated by hand , terminating at approximately 1.50 metres unless solid geology was encountered. These pits averaged 0.30 metre in diameter. Most of the pits encountered colliery spoil although pits 5-8 and 11 and 18 encountered natural clays that had not been buried under the dumping of waste from the coal washery and open cast mine in previous years.

No evidence of earlier structures or features were recorded within the excavated area.

Finds

No artefacts or pottery were recovered from boreholes 1-14 & 17-18 or excavated spoil.

Sampling

No environmental or technological samples were taken during the excavations.

Borehole core samples

Core samples were taken by Quantum Geotech Limited only when bedrock was encountered. These rock samples were not recorded archaeologically. See Appendix 2.

9.2 Trial Pit Records: TP10, TP11, TP16, TP19, TP20, 21, TP27, TP32, TP33

Trial Pits were excavated by machine, averaging 0.50 metres wide, 3.00 metre in length and terminating at approximately 3.00 metres depth unless solid geology was encountered. Most of the pits encountered colliery spoil although pits TP19, TP21, TP27 and TP33 encountered natural clays and topsoils that had been buried under the dumping of waste from the coal washery and open cast mine in previous years.

No evidence of earlier structures or features were recorded within the excavated area.

NB The location of TP 16 has not been recorded on Plan 8.3.

Finds

No artefacts or pottery were recovered from the Trial Pits or excavated spoil.

Sampling

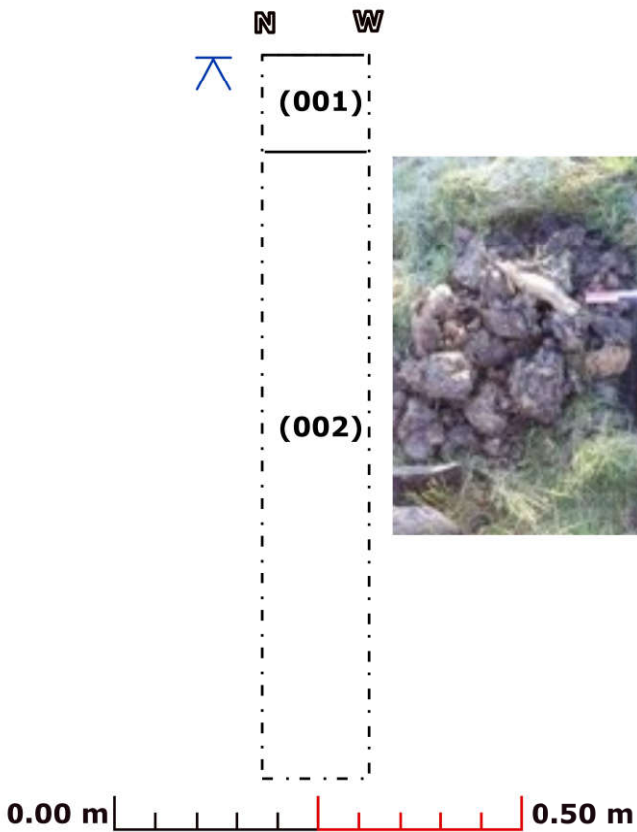
No environmental or technological samples were taken during the excavations of the Trial Pits.

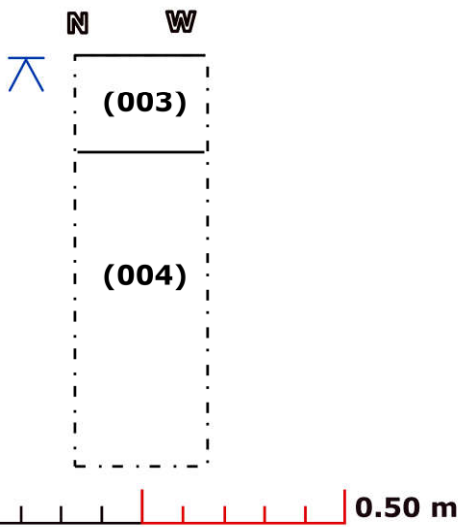
9.3 Context Record

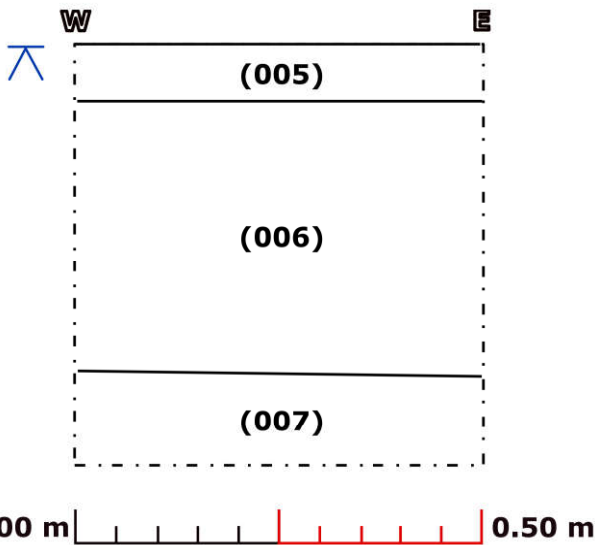
CONTEXT NUMBER	TYPE	Description	Plates	Period
001	Layer	Turf & Topsoil 12cm thick	2192-2193	Natural
002	Layer	Mixed yellow/grey clay, redeposited natural to depth	2192-2193	Natural
003	Layer	Turf & Topsoil 12cm thick	2189-2191	Natural
004	Layer	Black silt & small angular stone, colliery spoil to depth	2189-2191	19th/20th century
005	Layer	Turf & Topsoil 10cm	2172-2174	Natural
006	Layer	Dark grey silt & small angular stone, colliery spoil 30cm thick	2172-2174	19th/20th century
007	Layer	Black silt & small angular stone, colliery spoil to depth	2172-2174	19th/20th century
008	Layer	Turf & Topsoil 10cm	2175-2178	Natural
009	Layer	Dark grey silt & angular stone, colliery waste to 1.05 metres onto bedrock	2175-2178	19th/20th century
010	Layer	Turf & Topsoil 30cm thick	2194-2197	Natural
011	Layer	Grey silty clay to depth	2194-2197	Natural
012	Layer	Turf & Topsoil 20cm thick	2183-2186	Natural
013	Layer	Yellow grey mottled clay with occasional small rounded pebble <13cm	2183-2186	Natural
014	Layer	Turf & Topsoil 10 cm thick	2179-2182	Natural
015	Layer	Fractured bedrock shale	2179-2182	Natural
016	Layer	Turf & Topsoil 10 cm thick	2208-2210	Natural
017	Layer	Mudstone shale 30cm thick onto bedrock	2208-2210	Natural
018	Layer	Turf & Topsoil 10cm thick	2211-2215	Natural
019	Layer	Black colliery waste	2211-2215	19th/20th century
020	Layer	Turf & Topsoil 10cm thick	2216-2220	Natural
021	Layer	Black colliery spoil onto bedrock	2216-2220	19th/20th century
022	Layer	Turf & Topsoil 20cm thick	2204-2207	Natural
023	Layer	Mudstone onto bedrock	2204-2207	Natural
024	Layer	Turf & Topsoil 10cm thick	2219	Natural
025	Layer	Black colliery waste to depth	2220	19th/20th century
026	Layer	Turf & Topsoil 10cm thick	2221-2223	Natural

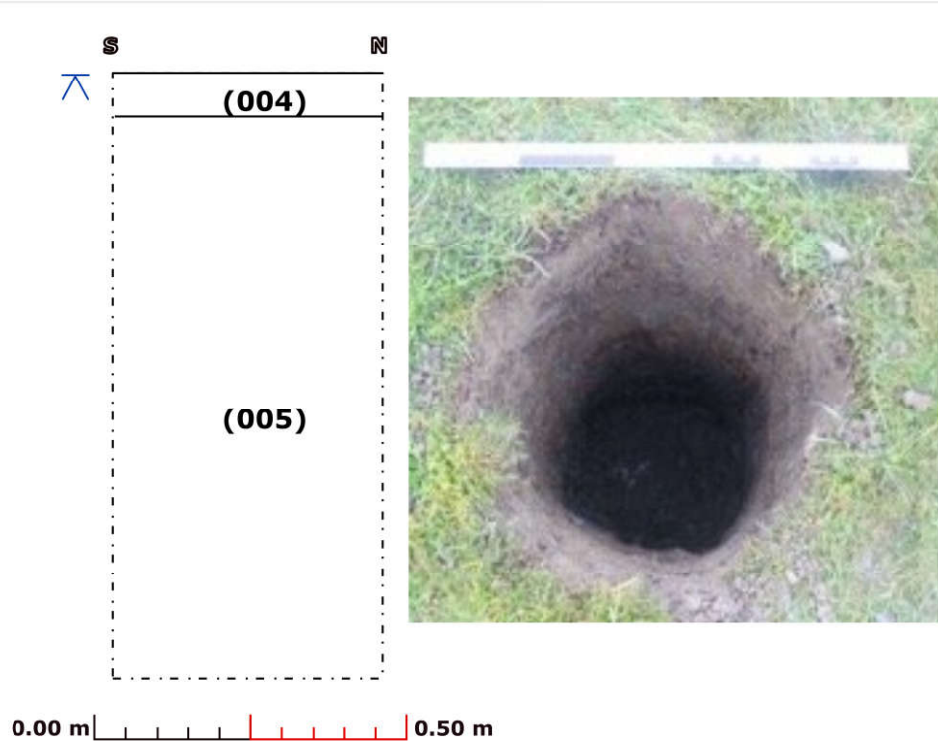
027	Layer	Black colliery spoil 80cm thick onto mudstone bedrock	2221-2223	19th/20th century
028	Layer	Turf & Topsoil 10cm thick	2224-2226	Natural
029	Layer	Black colliery spoil to depth	2224-2226	19th/20th century
030	Layer	Turf & Topsoil 10cm thick	2198-2203	Natural
031	Layer	Black colliery spoil to depth	2198-2203	19th/20th Century
032	Layer	Turf & Topsoil 10cm thick	2187-2188	Natural
033	Layer	Dark grey/brown silty clay	2187-2188	Natural
034	Layer	Dark grey silty clay to depth	2187-2188	Natural
035	Layer	Turf & Topsoil 10cm	2239-2241	Natural
036	Layer	Grey colliery spoil, small angular stone	2239-2241	19th/20th century
037	Layer	Dark grey/black colliery spoil. Large boulders to depth	2239-2241	19th/20th century
038	Layer	Turf & Topsoil 10cm	2273-2278	Natural
039	Layer	Colliery waste & large boulders, possible open cast backfill, rare mixed yellow grey redeposited clay to depth	2273-2278	19th/20th century
040	Layer	Turf & Topsoil 10cm	2227-2231	Natural
041	Layer	Black/grey colliery spoil and mudstone	2227-2231	19th/20th century
042	Layer	Marsh 20cm thick	2242-2246	Natural
043	Layer	Yellow/grey mixed clay, some small angular stone 90cm thick	2242-2246	Natural
044	Layer	Blue/Grey clay with occasional angular stone	2242-2246	Natural
045	Layer	Turf & Topsoil 10cm thick	2247-2252	Natural
046	Layer	Colliery spoil to 3.70 metres onto dark brown silty clay	2247-2252	19th/20th century
047	Layer	Marsh 20cm thick	2259-2266	Natural
048	Layer	Grey silts, mudstone spoil	2259-2266	19th/ 20th century
049	Layer	Red Grey clay large sub rounded boulders and stones	2259-2266	19th/ 20th century
050	Layer	Colliery spoil	2259-2266	19th/ 20th century
051	Layer	Buried dark brown hummic topsoil	2259-2266	Natural
052	Layer	Yellow grey clay	2259-2266	Natural
053	Layer	Turf & Topsoil 10cm thick	2232-2236	Natural
054	Layer	Mixed yellow/ grey clay, redeposited natural	2232-2236	Natural (redeposited)

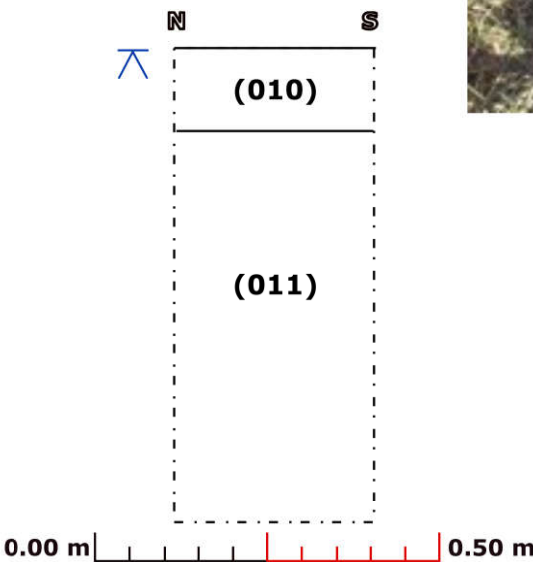
055	Layer	Possible buried topsoil	2232-2236	Natural
056	Layer	blue/ grey mixed clay	2232-2236	Natural
057	Layer	degradedMudstone	2232-2236	Natural
058	Layer	Turf & Topsoil 10cm	2253-2258	Natural
059	Layer	Colliery spoil	2253-2258	19th/20th century
060	Layer	Turf & Topsoil 20cm thick	2267-2272	Natural
061	Layer	Yellow subsoil, sub rounded stones	2267-2272	Natural
062	Layer	Colliery spoil	2267-2272	19th/20th century
063	Layer	Grey/yellow clay	2267-2272	Natural
064	Layer	Buried topsoil	2267-2272	Natural
065	Layer	Grey/yellow clay	2267-2272	Natural

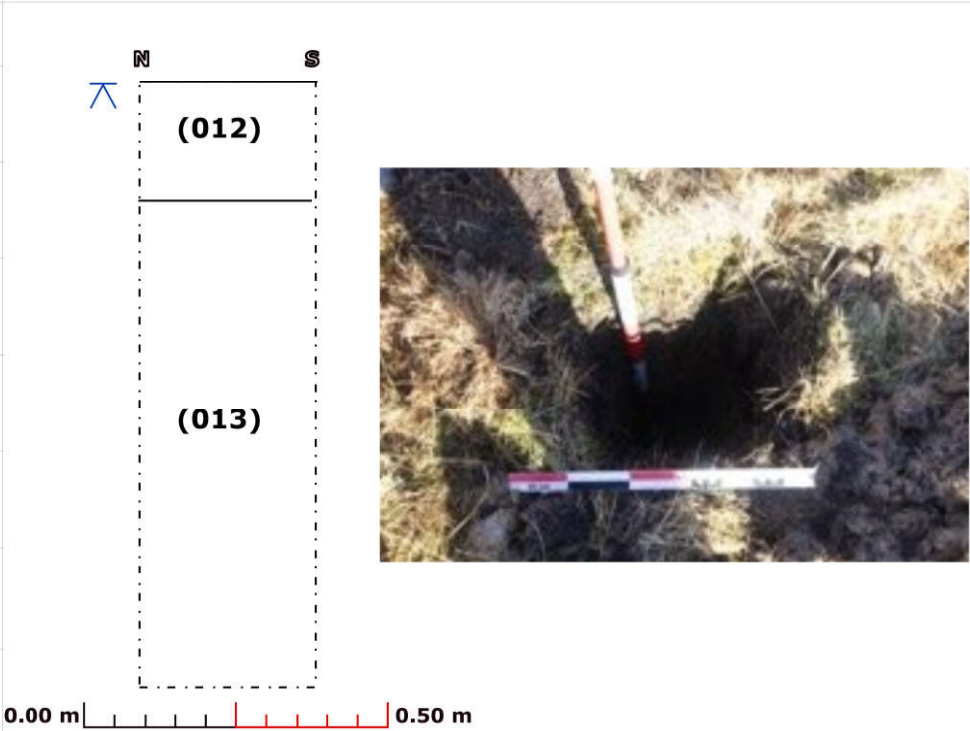
Number	BH01			
Date	25.11.21			
Length (Metres)				
Diameter (Metres)	0.30			
Width (Metres)				
Depth (Metres)	0.90			
Photographic Number	2193			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	001			
Camera Facing	SE			
Section	NW			
CONTEXT NUMBER	TYPE	Description	Plates	Period
001	Layer	Turf & Topsoil 12cm thick	2192-2193	Natural
002	Layer	Mixed yellow/grey clay, redeposited natural to depth	2192-2193	Natural

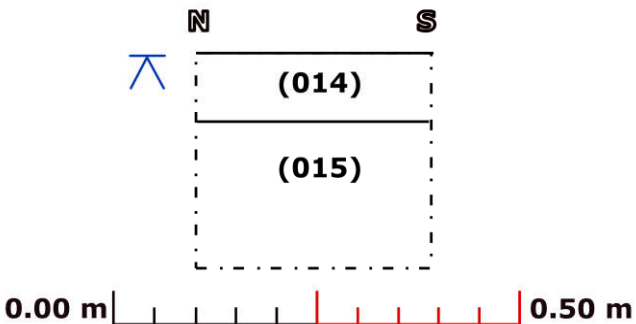
Number	BH02			
Date	25.11.21	 		
Length (Metres)				
Diameter (Metres)	0.30			
Width (Metres)				
Depth (Metres)	0.50			
Photographic Number	2191			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	002			
Camera Facing	SE			
Section	NW			
CONTEXT NUMBER	TYPE	Description	Plates	Period
003	Layer	Turf & Topsoil 12cm thick	2189-2191	Natural
004	Layer	Black silt & small angular stone, colliery spoil to depth	2189-2191	19th/20th century

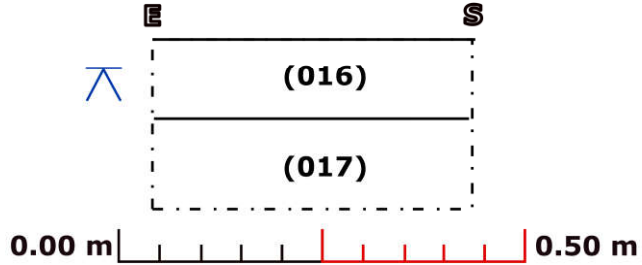
Number	BH03			
Date	18.11.21	 		
Length (Metres)				
Diameter (Metres)	0.50			
Width (Metres)				
Depth (Metres)	0.60			
Photographic Number	2172			
Photographic Scales (metres)	1.00 & 0.50			
Plan Numbers	Fig. 8.3			
Section Number	003			
Camera Facing	E			
Section	W			
Context Number	Type	Description	Plates	Period
005	Layer	Turf & Topsoil 10cm	2172-2174	Natural
006	Layer	Dark grey silt & small angular stone, colliery spoil 30cm thick	2172-2174	19th/20th century
007	Layer	Black silt & small angular stone, colliery spoil to depth	2172-2174	19th/20th century

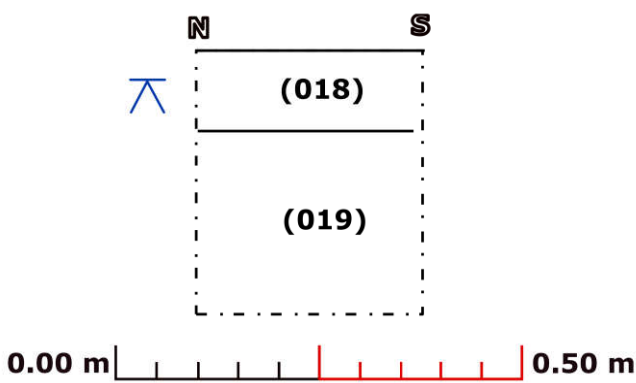
Number	BH04			
Date	18.11.21			
Length (Metres)				
Diameter (Metres)	0.40			
Width (Metres)				
Depth (Metres)	1.05			
Photographic Number	2172			
Photographic Scales (metres)	1.00 & 0.50			
Plan Numbers	Fig. 8.3			
Section Number	004			
Camera Facing	N			
Section	W			
CONTEXT NUMBER	TYPE	Description	Plates	Period
008	Layer	Turf & Topsoil 10cm	2175-2178	Natural
009	Layer	Dark grey silt & angular stone, colliery waste to 1.05 metres onto bedrock	2175-2178	19th/20th century

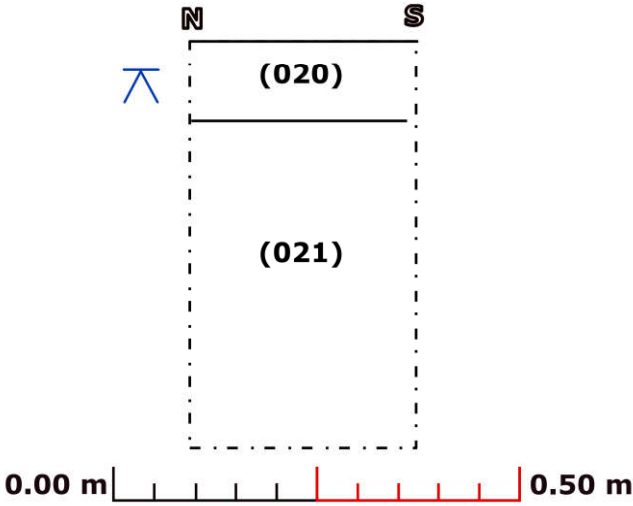
Number	BH05			
Date	25.11.21			
Length (Metres)				
Diameter (Metres)	0.30			
Width (Metres)				
Depth (Metres)	0.70			
Photographic Number	2196 & 2237			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	005			
Camera Facing	E			
Section	E			
		 Core samples of bedrock recorded from BH05		
CONTEXT NUMBER	TYPE	Description	Plates	Period
010	Layer	Turf & Topsoil 30cm thick	2194-2197	Natural
011	Layer	Grey silty clay to depth	2194-2197	Natural

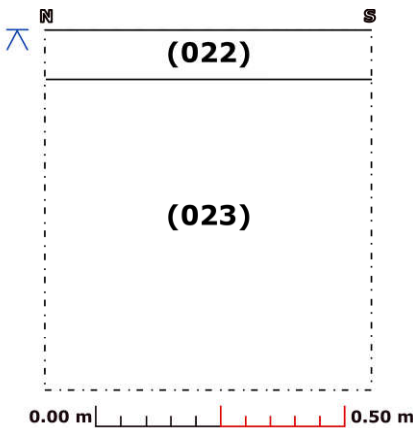
Number	BH06			
Date	22.11.21			
Length (Metres)				
Diameter (Metres)	0.30			
Width (Metres)				
Depth (Metres)	1.00			
Photographic Number	2184			
Photographic Scales (metres)	1.00 & 0.50			
Plan Numbers	Fig. 8.3			
Section Number	006			
Camera Facing	N			
Section	E			
CONTEXT NUMBER	TYPE	Description	Plates	Period
012	Layer	Turf & Topsoil 20cm thick	2183-2186	Natural
013	Layer	Yellow grey mottled clay with occasional small rounded pebble <13cm	2183-2186	Natural

Number	BH07			
Date	22.11.21			
Length (Metres)	0.30			
Diameter (Metres)				
Width (Metres)	0.30			
Depth (Metres)	0.25			
Photographic Number	2181			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	007			
Camera Facing	E			
Section	E			
CONTEXT NUMBER	TYPE	Description	Plates	Period
014	Layer	Turf & Topsoil 10 cm thick	2179-2182	Natural
015	Layer	Fractured bedrock shale	2179-2182	Natural

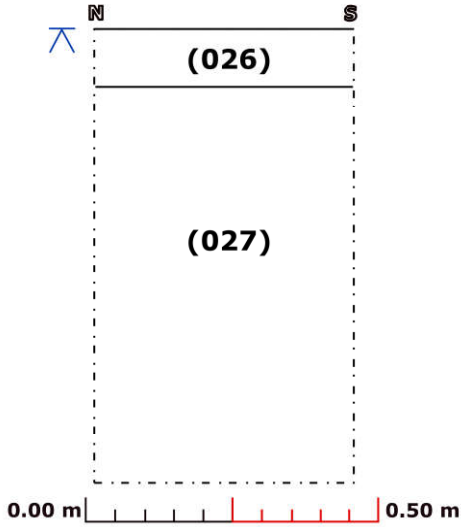
Number	BH08			
Date	29.11.21			
Length (Metres)				
Diameter (Metres)	0.40			
Width (Metres)				
Depth (Metres)	0.20			
Photographic Number	2208			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	008			
Camera Facing	NW			
Section	SE			
CONTEXT NUMBER	TYPE	Description	Plates	Period
016	Layer	Turf & Topsoil 10 cm thick	2208-2210	Natural
017	Layer	Mudstone shale 30cm thick onto bedrock	2208-2210	Natural

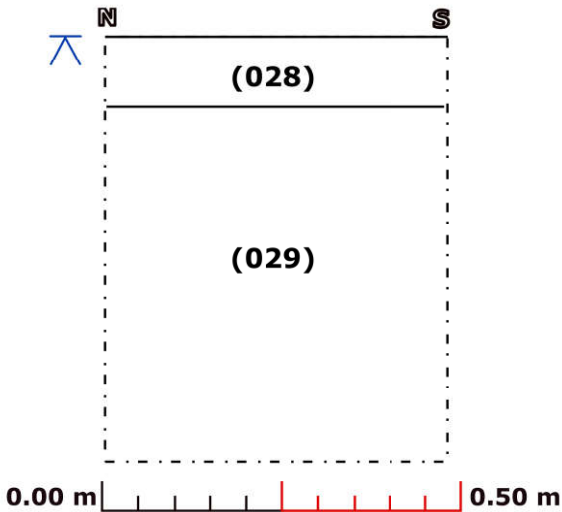
Number	BH09			
Date	29.11.21			
Length (Metres)				
Diameter (Metres)	0.30			
Width (Metres)				
Depth (Metres)	0.30			
Photographic Number	2212			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	009			
Camera Facing	E			
Section	E			
CONTEXT NUMBER	TYPE	Description	Plates	Period
018	Layer	Turf & Topsoil 10cm thick	2211-2215	Natural
019	Layer	Black colliery waste	2211-2215	19th/20th century

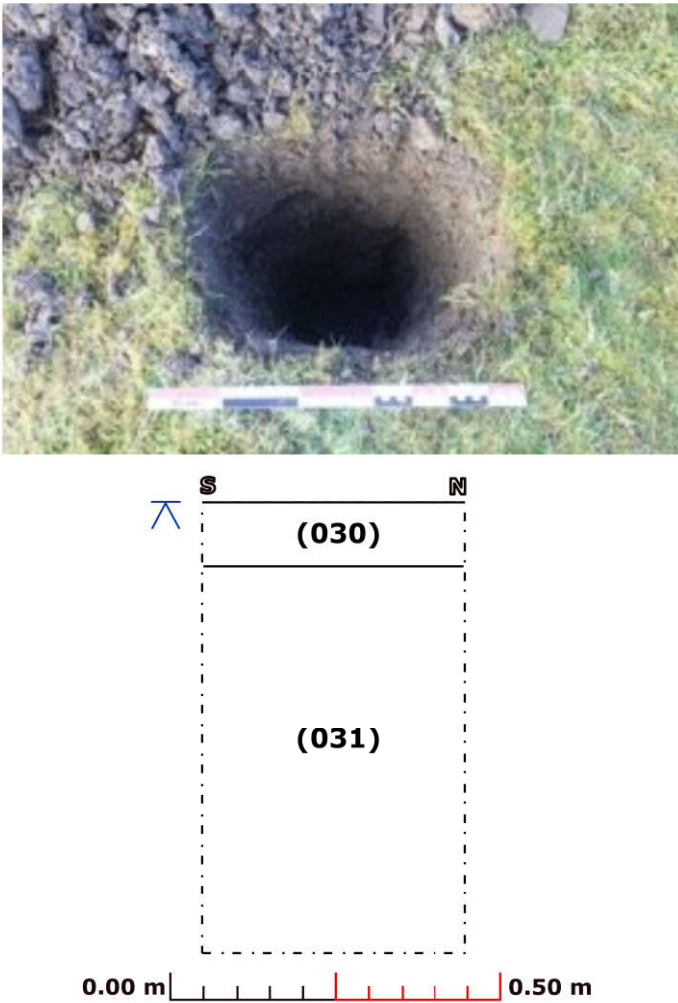
Number	BH10			
Date	29.11.21			
Length (Metres)				
Diameter (Metres)				
Width (Metres)	0.30			
Depth (Metres)	0.49			
Photographic Number	2217			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	010			
Camera Facing	N			
Section	E			
CONTEXT NUMBER	TYPE	Description	Plates	Period
020	Layer	Turf & Topsoil 10cm thick	2216-2220	Natural
021	Layer	Black colliery spoil onto bedrock	2216-2220	19th/20th century

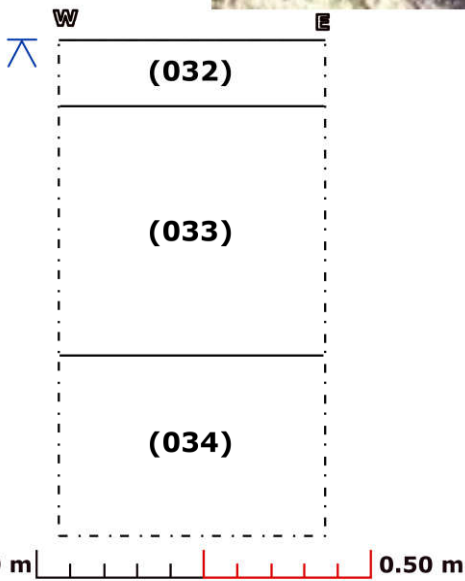
Number	BH11			
Date	29.11.21			
Length (Metres)				
Diameter (Metres)	0.55			
Width (Metres)				
Depth (Metres)	0.70			
Photographic Number	2207			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	011			
Camera Facing	W			
Section	E			
				
CONTEXT NUMBER	TYPE	Description	Plates	Period
022	Layer	Turf & Topsoil 20cm thick	2204-2207	Natural
023	Layer	Mudstone onto bedrock	2204-2207	Natural

Number	BH12			
Date	29.11.21			
Length (Metres)				
Diameter (Metres)	0.40			
Width (Metres)				
Depth (Metres)	0.55			
Photographic Number	2220			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	012			
Camera Facing	E			
Section	E			
CONTEXT NUMBER	TYPE	Description	Plates	Period
024	Layer	Turf & Topsoil 10cm thick	2219	Natural
025	Layer	Black colliery waste to depth	2220	19th/20th century

Number	BH13			
Date	29.11.21	 		
Length (Metres)				
Diameter (Metres)	0.46			
Width (Metres)				
Depth (Metres)	0.80			
Photographic Number	2222			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	013			
Camera Facing	S			
Section	E			
CONTEXT NUMBER	TYPE	Description	Plates	Period
026	Layer	Turf & Topsoil 10cm thick	2221-2223	Natural
027	Layer	Black colliery spoil 80cm thick onto mudstone bedrock	2221-2223	19th/20th century

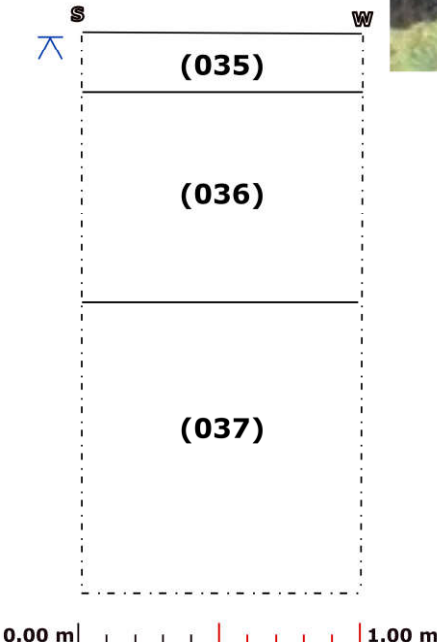
Number	BH14			
Date	29.11.21			
Length (Metres)				
Diameter (Metres)	0.50			
Width (Metres)				
Depth (Metres)	0.60			
Photographic Number	2225			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	014			
Camera Facing	E			
Section	E			
CONTEXT NUMBER	TYPE	Description	Plates	Period
028	Layer	Turf & Topsoil 10cm thick	2224-2226	Natural
029	Layer	Black colliery spoil to depth	2224-2226	19th/20th century

Number	BH17			
Date	25.11.21			
Length (Metres)				
Diameter (Metres)	0.40			
Width (Metres)				
Depth (Metres)	0.70			
Photographic Number	2204			
Photographic Scales (metres)	0.50			
Plan Numbers	Fig. 8.3			
Section Number	015			
Camera Facing	W			
Section	W			
CONTEXT NUMBER	TYPE	Description	Plates	Period
030	Layer	Turf & Topsoil 10cm thick	2198-2203	Natural
031	Layer	Black colliery spoil to depth	2198-2203	19th/20th Century

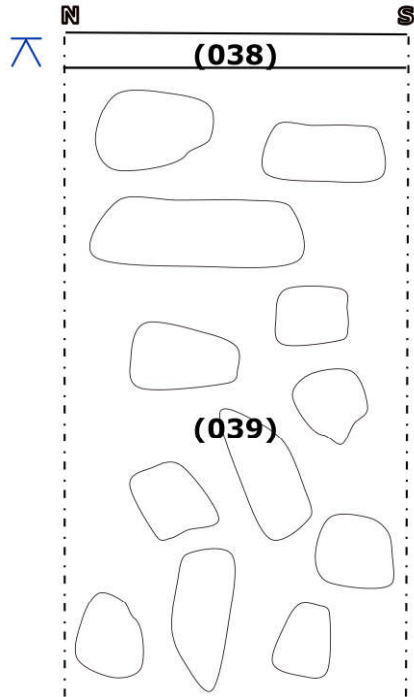
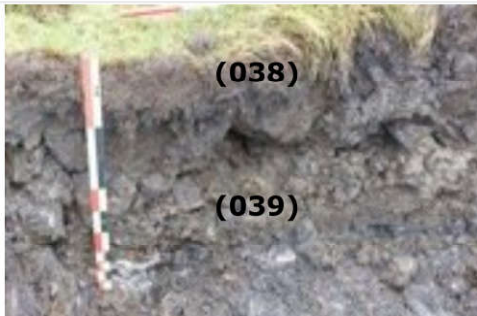
Number	BH18			
Date	22.11.21	 		
Length (Metres)				
Diameter (Metres)	0.44			
Width (Metres)				
Depth (Metres)	0.75			
Photographic Number	2187			
Photographic Scales (metres)	1.00 & 0.50			
Plan Numbers	Fig. 8.3			
Section Number	016			
Camera Facing	N			
Section	N			
CONTEXT NUMBER	TYPE	Description	Plates	Period
032	Layer	Turf & Topsoil 10cm thick	2187-2188	Natural
033	Layer	Dark grey/brown silty clay	2187-2188	Natural
034	Layer	Dark grey silty clay to depth	2187-2188	Natural

9.3 Trial Pit Records

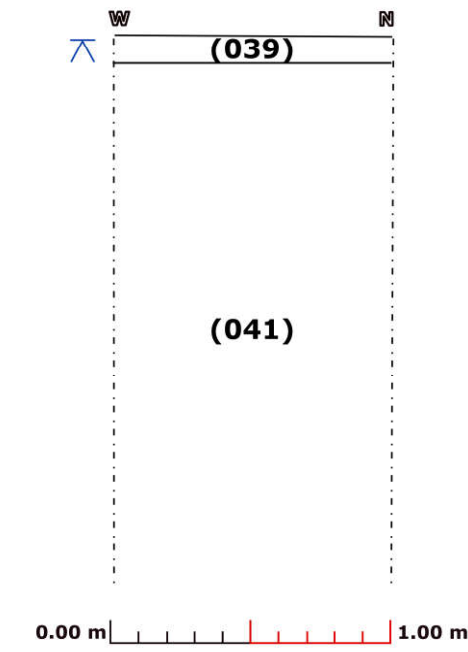
Trial Pits 10, 11, 16, 19, 20, 21, 27, 32, 33

Number	TP10			
Date	25.11.21			
Length (Metres)	5.2			
Diameter (Metres)				
Width (Metres)	0.50			
Depth (Metres)	2.00			
Photographic Number	2240 2241			
Photographic Scales (metres)	1.00 & 2.00			
Plan Numbers	Fig. 8.3			
Section Number	017			
Camera Facing	SW			
Section	SW			
		 Excavation @ 1.20 metres		
CONTEXT NUMBER	TYPE	Description	Plates	Period
035	Layer	Turf & Topsoil 10cm	2239-2241	Natural
036	Layer	Grey colliery spoil, small angular stone	2239-2241	19th/20th century
037	Layer	Dark grey/black colliery spoil. Large boulders to depth	2239-2241	19th/20th century

Dangerous and collapsing sections

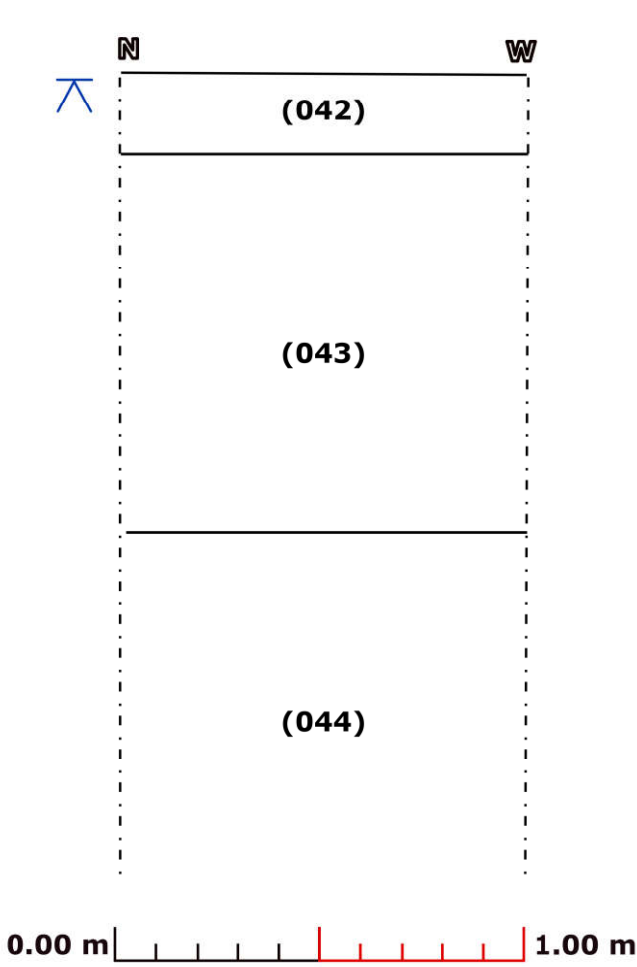
Number	TP11			
Date	10.1.22			
Length (Metres)	3.50			
Diameter (Metres)				
Width (Metres)	1.30			
Depth (Metres)	2.60			
Photographic Number	2274 2275			
Photographic Scales (metres)				
Plan Numbers	Fig. 8.3			
Section Number	018			
Camera Facing	E			
Section	E			
		0.00 m		1.00 m
				
				
		Excavation @ 1.20 metres		
CONTEXT NUMBER	TYPE	Description	Plates	Period
038	Layer	Turf & Topsoil 10cm	2273-2278	Natural
039	Layer	Colliery waste & large boulders, possible open cast backfill, rare mixed yellow grey redeposited clay to depth	2273-2278	19th/20th century

Dangerous and collapsing sections

Number	TP16			
Date	6.12.21			
Length (Metres)	3.5			
Diameter (Metres)				
Width (Metres)	0.50			
Depth (Metres)	3.00			
Photographic Number	2228 2229 2230	 Section 019 @ 1.20 metres 		
Photographic Scales (metres)	1.00 & 2.00			
Plan Numbers	Fig. 8.3			
Section Number	019			
Camera Facing	NW			
Section	NW			
CONTEXT NUMBER	TYPE	Description	Plates	Period
040	Layer	Turf & Topsoil 10cm	2227-2231	Natural
041	Layer	Black/grey colliery spoil and mudstone	2227-2231	19th/20th century

Dangerous and collapsing sections

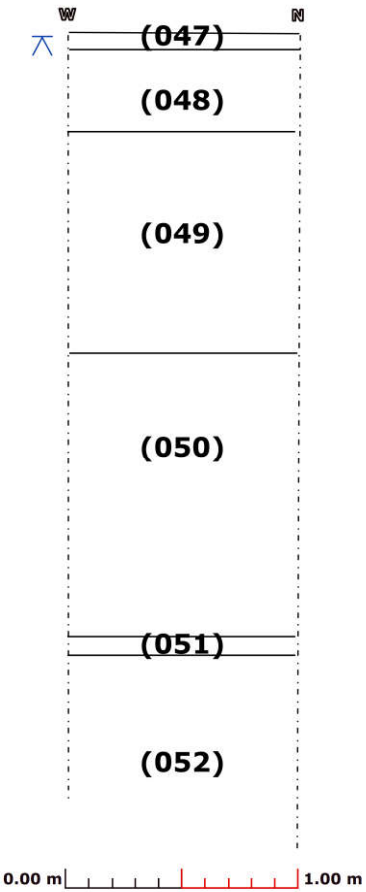
This Trial Pit location has not been recorded on location maps or plans.

Number	TP19			
Date	8.12.21			
Length (Metres)	3.00			
Diameter (Metres)				
Width (Metres)	0.70			
Depth (Metres)	3.2			
Photographic Number	2243 2245			
Photographic Scales (metres)	1.00 & 2.00			
Plan Numbers	Fig. 8.3			
Section Number	020			
Camera Facing	NW & NE			
Section	NW			
CONTEXT NUMBER	TYPE	Description	Plates	Period
042	Layer	Marsh 20cm thick	2242-2246	Natural
043	Layer	Yellow/grey mixed clay, some small angular stone 90cm thick	2242-2246	Natural
044	Layer	Blue/Grey clay with occasional angular stone	2242-2246	Natural

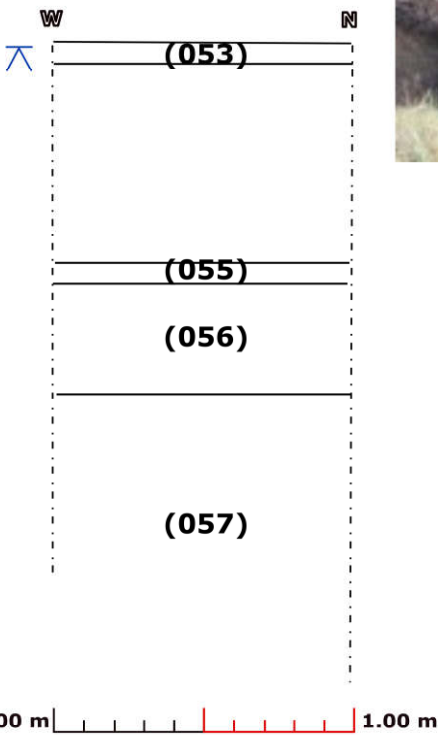
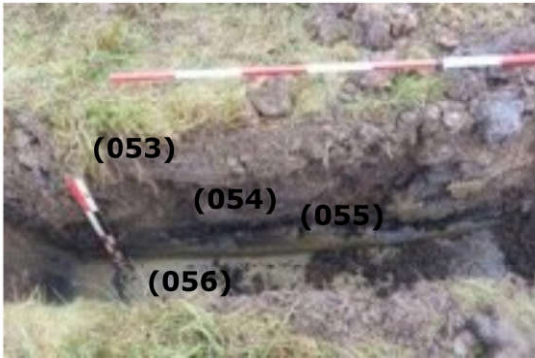
Dangerous and collapsing sections

Number	TP20			
Date	8.12.21			
Length (Metres)	3.00			
Diameter (Metres)				
Width (Metres)	0.50			
Depth (Metres)	4.00			
Photographic Number	2249 2250			
Photographic Scales (metres)	2.00 & 1.00			
Plan Numbers	Fig. 8.3			
Section Number	021			
Camera Facing	NW & NE			
Section	NW			
CONTEXT NUMBER	TYPE	Description	Plates	Period
045	Layer	Turf & Topsoil 10cm thick	2247-2252	Natural
046	Layer	Colliery spoil to 3.70 metres onto dark brown silty clay natural	2247-2252	19th/20th century

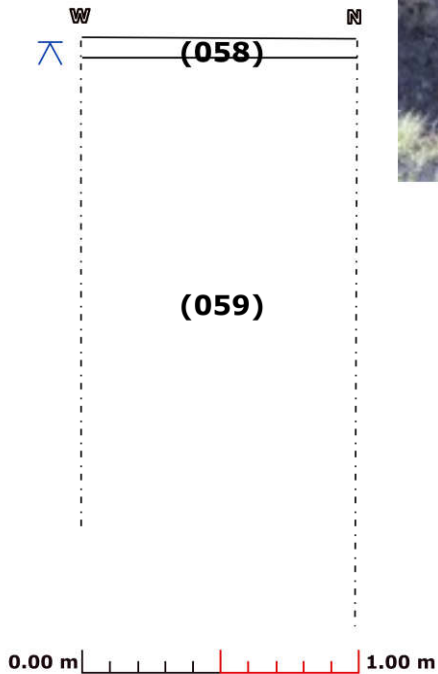
Dangerous and collapsing sections

Number	TP21			
Date	9.12.21			
Length (Metres)	3.00			
Diameter (Metres)				
Width (Metres)	0.50			
Depth (Metres)	4.00			
Photographic Number	2263 2264			
Photographic Scales (metres)	1.00 & 2.00			
Plan Numbers	Fig. 8.3			
Section Number	022			
Camera Facing	NW & NE			
Section	NW			
				
CONTEXT NUMBER	TYPE	Description	Plates	Period
047	Layer	Marsh 20cm thick	2259-2266	Natural
048	Layer	Grey silts, mudstone spoil	2259-2266	19th/ 20th century
049	Layer	Red Grey clay large sub rounded boulders and stones	2259-2266	19th/ 20th century
050	Layer	Colliery spoil	2259-2266	19th/ 20th century
051	Layer	Buried dark brown hummic topsoil	2259-2266	Natural
052	Layer	Yellow grey clay	2259-2266	Natural

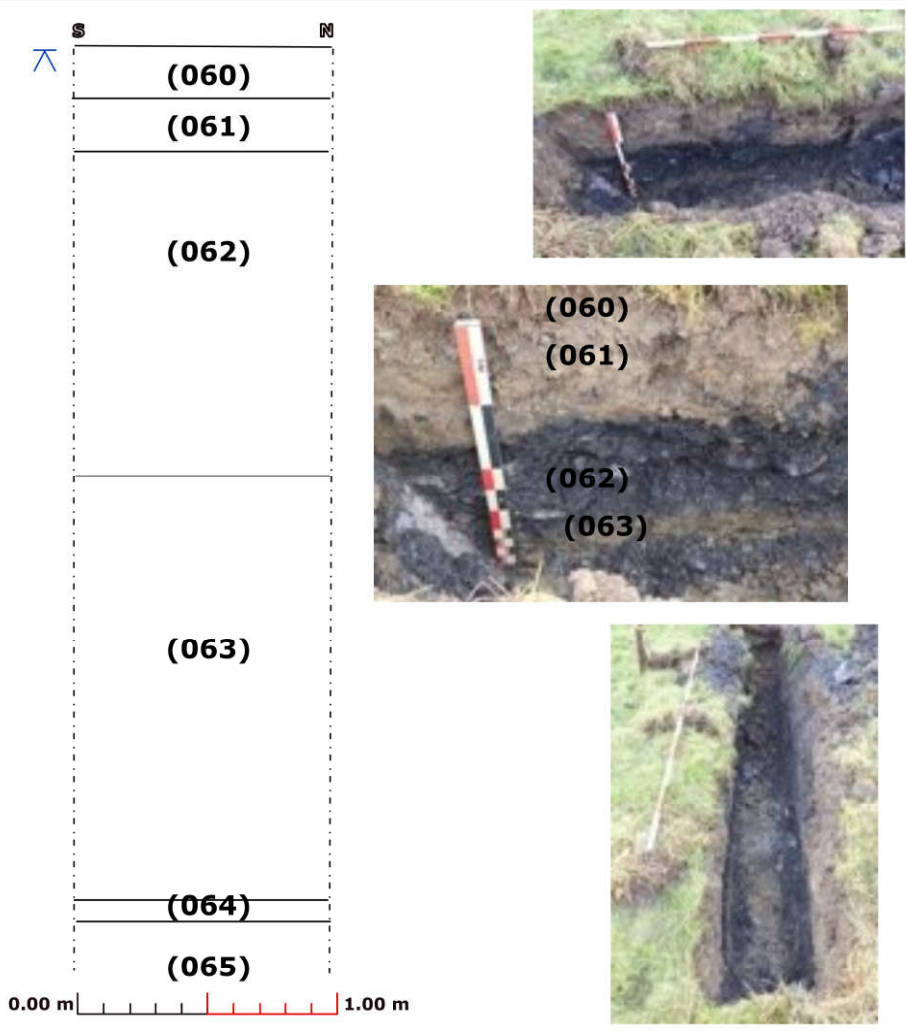
Collapsing Trench. Dangerous to enter

Number	TP27			
Date	7.12.21			
Length (Metres)	3.00			
Diameter (Metres)				
Width (Metres)	0.50			
Depth (Metres)	4.50			
Photographic Number	2234 2235			
Photographic Scales (metres)	1.00 & 2.00			
Plan Numbers	Fig. 8.3			
Section Number	023			
Camera Facing	NW NE			
Section	NW			
				
				
CONTEXT NUMBER	TYPE	Description	Plates	Period
053	Layer	Turf & Topsoil 10cm thick	2232-2236	Natural
054	Layer	Mixed yellow/ grey clay, redeposited natural	2232-2236	Natural (redeposited)
055	Layer	Buried topsoil, peaty layer with grass in evidence	2232-2236	Natural
056	Layer	Blue/ grey mixed clay	2232-2236	Natural
057	Layer	degraded Mudstone	2232-2236	Natural

Dangerous and collapsing sections

Number	TP32			
Date	8.12.21			
Length (Metres)	3.00			
Diameter (Metres)				
Width (Metres)	0.50			
Depth (Metres)	4.00			
Photographic Number	2254 2256			
Photographic Scales (metres)	1.00 & 2.00			
Plan Numbers	Fig. 8.3			
Section Number	024			
Camera Facing	NE SE			
Section	NE			
CONTEXT NUMBER	TYPE	Description	Plates	Period
058	Layer	Turf & Topsoil 10cm	2253-2258	Natural
059	Layer	Colliery spoil	2253-2258	19th/20th century

Dangerous and collapsing sections

Number	TP33			
Date	9.12.21			
Length (Metres)	4.00			
Diameter (Metres)				
Width (Metres)	0.50			
Depth (Metres)	4.00			
Photographic Number	2268 2269 2270			
Photographic Scales (metres)	1.00 & 2.00			
Plan Numbers	Fig. 8.3			
Section Number	025			
Camera Facing	NE			
Section	NW			
CONTEXT NUMBER	TYPE	Description	Plates	Period
060	Layer	Turf & Topsoil 20cm thick	2267-2272	Natural
061	Layer	Yellow subsoil, sub rounded stones	2267-2272	Natural
062	Layer	Colliery spoil	2267-2272	19th/20th century
063	Layer	Grey/yellow clay	2267-2272	Natural
064	Layer	Buried topsoil	2267-2272	Natural
065	Layer	Grey/yellow clay	2267-2272	Natural

Dangerous and collapsing sections

10. Results Analysis

10.1 The archaeological background of Onllwyn Washery and its setting, including a Historic Environment Record search, are detailed in Section 7 of this report and the following results reviewed in context of this information. Located at the head of the Dulais Valley in South Wales, in an area of known industrial activity spanning over 200 years, Onllwyn was used for activities associated with drift mining from 1932 with many coal shafts also recorded in the local vicinity but more recently it has serviced two local open cast mine sites.

10.2 Site monitoring and recording in the form of an archaeological watching brief ensured that mitigating measures were in place in order to protect the archaeological resource of the site during recent ground investigation works, namely a series of trial pits and boreholes. A detailed data record of each borehole and trial pit including photographic record can be found in 9. Results (pp 16-40) with an associated Context Record (pp 13-15).

10.3 The results of monitoring the ground investigation works at the site show that the area had previously been used for activities associated with mining, likely to date from the 19th/20th century or later but with no archaeological evidence of any earlier activity at the site. No significant archaeological features or contexts were discovered and no archaeological artefacts were recovered from either the Borehole or Trial Pit excavations, or from the associated excavated spoil.

11. Conclusion

11.1 It can be concluded from analysis of the results of the watching brief that no evidence of earlier archaeological activity was discovered during site monitoring at the site and that recorded industrial contexts are likely to date from the 19th/20th century onwards. No significant archaeological artefacts, features or contexts were recorded during the watching brief.

12. References & Bibliography

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Internet

Archwilio: archwilio.org.uk
 British Geological Survey: www.bgs.ac.uk
 Chartered Institute for Archaeologists: www.archaeologists.net
 Historic Wales: historicwales.gov.uk
 Museum Federation of Wales: www.welshmuseumsfederation.org.uk
 Portable Antiquities Scheme: www.finds.org.uk

Appendix 1

Photographic Index

Site Name	Site Code	Sheet Number
Onllwyn Washery	OWN21	1

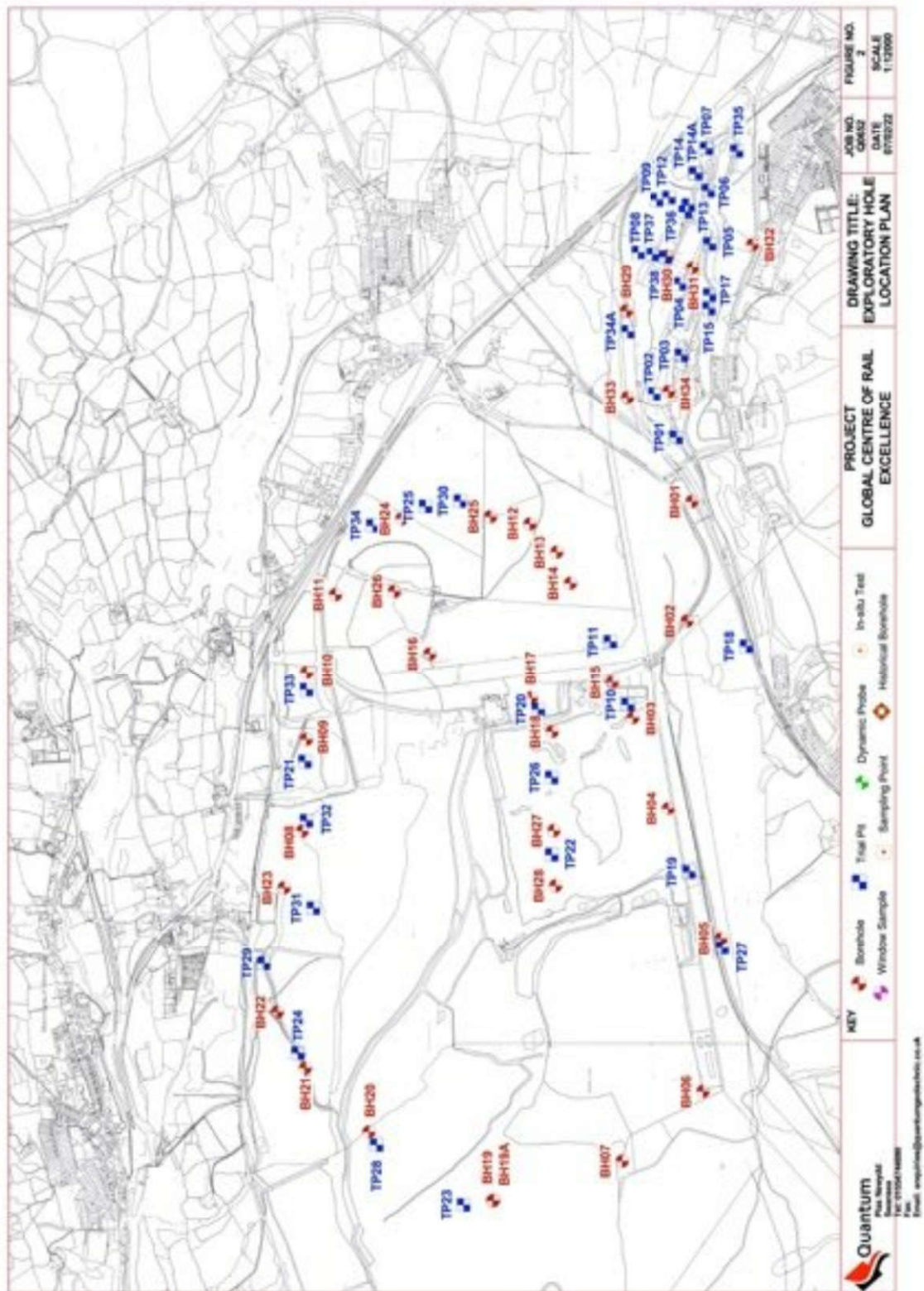
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2169	1	General view of site BH03		SE	18.11.21
2170	2	General view of site BH03		E	
2171	3	General view of site BH03		SE	
2172	4	BH03	1 & 0.5	E	
2173	5	BH03	1 & 0.5	E	
2174	6	BH03	1	S	
2175	7	BH04 Spoil			18.11.21
2176	8	BH04 Setting up			
2177	9	BH04	0.5	W	
2178	10	BH04	0.5	W	
2179	11	BH07 Setting up		E	22.11.21
2180	12	BH07 General shot		E	
2181	13	BH07	0.5	E	
2182	14	BH07	0.5	E	
2183	15	BH06 General shot		N	22.11.21
2184	16	BH06	2 & 0.5	N	
2185	17	BH06	2 & 0.5	NE	
2186	18	BH06	2 & 0.5	E	
2187	19	BH18	2 & 0.5	N	22.11.21
2188	20	BH18	2 & 0.5	N	
2189	21	BH02 Setting up		SE	25.11.21
2190	22	BH02	0.5	SE	
2191	23	BH02	0.5	SE	
2192	24	BH01 Setting up		SE	25.11.21
2193	25	BH01	0.5	SE	
2194	26	BH05 General Shot		E	25.11.21
2195	27	BH05 General Shot		E	
2196	28	BH05	0.5	E	
2197	29	BH05	0.5	E	
2198	30	BH17 Setting up		W	25.11.21
2199	31	Panorama BH17			
2200	32	Panorama BH17			

2201	33	BH17	0.5	W	
2202	34	BH17	0.5	W	
2203	35	BH17 Spoil	0.5	W	
2204	36	BH11 Setting up			29.11.21
2205	37	BH11	0.5	W	
2206	38	BH11	0.5	W	
2207	39	BH11	0.5	W	
2208	40	BH08	0.5	NW	
2209	41	BH08 Panorama		NW	
2210	42	BH08 Panorama		NW	
2211	43	BH09 Setting up		E	29.11.21
2212	44	BH09	0.5	E	
2213	45	BH09	0.5	E	
2214	46	BH09	0.5	E	
2215	47	BH09	0.5	E	
2216	48	BH10 Setting up		N	29.11.21
2217	49	BH10	0.5	N	
2218	50	BH10	0.5	N	
2219	51	BH12 Setting up		E	29.11.21
2220	52	BH12	0.5	E	
2221	53	BH13 Setting up		S	29.11.21
2222	54	BH13	0.5	S	
2223	55	BH13	0.5	S	
2224	56	BH14	0.5	E	29.11.21
2225	57	BH14	0.5	E	
2226	58	BH14	0.5	E	
2227	59	TP16 Setting up		NW	6.12.21
2228	60	TP16	1 & 2	NW	
2229	61	TP16	1 & 2	NE	
2230	62	TP16 Section	1	NW	
2231	63	TP16 Full depth		NE	
2232	64	TP27 Setting up			7.12.21
2234	65	TP27	1	NW	
2235	66	TP27	1	NW	
2236	67	TP27	1 & 2	NW	
2237	68	Core Sample			
2238	69	Core Sample			
2239	70	TP10 Setting up			7.12.21
2240	71	TP10	1 & 2	S	
2241	72	TP10	1 & 2	W	

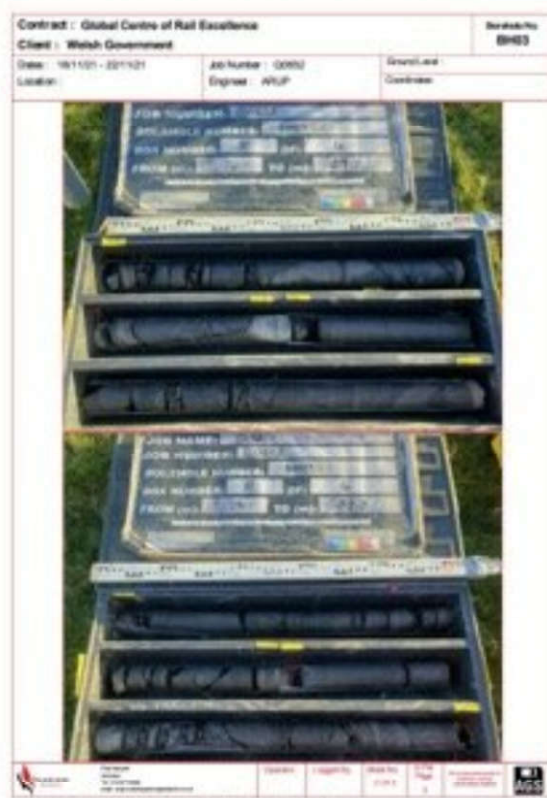
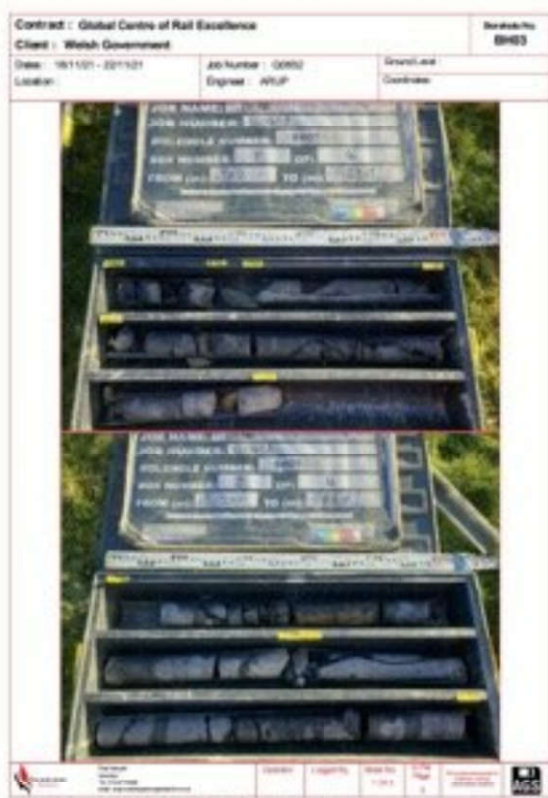
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2243	74	TP19 Section	1 & 2	NW	
2244	75	TP19		NE	
2245	76	TP19		NE	
2246	77	TP19		NE	
2247	78	TP20 Setting up			8.12.21
2248	79	TP20	1 & 2	SE	
2249	80	TP20 Section @ 1.20m	1 & 2	SE	
2250	81	TP20	1	NE	
2251	82	TP20		NE	
2252	83	TP20 Full depth		NE	
2253	84	TP32 Setting up			8.12.21
2254	85	TP32 Section @ 1.20m	1	NE	
2255	86	TP32		NE	
2256	87	TP32	2	NW	
2257	88	TP32	2	NW	
2258	89	TP32		NW	
2259	90	TP21 Setting up			9.12.21
2260	91	TP21 Panorama			
2261	92	TP21 Panorama			
2262	93	TP21	1 & 2	NW	
2263	94	TP21 Section @ 1.20m	1 & 2	NW	
2264	95	TP21	2	NE	
2265	96	TP21 Spoil			
2266	97	TP 21 Spoil			
2267	98	TP33 Setting up			9.12.21
2268	99	TP33	1 & 2	E	
2269	100	TP33 Section @ 1.20m	1	E	
2270	101	TP33	1	N	
2271	102	TP33		N	
2272	103	TP33 Full depth		N	
2273	104	TP11 Under excavation			10.1 22
2274	105	TP11 Section	1 & 2	E	
2275	106	TP11 @ 1.20m	1 & 2	N	
2276	107	TP11 Section	1	E	
2277	108	TP11 Collapse		S	
2278	109	TP11 Collapse		S	

Appendix 2

Borehole Log Sheets



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[illegible][illegible]

Contract : Global Centre of Rail Excellence															Store No. BH04		
Client : Welsh Government																	
Date : 23/11/21 - 23/11/21					Job Number : Q052			Project Job : 23/11/21 - 23/11/21			Coordinates : 23/11/21 - 23/11/21			Ground Level : 23/11/21 - 23/11/21			
Location :					Engineer : ANUP			Description :			Inspection :			Notes :			
Item No.	Item Name	Item Description	Item Quantity	Item Unit	Item Price	Item Total	Item Status	Item Location	Item Date	Item Time	Item User	Item Comment	Item Photo	Item Signature	Item Stamp	Item Date	Item Time
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4	Item 4	Item 4 Description	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
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6	Item 6	Item 6 Description	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
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8	Item 8	Item 8 Description	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	Item 9	Item 9 Description	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
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11	Item 11	Item 11 Description	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
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23	Item 23	Item 23 Description	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
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63	Item 63	Item 63 Description	63	63	63	63	63	63	63	63	63	63	63	63	63	63	63
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66	Item 66	Item 66 Description	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
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Contract : Global Centre of Rail Excellence		Barcode No
Client : Welsh Government		BH05
Date : 1/12/21 - 3/12/21	Job Number : 0050	Ground and
Location :	Engineer : WUP	Condition:



	
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Contract : Global Centre of Rail Excellence		Barcode No
Client : Welsh Government		BH05
Date : 1/12/21 - 3/12/21	Job Number : 0050	Ground and
Location :	Engineer : WUP	Condition:



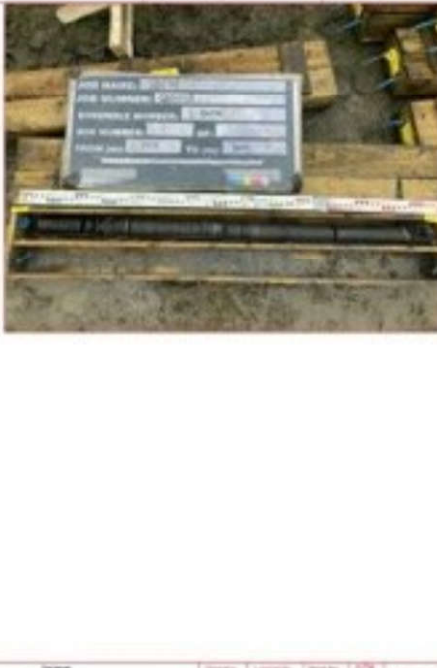
	
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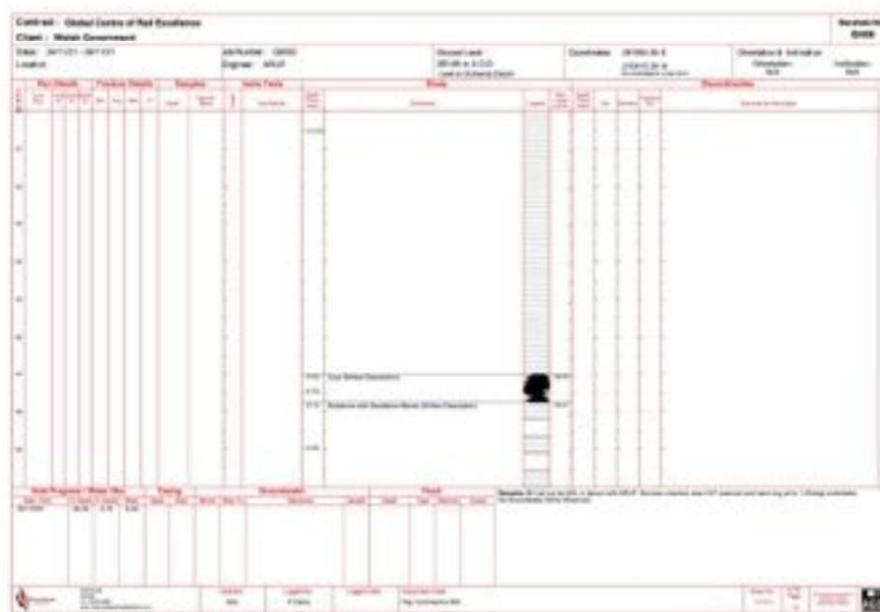
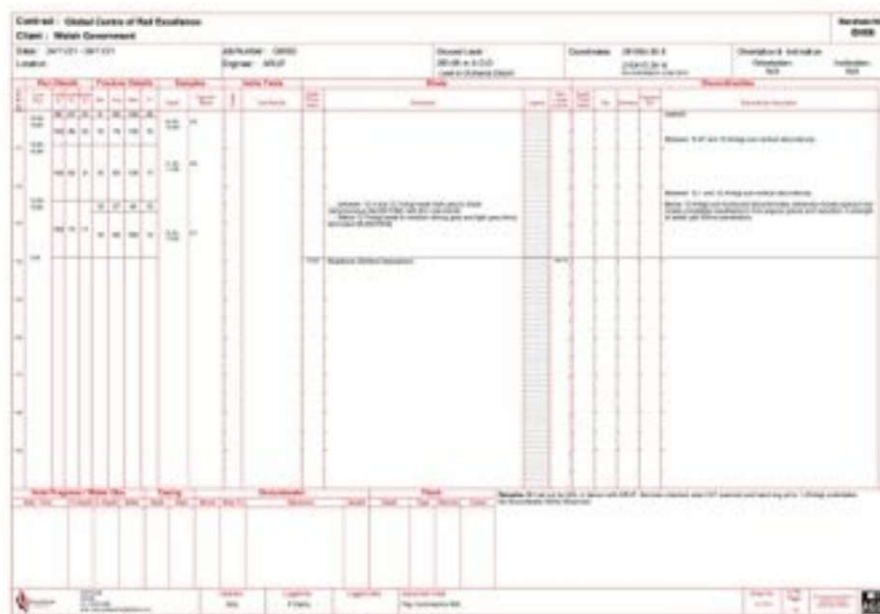


	
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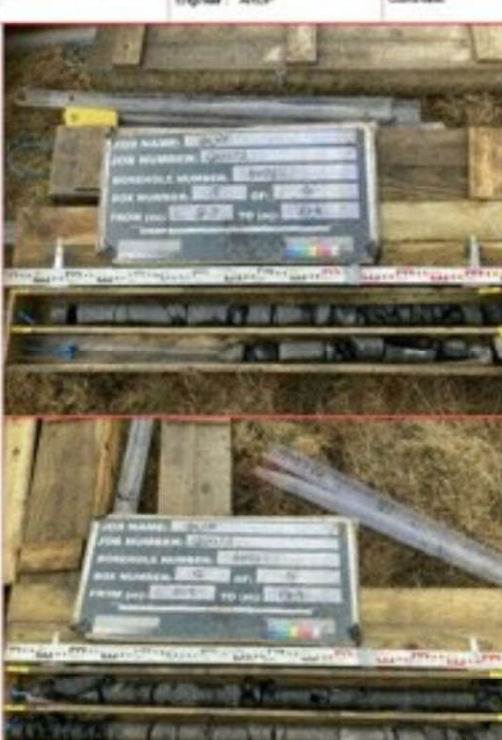
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Client : Welsh Government		BH05
Date : 1/12/21 - 3/12/21	Job Number : 0050	Ground and
Location :	Engineer : WUP	Condition:



	
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Contract : Global Centre of Rail Excellence		Borehole No. BH06	
Client : Welsh Government			
Date : 24/1/21 • 25/1/21	Job Number : Q0032	Ground Level :	
Location :	Engineer : A/S/P	Card No.:	



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Contract : Global Centre of Rail Excellence										Worksheet No: 0007									
Client : Welsh Government																			
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Location:			Engineer: ARLUP			Level in Distance Chain:		Observation: 201544.90 E		Installation: 201544.90 E									
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Station	Point	Level	Remarks																
201544.90 E	271.26 m A.D.S.	201544.90 E	Level in Distance Chain																
<table border="1"> <thead> <tr> <th>Station</th> <th>Point</th> <th>Level</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>201544.90 E</td> <td>271.26 m A.D.S.</td> <td>201544.90 E</td> <td>Level in Distance Chain</td> </tr> </tbody> </table>												Station	Point	Level	Remarks	201544.90 E	271.26 m A.D.S.	201544.90 E	Level in Distance Chain
Station	Point	Level	Remarks																
201544.90 E	271.26 m A.D.S.	201544.90 E	Level in Distance Chain																
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Station	Point	Level	Remarks																
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Contract : Global Centre of Rail Excellence										Worksheet No: 0007									
Client : Welsh Government																			
Date: 29/1/21 - 30/1/21			Job Number: G0052			Ground Level: 271.26 m A.D.S.		Coordinates: 201544.90 E		Observation & Installation: 201544.90 E									
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<table border="1"> <thead> <tr> <th>Station</th> <th>Point</th> <th>Level</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>201544.90 E</td> <td>271.26 m A.D.S.</td> <td>201544.90 E</td> <td>Level in Distance Chain</td> </tr> </tbody> </table>												Station	Point	Level	Remarks	201544.90 E	271.26 m A.D.S.	201544.90 E	Level in Distance Chain
Station	Point	Level	Remarks																
201544.90 E	271.26 m A.D.S.	201544.90 E	Level in Distance Chain																

Contract : Global Centre of Rail Excellence										Worksheet No: 0007									
Client : Welsh Government																			
Date: 29/1/21 - 30/1/21			Job Number: G0052			Ground Level: 271.26 m A.D.S.		Coordinates: 201544.90 E		Observation & Installation: 201544.90 E									
Location:			Engineer: ARLUP			Level in Distance Chain:		Observation: 201544.90 E		Installation: 201544.90 E									
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Station	Point	Level	Remarks																
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Downloaded At: 11:52 11 September 2009

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Contract : Global Centre of Rail Excellence		Drawn by : BH11	
Client : Welsh Government			
Date : 18/12/11 - 15/12/11	Job Number : Q2862	Drawn by :	
Location : Grand railway area	Engineer : APU/P	Coordinates :	

Contract : Global Centre of Rail Excellence		Revision No. 0011	
Client : Welsh Government			
Date : 06/12/11 - 15/12/11	As Number : 0002	Revised as	
Location : Airport taxiway area	Engineer : AMUP	Comments	

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Contract : Global Centre of Rail Excellence		Barcode No.
Client : Welsh Government		BH12
Date: 14/12/21 - 15/12/21	Job Number : Q052	Ground Level :
Location :	Engineer : ARUP	Coordinates :

Draconis Surveying Ltd 01492 881111 www.draconis.co.uk	Client: GGL	Logically: P/Date	Sheet No: 1 OF 2	Page: 2	
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Contract : Global Centre of Rail Excellence		Barcode No.
Client : Welsh Government		BH12
Date: 14/12/21 - 15/12/21	Job Number : Q052	Ground Level :
Location :	Engineer : ARUP	Coordinates :

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