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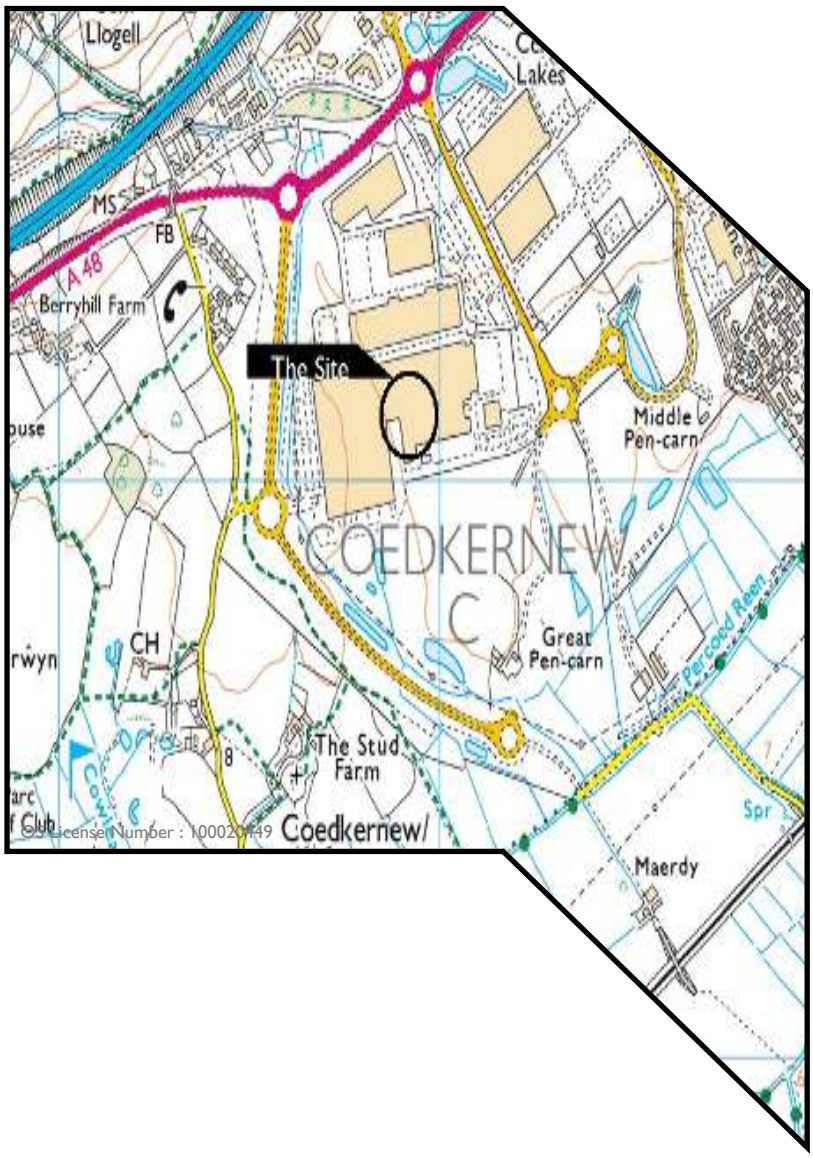
Site Investigation



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Newport, Wales, NP10 8FS

Factual and Interpretative Report

for

Pinnacle Consulting Engineers Limited

Project Number PN214233

September 2021

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Ground Investigation
at Former Quinn Radiator Factory

Factual and Interpretative Report

Newport, Wales, NP10 8FS
for
Pinnacle Consulting Engineers Limited

Project No:
PN214233
September 2021

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APPENDICES

1.0 INTRODUCTION

A geotechnical and geoenvironmental investigation was undertaken by Geotechnics Limited at the site of a former radiator manufacturing facility on the outskirts of Newport and comprises five rectangular structures and associated hardstanding and minor areas of landscaping. The investigation was carried out to the instructions of Pinnacle Consulting Engineers Limited (Pinnacle), the Client. This report describes the work undertaken and presents the data obtained.

2.0 OBJECT AND SCOPE OF THE INVESTIGATION

The object of the investigation was to obtain information on the current ground and groundwater conditions within the limitations posed by exploratory hole numbers, locations, depths, methods adopted and the scope of approved in situ and laboratory testing. The Brief for the project is included in Appendix 1. The investigation comprised cable percussive, rotary and dynamic sample boreholes, *in-situ* and laboratory testing and reporting. A geotechnical and geoenvironmental interpretation and evaluation of the data obtained was also commissioned.

3.0 PRESENTATION

A description of the site and a summary of the procedures followed during the investigation process are presented in Sections 4 to 6. The factual data so obtained are presented in Appendices 3 to 11 of this report. A desk study has been undertaken by Geotechnics Limited (reference: PN214233 Newport Quinn Desk Study, May 2021) which summarises the site, its history, geology and ground conditions and provides a preliminary risk assessment and geotechnical risk assessment for the site, with the findings in Section 7. An interpretation of the data obtained is presented in Section 8 and an evaluation of its significance in relation to proposals available at the time of preparation of this report is presented in Section 9 (Geotechnics) and Section 10 (Geo-environmental). Attention is drawn to the General Notes and Investigation Procedures presented in Appendix 17 to aid an understanding of the procedures followed and the context in which the report should be read.

4.0 THE SITE

4.1 Location

The site is located approximately 5km south-west of the centre of Newport and approximately 1km south of junction 28 on the M4 motorway. The approximate Ordnance Survey National Grid Reference for the centre of the site is ST 278 841 and an extract from the relevant 1:25,000 Scale O.S. Map is included as Appendix 2.

4.2 Description

The site is approximately rectangular in shape and covers an area of approximately 16.59 ha. The site comprises a disused radiator manufacturing site with associated areas of hardstanding for roads and parking and areas of soft landscaping comprising mostly short field grass, bushes and mature and semi-mature trees around the perimeter. The majority of structures remain *in-situ* with internal manufacturing infrastructure largely removed.

The site has an elevation of approximately 10 mOD and slopes gently from northwest to south east.

There are no water features located on-site, but a pond is located approximately 70 m south and a drainage ditch is located approximately 20m to the west.

Several storage vessels were observed including oil and propane bottles, former paint storage tanks, liquid oxygen and liquid argon tanks and gas bottles.

Numerous service access chambers were observed including storm and foul drains.

5.0 PROCEDURE

5.1 Commissioning

The work was awarded following submission of a proposal for ground investigation of the site in accordance with the Client's requirements (see Appendix 1).

5.2 General

The procedures followed in this site investigation are based on *BS 5930:2015+ A1:2020 – Code of Practice for Site Investigations* and *BS 10175:2011+A2:2017 - Investigation of Potentially Contaminated Sites*. The soils and rocks encountered have been described in accordance with BS5930:2015+ A1:2020 and BS EN ISO 14688-1:2018 and BS EN ISO 14689:2018. The Cable Percussive Borehole, Rotary Borehole and Dynamic Sample Borehole positions are shown on the Exploratory Hole Location Plan in Appendix 7.

The Exploratory Hole locations were specified by Geotechnics, and were located to provide specific information based on four criteria:

- Potential petroleum hydrocarbons in shallow Made Ground (Internal areas):
    - WS-BH109
    - WS-BH110
    - WS-BH111
- Potential petroleum hydrocarbon Migration (External area):
    - WS-BH104
    - WS-BH105
    - WS-BH106
    - CP-BH101
    - CP-BH102
- Potential sources of contaminants close to observed above ground storage tanks
    - WS-BH101
    - WS-BH102
    - WS-BH103
    - WS-BH108
- General site coverage and geotechnical characterisation
    - RC-BH101
    - RC-BH102
    - RC-BH103
    - RC-BH104
    - RC-BH105
    - CP-BH101
    - CP-BH102
    - CP-BH103
    - CP-BH104
    - CP-BH105

The co-ordinates and levels shown on the Exploratory Hole Records were measured using a GPS survey device. Positions within the buildings were surveyed using taped measurements from GPS located positions. The depths quoted on the exploratory hole records are in metres below ground level.

Prior to the investigation, a survey was carried out by Midland Survey Limited utilising Ground Penetrating Radar (GPR) techniques to check for the presence of buried services at the proposed exploratory hole locations.

At each exploratory hole location an inspection pit was excavated using hand tools to a depth of 1.20m below ground level to check for the presence of underground services. Prior to and on completion of the excavation, the location was scanned using a cable avoidance tool (CAT). At those locations where concrete was present at ground level, 350mm diameter coring was used to advance the exploratory hole through the concrete and facilitate the excavation of the inspection pit. Details of the concrete coring is included on the appropriate exploratory hole records.

5.3 Boreholes

Four (4 No.) 200mm diameter boreholes (numbered CP-BH101 to CP-BH103 and WS-BH109) were sunk by Cable Percussion Tool techniques to depths of 5.50m (CP-BH101), 8.44m (CP-BH102), 3.45m (CP-BH103) and 9.95m (WS-BH109) below ground level. A fifth borehole (CP-BH105) was terminated on a buried obstruction within the inspection pit at a depth of 0.65m below ground level. Proposed borehole CP-BH104 was cancelled due to time constraints. The work was carried out between 24th May and 1st June 2021.

Representative disturbed (D and B) and driven open-tube thin-walled (UT) samples of the soils encountered were obtained at regular intervals. Standard Penetration Tests (SPTs) were undertaken at the depths indicated on the borehole records in accordance with BS EN ISO 22476-3:2005+A1:2011 to obtain a measure of the engineering properties of the proved strata. In addition, Environmental Soil samples (ES) were recovered at the depths indicated on the Borehole Records, presented in Appendix 3.

On encountering groundwater, boring operations were suspended for 20 minutes in order to record any rise in water level. Full details of groundwater observations during site work are included on the

Borehole Records.

On completion, standpipes were installed in each of the completed boreholes (see Section 5.6). Borehole CP-BH105 was backfilled with bentonite and the surface was reinstated.

5.4 Rotary Boreholes

Five (5 No.) boreholes (numbered RC-BH101 to RC-BH105), up to 100mm in diameter, were sunk utilising a combination of dynamic sampling, rotary open-hole and rotary coring techniques to depths ranging between 7.50m and 15.00m below ground level. The work was carried out between 27th May and 8th June 2021.

The dynamic sample sections of the boreholes were carried out using a compressed air percussive apparatus fitted to the rotary drilling rig which drives lined steel tubes into the ground in 1.00m lengths. Samples are retrieved in the plastic liners. The retrieved liners were split and the recovered soils described before being sub-sampled into ES, D and B samples as shown on the Borehole Records, presented in Appendix 4.

In places, rotary open-hole drilling was used to advance the boreholes through the Made Ground or to allow installation of the rotary casing. The strata descriptions in the open-hole sections of the Borehole Records are based on chipping returns in the flushing medium placed. The rate of penetration is also used as an indicator of the type of material being drilled, particularly where there is loss of flush returns. Definitive classification in terms of geology or degree of disturbance is not possible from these sources.

Rotary coring commenced at depths ranging between 3.80m and 4.80m below ground level. The drilling equipment used in the rotary sections of the boreholes on this particular contract utilised air-mist as the flushing medium. Rock cores were extruded horizontally in transparent liners and placed into suitable core boxes. Photographs of the individual core boxes are included in Appendix 5.

Standard Penetration Tests (SPTs) were undertaken at the depths indicated on the borehole records in accordance with BS EN ISO 22476-3:2005+A1:2011 to obtain a measure of the engineering properties of the proved strata.

Groundwater observations are included on the Borehole Records where appropriate and any rise in water level was recorded over 20 minutes whilst drilling operations were suspended. It should be noted that the addition of water to the borehole as part of the drilling process may have masked the presence of groundwater in the borehole. Where water was added it has been noted on the Borehole Records.

On completion, standpipes were installed in each of the Boreholes (see Section 5.6).

5.5 Dynamic Sample Boreholes

Ten (10 No.) Dynamic Sample Boreholes (numbered WS-BH101 to WS-BH108, WS-BH110 and WS-BH111) were undertaken at the site to depths ranging between 1.60m and 4.45m below ground level. The work was carried out between 24th and 27th May 2021. Proposed Dynamic Sample Borehole WS-BH109 was carried out using Cable Percussion techniques (see Section 5.3 above) due to drilling rig availability.

The Dynamic Samples were taken using the super-heavy Dynamic Probe apparatus which drives lined steel tubes into the ground in 1.00m lengths. The retrieved liners were split and the recovered soils described before being sub-sampled into ES, D and B samples as shown on the Borehole Records, presented in Appendix 6. The holes were not cased and progress depended on the nature of the strata penetrated.

Standard Penetration Tests (SPTs) were undertaken at the depths indicated on the borehole records in accordance with BS EN ISO 22476-3:2005+A1:2011 to obtain a measure of the engineering properties of the proved strata.

Groundwater observations are included on the Borehole Records where appropriate and any rise in water level was recorded over 20 minutes whilst drilling operations were suspended.

On completion, standpipes were installed in Boreholes WS-BH102 to WS-BH106, WS-BH110 and WS-BH111 (see Section 5.6). The other boreholes were backfilled with bentonite.

5.6 Instrumentation and Monitoring

Long-term monitoring of the gas and groundwater levels was made possible by the installation of standpipes as follows:

Exploratory Hole	Standpipe Slotted Pipe and (Filter Zone) (m)
CP-BH101	4.00 to 5.50 (4.00 to 5.50)
CP-BH102	4.00 to 8.00 (4.00 to 8.44)
CP-BH103	1.00 to 3.00 (1.00 to 3.45)
RC-BH101	1.00 to 3.00 (1.00 to 3.00)
RC-BH102	3.00 to 12.00 (3.00 to 12.00)
RC-BH103	2.00 to 8.30 (2.00 to 8.30)
RC-BH104	3.00 to 15.00 (3.00 to 15.10)
RC-BH105	1.00 to 4.00 (1.00 to 4.00)
WS-BH102	1.00 to 2.28 (1.00 to 2.28)
WS-BH103	1.00 to 2.50 (1.00 to 2.50)
WS-BH104	0.50 to 2.00 (0.50 to 2.25)
WS-BH105	0.50 to 1.00 (0.50 to 1.00)
WS-BH106	0.50 to 1.50 (0.50 to 1.50)
WS-BH109	0.50 to 2.50 (0.50 to 2.50)
WS-BH110	2.00 to 4.00 (2.00 to 4.45)
WS-BH111	2.00 to 3.00 (2.00 to 3.45)

Monitoring of the gas and groundwater levels at the site were undertaken on the 17th June 2021.

On 17th June 2021, groundwater samples were obtained (where possible) following a purging of approximately three volumes of water in the standpipe.

In addition to the groundwater levels, the following parameters were measured and recorded in each standpipe using a GFM 435 Gas Analyser:-

- Concentrations (% Vol) of CH_4, O_2, CO_2, along with % LEL and ppm of H_2S, CO
- Flow Rate
- Differential Pressure
- Barometric Pressure
- Air Temperature

The results of the monitoring are presented in Appendix 8.

6.0 LABORATORY TESTING

6.1 Geotechnical

The laboratory testing schedule was formulated by Geotechnics Limited in order to relate to the proposed development. Unless otherwise stated, the tests were carried out in Geotechnics Limited's UKAS accredited Laboratory (Testing No. 1365) and were undertaken in accordance with the appropriate Standards as indicated below and on the Laboratory Test Certificate in Appendix 9. Any descriptions, opinions and interpretations are outside the scope of UKAS accreditation.

The tests undertaken can be summarised as follows:-

ISRM Testing Methods

50 No.	Point Load Determination

The following testing was carried out at the laboratories of Apex Testing Solutions Limited (UKAS Accredited Laboratory, Number 7771):

BS EN ISO 17892-1:2014

8 No.	Water Content Determination

BS 1377:1990

Test No.		Test Description
Part 2		
4.3 & 5.3	8 No.	Liquid and Plastic Limit Determination
9.2 & 9.3	5 No.	Mechanical Analysis – Wet Sieving
9.4	2 No.	Mechanical Analysis - Sedimentation
Part 4		
3.3	4 No.	Dry Density/Moisture Content relationship determination. Compaction Test - British Standard (2.5 kg Hammer)

The following testing was carried out at the laboratories of GEO Site & Testing Services Limited (UKAS Accredited Laboratory, Number 2788):

BS 1377:1990

Test No.		Test Description
Part 2		
9.2 & 9.3	2 No.	Mechanical Analysis – Wet Sieving
Part 4		
7	3 No.	California Bearing Ratio (CBR) Measurement - recompacted
Part 5		
3	3 No.	One-Dimensional Consolidation Test
Part 7		
8	5 No.	Shear Strength Measurement -

100mm diameter (Single Stage) Quick Undrained Triaxial Compression Test

The following testing was carried out at the laboratories of MATtest Limited (UKAS Accredited Laboratory, Number 2643):

ISRM Testing Methods

4 No. Unconfined Compressive Strength Determination

The results of these tests are also presented in Appendix 9.

The following testing was carried out at the laboratories of Soil Environment Services Limited (UKAS Accredited Laboratory, Number 10768):

2 No. Thermal Resistivity 6-point Dry Out Curves

The results of these tests are also presented in Appendix 9.

The following testing was carried out at the laboratories of Derwentside Environmental Testing Services Limited (UKAS Accredited Laboratory, Number 2139):

BRE Special Digest 1 Suite

7.No. Suites comprising:-

Soluble Sulphate
Acid Soluble Sulphate
Total Sulphur
Soluble Magnesium
Ammonium
Nitrate
Chloride
pH

The results of these tests are presented with the contamination test results in Appendix 10.

6.2 Contamination

Selected samples of soil and groundwater were tested at the laboratories of Derwentside Environmental Testing Services Limited (DETS) for a number of determinands in order to check on potential site contamination. The determinands were selected by Geotechnics Limited and are detailed below and on the results sheets in Appendices 10 (soil chemical laboratory data) and 11 (groundwater laboratory analytical data) together with the test result as well as the test method, accreditation and detection limit.

Soil

Soil samples were tested for the following determinands:-

Arsenic
Barium
Boron (Water Soluble)
Beryllium
Cadmium
Chromium
Chromium (Hexavalent - Calculated)
Copper
Lead
Mercury
Nickel
Selenium
Vanadium
Zinc

Ammonia as NH_4
Chloride
Cyanide (total)
Fluoride
pH
Sulphate
Sulphate (Water Soluble)

Sulphur

Organic Carbon
Phenols (Monohydric)
Polyaromatic Hydrocarbons (Speciated)
PCB (Speciated)
Petroleum Hydrocarbons (Speciated)
Semi-Volatile Organic Compounds (SVOC)
Volatile Organic Compounds (VOC)

Asbestos Screen

In addition, Waste Acceptance Criteria (WAC) analyses were carried out on selected samples including tests on solid waste and on eluates. The determinands tested for are detailed on the results sheets in Appendix 10.

Tests on solid waste

Acid Neutralising Capacity (ANC)
Loss on ignition
Total organic carbon
Mineral Oils
BTEX (Total)
PAH (Total)
PCB's
pH

Tests on Eluates (10:1)

Antimony

Arsenic
Barium
Cadmium
Chromium
Copper
Lead
Mercury
Molybdenum
Nickel
Selenium
Zinc
Phenol
Sulphate as SO_4
Chloride
Fluoride
Total Dissolved Solids
Dissolved Organic Carbon

Groundwater
Groundwater samples taken from the standpipes were tested for the following determinands:-

Arsenic
Barium
Boron
Beryllium
Cadmium
Calcium
Chromium
Copper
Lead
Mercury
Manganese
Nickel
Selenium
Vanadium
Zinc

pH
Dissolved Organic Carbon
Ammonical Nitrogen as N

Polyaromatic Hydrocarbons (Speciated)
Phenols (Monohydric)
Petroleum Hydrocarbons (Speciated)

The results are presented in Appendix 11.

7.0 DESK STUDY

7.1 General

A desk study for the site has been undertaken by Geotechnics and the results presented and discussed in report "Preliminary Risk Assessment – Newport Quinn SDD RPF, Newport, Wales", Report Number PN214233 dated May 2021. A summary of the findings is given in the following sections.

7.2 Geology

The majority of the site in underlain by Quaternary River Terrace Deposits comprising mostly sand and gravel deposits. A small area is underlain by Alluvium associated with a re-routed river channel. A thickness of Made Ground would be expected above the natural superficial deposits, associated with the existing development.

Bedrock geology is shown to be the Devonian St. Maughans Formation comprising interbedded mudstones and sandstones. The far southeast is shown to be underlain by Triassic Mercia Mudstone deposits.

7.3 Site History

The site was undeveloped until 1974 when electricity pylons are shown as being present. By 1999 the site is shown as being developed to a similar configuration as is present at the time of this study comprising five rectangular structures and two circular structures. Further extensions and roadways are present in 2009 and 2006 respectively.

7.4 Hydrology

The nearest off-site water feature is Nant-y-moor Reen, located 3 m to the west. From an examination of historical Ordnance survey maps the Reen was originally located on-site orientated approximately north-south flowing through the central area of the site, but the course appears to have been diverted when the site was developed in approximately 1999. There are two ponds located adjacent to the southern boundary which may slightly encroach across the southern site boundary.

7.5 Hydrogeology

The site is mostly underlain by Drift deposits comprising River Terrace Deposits which are classified as a Secondary A aquifer. There are small areas of Drift Alluvium associated with the former course of Nant-y-moor Reen which are also classified as a Secondary A aquifer. Bedrock deposits comprise Maughans Formation which are also classified as a Secondary A aquifer.

7.6 Unexploded Ordnance

The Zetica Bomb Risk Map website indicates the site has a low risk for unexploded ordnance.

7.7 Environmental Issues

As part of the desk study, is was discovered that Natural Resources Wales had issued two warning letters to the former operators of the site in 2007 and 2010 relating to discharge of contaminants to surface water. It is considered that these letters related to petroleum hydrocarbons due to a poorly maintained oil/water separator associated with a vehicle washing area.

During the site walkover, inside structures located in the southwest of the site, suspected petroleum hydrocarbons were observed in drainage / access trenches. From discussions with site staff, the source of the potential petroleum hydrocarbons was reported to be due to poorly managed removal of plant and leakage of fluids during removal.

8.0 INTERPRETATION

8.1 Ground Conditions

On the basis of the expected geology discussed in Section 7.0 and the findings of the exploratory holes it has been possible to classify the various strata proved in the investigation into the following divisions:-

- Made Ground
- Clay
- Mudstone/Siltstone

8.1.1 Made Ground

Made Ground was encountered below the surface at each of the exploratory hole locations. This typically comprised a surface layer of concrete or asphalt/tarmacadam underlain by sand and gravel with some silt, cobbles, clinker, slag and brick fragments. In WS-BH110 the Made Ground included a layer of stiff slightly sandy slightly gravelly clay between 1.40m and 2.40m below ground level.

The depth to the base of the Made Ground at the exploratory hole locations ranged from 0.65m (CP-BH101) to 4.10m below ground level (RC-BH105). A number of the exploratory holes (CP-BH105, WS-BH101, WS-BH102, WS-BH107 and WS-BH108) were terminated in the Made Ground on encountering obstructions.

Standard Penetration Tests (SPT) carried out in the Made Ground produced results ranging from N=5 to several tests that were terminated at 50 blows. Such results indicate the variability in relative density of these materials from loose to very dense. The cohesive Made Ground in WS-BH110 produced SPT results of N=21 and N=30, these results being indicative of high strength clay.

8.1.2 Clay

Below the Made Ground (where penetrated), the exploratory holes typically encountered clay deposits, the exception being at WS-BH111 where superficial deposits were absent. These clay deposits were reddish brown or grey mottled brown in colour and contained a proportion of sand and gravel. The clay deposits were typically firm and in some places stiff. However, in CP-BH102, RC-BH103 and WS-BH103 layers of soft/very soft clay with some pockets of organic matter (CP-BH102). In places (WS-BH105 and WS-BH106) a 0.40m thick band of silt was encountered within the clay deposits, the silt being soft or firm and again containing pockets of decomposed organic matter.

Standard Penetration Tests carried out in these clay deposits produced results ranging from N=6 to some tests that were terminated at 50 blows. The latter results are probably due to striking obstructions but the remainder of the results are indicative of clays with strengths ranging from low strength to very high strength.

Laboratory triaxial compression tests on five (5 No.) undisturbed samples of the clay produced results for the undrained shear strength ranging from 25kN/m² (low strength) to 135kN/m² (high strength), again showing the variability within these clay deposits.

Laboratory oedometer consolidation tests on three (3 No.) undisturbed samples of the clay deposits produced results for the coefficient of volume compressibility (m_v) ranging from 0.20 to 0.33m²/MN for the 100-200kN/m² pressure range. Such values are indicative of medium to high compressibility materials.

Laboratory Liquid and Plastic Limit tests typically show Plasticity Indices in the range 11 to 23. Such results fall into the 'Low' or 'Medium' classification for Volume Change Potential, based on NHBC Chapter 4.2. However, the sample tested from WS-BH103 from a depth of 2.40m below ground level produced a Plastic Index result of 51 which falls into the 'High' classification for Volume Change Potential.

8.1.3 Mudstone/Siltstone

Bedrock was encountered at depths ranging between 2.80m (CP-BH103) and 9.40m (WS-BH109) below ground level. This bedrock typically comprised extremely weak or very weak brownish red mudstone, occasionally interbedded with very weak grey siltstone. The bedrock was proved to a maximum depth of 15.10m below ground level.

Unconfined compressive strength tests carried out on four (4 No.) specimens of the bedrock in the laboratory produced results ranging from 0.271MPa to 4.16MPa. The lower result falls below the lowest strength term for rock and is more indicative of a stiff, high strength clay. The remaining results are indicative of very weak rock.

Point Load Strength tests carried out in the laboratory on numerous specimens of the bedrock produced results for the Point Load Index (Is_{50}) ranging from 0.011MN/m² to 1.270MN/m². The results are typically indicative of rocks having strengths ranging from extremely weak to weak.

8.2 Groundwater

Groundwater was encountered within Made Ground deposits in three exploratory holes, WS-BH104, WS-BH105 and RC-BH105 with strikes in WS-BH104 and WS-BH105 at 0.9 mbgl. In WS-BH105 the strike rose to 0.55 mbgl after 20 minutes. Groundwater in RC-BH105 was struck at 2.2 mbgl and did not rise. Groundwater was not encountered in Made Ground during progression in any other exploratory hole.

Groundwater was encountered within the Quaternary River Terrace Gravel Deposits in two exploratory holes, RC-BH103 and CP-BH102 with strikes at 2.63 mbgl rising to 2.00 mbgl and 5.60 mbgl with no rise, respectively.

Groundwater was encountered in the Devonian Maughans Formation at 9.00 mbgl rising to 4.53 mbgl in RC-BH104. In other exploratory holes, water observations with exploratory hole progression showed that some exploratory holes remained dry and in others, groundwater levels encountered in the Quaternary River Terrace Gravel deposits above remained approximately consistent during drilling into the Devonian Maughans Formation.

Groundwater gauging undertaken on the 16th June 2021 showed that groundwater was present in all monitoring wells, with the exception of WS-BH102 which was dry. Groundwater levels varied between 0.71 mbgl and 3.00 mbgl.

9.0 EVALUATION

9.1 Proposals

It is understood that proposals for the site include demolition and clearance of the existing buildings/hardstanding followed by the construction of a new data centre comprising two buildings with associated areas of access roadways, hardstanding and car parking. It is also understood that the proposed development will include areas of soft landscaping and three ponds.

The data centre buildings are expected to be of steel framed construction with lightweight cladding. The maximum anticipated structural loading at foundation level is understood to be 450kN and the maximum anticipated ground floor loading is 25kN/m². The building and ground floor slab are not expected to be particularly sensitive to settlement. It is understood that some minor retaining structures (1.20m high) will be required for the unloading docks.

The proposed finished floor levels for both buildings are understood to be 11.50m above OD. However, at the time of preparation of this report the Engineer was reviewing levels for the westernmost building. As a result of these proposed levels, a degree of cut and fill will be required, the primary cut area being towards the north-eastern corner of the site and primary fill area being towards the central part of the southern boundary.

9.2 Foundation Design Principles

In formulating proposals for foundation and floor slab design, the two primary controlling factors are soil strength and foundation settlement. In general it is the latter which is the primary determinand of what is perceived to be satisfactory performance. For clay soils, allowable bearing capacity is based on undrained shear strength, although a Factor of Safety of 3 is commonly adopted in order to ensure that the loading is on the sensibly linear component of the stress/strain curve for the soil.

With time, the clays will strengthen under the higher loadings as any excess pore water pressures dissipate. Hence, the worst case is at the time of initial loading and, for gradually applied or static loading, bearing capacity should progressively increase. For eccentric loading, where peak load is at an extremity of the foundation, this can be higher than the allowable load, provided that the mean equivalent stress is within the allowable value.

For granular or essentially free draining soils the frictional characteristics and density will dominate bearing capacity and this is generally much higher than for clay soils. For normal spread foundations conventional design is typically based on the stress which would give rise to 25mm settlement. Actual settlements will depend upon the type, period, load intensity and width of the loaded area and the thickness and compressibility of the soils below.

A further issue for foundations is the degree of variability in the foundation soils. The adoption of a lower bearing pressure than strength criteria would indicate implicitly results in a larger foundation which is likely to behave more in line with average conditions and hence, for a given load, to result in less differential settlement.

9.3 Earthworks

The proposed finished ground and floor levels will require a degree of cut and fill to be carried out. Four (4 No.) samples of soil from exploratory holes in the 'cut' areas were tested in the laboratory. Three (3 No.) of the samples were of granular material and were tested for particle size distribution and moisture content/dry density relationship. The fourth sample was of cohesive material and was tested for moisture content, Atterberg Limits and moisture content/dry density relationship.

The particle size distributions of the granular materials were all seen to be well-graded and the percentage fines (smaller than 63µm) was low, ranging from 3% to 12%. The cohesive sample fell on the boundary between low and intermediate plasticity with a significant amount (42%) of granular material being retained on the 425µm sieve. For all samples tested, the natural moisture contents were close to (-1.4% to +2.8%) the optimum moisture contents determined from the compaction test curves.

The soil samples tested suggest that the 'cut' soils, although variable in nature could be suitable for re-use in 'fill' areas. However, controls will need to be in place to ensure adequate screening of the soils to ensure separation of different classes of materials. Care will also be needed to ensure that moisture contents remain close to optimum in order to ensure that materials are placed at or close to maximum dry density.

It should be noted that some soft medium/high compressibility clays were encountered at depth in some of the exploratory holes. Raising ground levels above such materials will increase the overburden pressure on them and this is likely to result in some long-term consolidation settlement. Based on proposals available at the time of preparation of this report, a maximum 'fill' thickness of around 1.0m is anticipated. This would produce an increase in overburden pressure of the order of approximately 20kN/m². It is estimated that such an increase in stress on a 2m thick layer of the soft clay (e.g. CP-BH102) could result in consolidation settlements in the soft clay alone of the order of 20mm. It would therefore be advisable to leave final surfacing for as long as possible after the cut/fill operation to minimise any distress to the finished surface.

9.4 Foundation Solutions

The approach to design and selection of suitable foundation options for this site is based on a hierarchy of complexity and expense. If the simplest and cheapest solution case can be shown to be appropriate, then further discussion is considered superfluous. Where such simple and proven techniques are not expected to be suitable, then other options are examined in more detail. The following options have been considered:

- Traditional pad foundations at shallow depth.
- Traditional pad foundations, but using trench fill to transfer loads to soils at greater depths.
- Raft foundation to reduce the intensity of loading.
- Ground improvement prior to foundation construction.
- Piled solution, including selection of suitable pile types and preliminary calculation of carrying capacity.

9.4.1 Pad Foundations

The Made Ground does not form a suitable founding stratum due to its variable nature and thickness. With Made Ground present to depths of up to 4.10m, the use of traditional pad foundations is precluded.

9.4.2 Trench Fill Foundations

Consideration has been given to the use of concrete trench fill foundations taken through the Made Ground into the underlying clay. The underlying clay is typically firm and in some places stiff. However, some layers of soft/very soft clay were encountered and these would results in long-term consolidation settlements of any foundations constructed above

them. It has already been estimated that consolidation settlements from placed 'fill' materials could be of the order of 20mm. With the addition of structural loadings, it is estimated that this could increase to the order of 30mm, such order of settlement normally being considered unacceptable. In addition, with the depth to the firm clay strata being up to 4.10m (RC-BH105), the use of trench fill foundations is unlikely to be economically viable. Furthermore, deep open excavations are likely to suffer from instability and trench fill foundations are therefore likely to be precluded.

9.4.3 Raft Foundations

Consideration has been given to the use of a reinforced concrete raft foundations to reduce the intensity of loading on the Made Ground and underlying clay. However, with the variable thickness of Made Ground and the presence of some soft/very soft clay, there is a risk that unacceptable differential settlements could occur resulting in tilting of the rafts. Furthermore, due to the length of the proposed buildings, it is considered unlikely that raft foundations with adequate stiffness to mitigate the effects of potential settlements could be economically designed/constructed. The use of raft foundations therefore also appears to be precluded.

9.4.4 Ground Improvement

Consideration has been given to the use of the 'vibro' ground improvement process by which stone columns would be formed through the Made Ground and underlying clay to increase the load bearing capacity.

However, the success of the 'vibro' technique is generally considered to be marginal where very soft clays are present due to the limited lateral restraint provided to the stone columns by the clay. This can result in stone migrating into the adjacent clay when loaded, thus leading to settlement of the foundations. Very soft clay was encountered in borehole CP-BH102 and soft clays/silts were encountered elsewhere below the site. The successful use of the 'vibro' process on this site would therefore appear to be marginal.

9.4.5 Piled Foundations

With the variable nature and thickness of Made Ground and with the presence of some soft/very soft medium/high compressibility clays below this site, the most suitable foundation solution would appear to be the adoption of piled foundations. Piles of either the driven or CFA bored type would be suited to the ground conditions. It is recommended that the specialist piling contractors are asked for advice on the suitability of their individual piling systems to these ground conditions. They should also be asked for their estimates of the pile size, length, load capacity relationship. For guidance purposes only, it is estimated that a 300mm diameter bored pile socketed 1.00m into the mudstone bedrock should be capable of supporting a safe working load of the order of 250kN. Higher working loads could be achieved by increasing the pile diameter or socket length.

As discussed in Section 9.3 above, the earthworks operation is expected to cause long-term consolidation settlement of the Made Ground and clay strata in some 'filled' parts of the site. Allowance should therefore be made in the pile design for negative skin friction on the upper part of the pile shaft in those areas of the site where 'fill' is to be placed.

It should be noted that this investigation has not included any investigation of the foundations to the existing buildings. Given the findings of the exploratory holes, it is anticipated that some of the existing buildings may also be supported on piled foundations. If that is the case, it may be possible to re-use these piles to provide support for the proposed buildings. Further investigation would be required, preferably following demolition and clearance of the existing buildings.

9.4.6 Seasonal Ground Movements

Tests on samples of clay from the boreholes have shown the clay to typically be of 'low' or 'medium' volume change potential. However, one of the samples tested was found to be in the 'high' classification for volume change potential. Clays can shrink and swell due to seasonal variations in moisture content or due to variations in moisture content caused by tree root systems. It is therefore recommended that foundations are designed to limit the effects of any seasonal ground movements, especially where any trees are present or have been removed within influencing distance of foundations. For piled foundations this could include sleeving the upper part of the pile shafts and providing compressible materials below any pile caps, ground beams or suspended floor slabs. Guidance on suitable precautions is provided in NHBC Chapter 4.2 'Building near trees'.

9.5 Ground Floor Slab

With the depth of Made Ground and presence of

some soft/very soft clays beneath, the adoption of a normal ground floor slab construction is precluded due to the risk of unacceptable settlements developing. It is therefore recommended that a fully suspended ground floor slab construction is adopted with all loads carried on the main structural foundations.

9.6 Retaining Walls

It is understood that some minor retaining structures (1.20m high) will be required for the unloading docks. On the building line, it is anticipated that these walls will be supported on the main structural foundations. It is therefore recommended that similar foundations are used to support the retaining walls as they run away from the buildings, in order to provide uniform support and minimise the risk of differential movements occurring. Testing on samples from the site has shown the granular Made Ground likely to be retained to be well-graded with a low fines (<63µm) content. *British Standard BS8002:2015 Code of Practice for Earth Retaining Structures* provides suggested values for characteristic weight density (γ_k) and methods of estimating the critical state angle of shearing resistance ($\phi'_{cv,k}$). Based on the findings of the exploratory holes and laboratory test results, the following values are suggested for retaining wall design purposes:

γ_k = 18 kN/m²
$\phi'_{cv,k}$ = 36°

9.7 Concrete

Testing on samples from the site has shown the characteristic water soluble sulphate concentration to lie within Design Sulphate Class DS-1 of BRE Special Digest 1 'Concrete in Aggressive Ground' (2003). The characteristic pH value is 6.98, the site is considered 'brownfield' and groundwater is considered to be mobile. Testing has not indicated the presence of pyrites. The ACEC Class for the site is therefore AC-1 and only concrete meeting the requirements of this classification should be used for sub-surface work on this site.

9.8 Excavatability

The soils encountered in the boreholes would generally be considered 'easy digging' for normal backhoe excavation plant. However, it should be noted that some buried obstructions were encountered within the boreholes and substructure remains will likely be present following demolition and clearance of the existing buildings. Allowance should therefore be made for removing such concrete or other buried obstructions using hydraulic breakers where necessary.

Shallow excavations (less than 1.20m) will likely remain relatively stable in the short-term although some local spalling may occur. Where such excavations are left open for longer periods, it is recommended that the sides are battered back to slopes no steeper than 1 (vertical) to 2 (horizontal). Alternatively, and for deeper excavations, support should be provided using close boarding or trench sheets with appropriately spaced walings and props.

The exploratory holes have shown the presence of perched groundwater within the Made Ground and monitoring has shown this to produce standing water levels at relatively shallow depths. As a result, groundwater inflows are likely to be encountered in excavations with accumulations occuring where such excavations are left open. The rate of water inflow will be dependent on the percentage of fine material present within the soils and this appears to vary across the site. Where the rate of inflow is relatively low, it is anticipated that the inflows can be dealt with by simple filtered pumping from sumps. Where higher rates of inflow are encountered, more specialist dewatering methods, such as well-point dewatering may be necessary.

9.9 Pavement Design

The conditions prevailing at the time of construction will affect the CBR of the subgrade soil and its strength. Research has shown the importance of the equilibrium moisture content of the subgrade. The relationship between soil suction and the moisture content shows that a soil that becomes wet during construction will retain water and will therefore be weaker under the pavement in the equilibrium condition than a foundation that has remained dry, particularly for soils of low to medium plasticity.

Equilibrium CBR values for various materials for poor and good construction conditions are given in a report by the TRRL (Report 1132) and in CD225 Revision 1 "Design for new pavement foundations" produced by the Highways Agency. The Made Ground materials likely to be exposed at formation level typically comprise sand and gravel with some silt, cobbles, clinker, slag and brick fragments. For sands and gravels an equilibrium CBR in excess of 20% is indicated.

CBR values measured in the laboratory on three (3 No.) recompacted samples of soil from the site

ranged from 40% to 50%. Without the benefit of in situ CBR test results on the actual formation surface, it is recommended that a cautious approach to pavement design is taken using a design CBR value of 20%. All formations should be assumed to be frost susceptible.

9.10 Further Investigation

The investigation fieldwork was carried out with the former Quinn Radiator factory buildings still present and as a result, large parts of the site were inaccessible for the drilling rigs. It is therefore recommended that a further phase of investigation is carried out following demolition and clearance of the existing buildings and hardstanding. The investigation should provide coverage of those areas of the site where information is currently sparse as well as more detailed information on the foundations to the former factory buildings, if re-use of these is to be considered.

10.0 ENVIRONMENTAL ASSESSMENT

10.1 Legal Framework

This report follows the principles and methodology outlined in Land Contamination Risk Management (LCRM) and BS10175:2011+A2:2017 which is currently determined as UK best practice. The primary issues of concern are Risks to Human Health, for which the regulator is generally the Local Authority and Risks to Controlled Waters for which the appropriate consultee is Natural Resources Wales. Reference should also be made to the Environmental Notes in Appendix 16 to place the discussion in context.

10.2 Proposed Site Use

It is proposed to develop the site as a data storage centre. Hence, for the purposes of this report, the contamination risk assessment in respect of human health is considered in the context of a proposed site use of commercial / industrial.

10.3 Conceptual Model

The Conceptual Model (CM) is a representation of the current understanding of the site and the surrounding environment. This includes an understanding of the geology, groundwater, surface water bodies and potential contamination processes acting on substances present and migration pathways. It also takes into account all identified potential pollutant linkages using a source-pathway-receptor approach, based on the proposed use of the site. Where any element of the source-pathway-receptor linkage is absent, there is considered to be no or negligible risk.

The following potential site specific Source-Pathway-Receptor Linkages were identified in the Desk Study Geotechnics PN214233 Newport Quinn SDD RFP Desk Study, May 2021. These formed the basis of the site specific Conceptual Model and the proposed investigation and analytical testing in line with current guidance:

- Contaminated soil / groundwater → Ingestion, inhalation and dermal contact → Humans using the site during construction
- Contaminated soil / groundwater → Ingestion, inhalation and dermal contact → Humans using the site following development
- Contaminated soil / groundwater → Downward / lateral migration → Secondary aquifer / surface water
- Contaminated soil / groundwater → Direct contact → Buildings and structures

The potential presence of a linkage should not be taken to indicate its actual presence or significance which can only be confirmed through site investigation and analysis. This preliminary model is of necessity generalised and local variations may exist which have not been taken into account by the model.

A diagrammatic and tabulated representation of the CM created from these potential linkages was presented in section 8 of the Desk Study.

10.4 Soil Testing

The analytical results obtained during this investigation are presented in Appendix 10.

Based on a combination of observations made during the site reconnaissance visit, the history of the site and observations made during field work, the site has been divided into 2 Zones. A description of these zones is presented below:

- Zone 1: Southwest – Made Ground and Natural Ground

- Zone 2: Remainder of the site

Zone 1
Potential petroleum hydrocarbons were observed in drainage / service trenches following badly managed removal of plant. There is the potential for infiltration of petroleum hydrocarbons into shallow Made Ground, including any perched groundwater or light non-aqueous phase liquids (LNAPL) present at the interface between granular Made Ground and underlying cohesive deposits. Any petroleum hydrocarbons, if present, may also have the potential to impact the underlying natural soils and groundwater in the underlying Aquifers. This Zone comprises the following exploratory holes: WS-BH110, CP-BH102, WS-BH111, WS-BH109 and RC-BH103

Zone 2
No significant areas warranting specific further investigation were identified across the remainder of the site, with only relatively low hazard potential sources identified including paint storage tanks and other storage vessels. Any exceedances of generic screening values in soil and groundwater will be assessed as required.

Due to the relatively low number of samples (< 10 No.), statistical analysis is deemed unsuitable for each of the zones under current guidance and results will be compared directly with current guideline values.

The soil results show the following for each Zone is discussed below, and a summary can be found in Appendix 12.

Discussion of Zone 1 Soil Samples

- Metals: No heavy metals exceeded any generic assessment criteria (GAC) for a commercial end-use. The only exception to this is calculated concentrations of hexavalent chromium based on equilibrium of chrome (III) and chrome (VI) in an oxidising environment where speciation is sensitive to pH. In areas of higher pH, assumed to be due to pH buffering from the dissolution of lime, the GAC for chrome (VI) (35 mg/kg) is slightly exceeded in three samples of Made Ground. These samples due show relatively high concentrations of total chromium (between 280 mg/kg and 1,600 mg/kg) and these relatively high concentrations may be due to be observed presence of slag in some Made Ground deposits. Slag can also be a source of lime, contributing to elevating the pH in these soils.

- Organics: No organic contaminants exceeded the relevant GAC. All VOCs and SVOCs were not detected above the laboratory limit of detection.

- Other inorganics: No other inorganic contaminant exceeded the relevant GAC

- Mineralogical Contaminants: All samples were negative for the presence of asbestos.

- Evidence for potential LNAPL: During progression of exploratory holes and groundwater sampling there was no visual of olfactory evidence for the presence of LNAPL either associated with perched groundwater in Made Ground or within deeper groundwater in natural deposits. No potential LNAP was encountered at the interface between granular Made Ground deposits and less permeable natural deposits or sorbed to soils. Laboratory analysis of soils has also shown that very low concentrations of TPH are present in some soils, with the majority of Made Ground and all natural ground samples showing TPH concentrations less than the laboratory limit of detection.

Discussion of Zone 2 Soil Samples

- Metals: No heavy metals exceeded any generic assessment criteria (GAC) for a commercial end-use.

- Organics: No organic contaminants exceeded the relevant GAC. All VOCs and SVOCs were not detected above the laboratory limit of detection.

- Other inorganics: No other inorganic contaminant exceeded the relevant GAC

- Mineralogical Contaminants: All samples were negative for the presence of asbestos.

10.5 Soil Phytotoxic Risks

Concentrations of the phytotoxic metals copper, nickel, lead, cadmium, mercury and zinc nickel have been recorded in Made Ground in excess of the guideline values for the protection of plants as presented in the Defra Sewage Sludge Code of Practice. The results of the phytotoxic screening are

presented in the tables below.

Determinand	No of samples	GAC (mg/kg)	Results Exceeding GAC (mg/kg)	Exceeds GAC (Y/N)
Arsenic	19	All pH - 50	-	N
Copper	19	pH>7 – 200	-	N
Cadmium	19	All pH – 3	Made ground – 4.3 and 6.1	Y
Chromium	19	All pH - 400	Made Ground – 1,600 and 480	Y
Nickel	6	pH>7 – 110	-	N
Mercury	6	All pH - 1	-	N
Lead		All pH – 300	-	N
Zinc	6	pH>7 – 300	-	Y
Selenium	6	All pH - 3	Made Ground – 7.3 Natural - 4	Y

Within the Made Ground, and one sample from natural ground selenium, cadmium, chromium and selenium are marginally elevated when compared to the relevant GAC. This is based on very limited number of samples from 19 soil samples in total exceeding the relevant GAC. Geotechnics Limited considers that a limited number of locations with marginally elevated concentrations is not a significant risk to plants. Detriment to plant life is difficult to quantify as many of the GACs are based on agricultural crop yields rather than serious harm of death of a species. As the vegetation present on site appears to be in good condition, and the proposed development is unlikely to include significant areas of landscaping Geotechnics Limited do not consider any additional consideration is required with regards to risk to plants.

10.6 Hydrogeological Interpretation

Observations during progression of exploratory holes and during post-installation monitoring have shown that groundwater at the site occurs both as perched groundwater within Made Ground, and as groundwater in the deeper natural deposits. The table below shows a summary of strata where monitoring wells are installed and the resting groundwater level (mOD).

Exploratory Hole	Reduced groundwater level (mOD)
Made Ground	
WS-BH104	8.19
WS-BH105	9.43
WS-BH106	8.94
WS-BH109	9.62
WS-BH110	8.11
WS-BH111	7.92
RC-BH105	8.84
WS-BH102	Dry
WS-BH103	7.76
CP-BH103	9.27
RC-BH101	7.64
Drift	
CP-BH101	7.65
CP-BH102	7.28
Bedrock	
RC-BH103	7.78
RC-BH104	8.36
RC-BH102	7.74

General groundwater observations show that groundwater was encountered within Made Ground deposits in three exploratory holes, WS-BH104, WS-BH105 and RC-BH105 with strikes in WS-BH104 and WS-BH105 at 0.90 mbgl. In WS-BH105 the strike rose to 0.55 mbgl after 20 minutes. Groundwater in RC-BH105 was struck at 2.20 mbgl and did not rise. Groundwater was not encountered in Made Ground during progression in any other exploratory hole.

Cross sections showing water strikes are presented in Appendix 13.

Groundwater was encountered within the Quaternary River Terrace Gravel Deposits in two exploratory holes, RC-BH103 and CP-BH102 with strikes at 2.63 mbgl rising to 2.00 mbgl and 5.60 mbgl with no rise respectively.

Groundwater was encountered in the Devonian Maughans Formation at 9.00 mbgl rising to 4.53 mbgl in RC-BH104. In other exploratory holes, water observations with exploratory hole progression showed that some exploratory holes remained dry and in others, groundwater levels encountered in the Quaternary River Terrace Gravel deposits above remained approximately consistent during drilling into the Devonian Maughans Formation.

Groundwater levels during monitoring show the following:

- Groundwater levels in Drift and Bedrock deposits are probably in hydraulic continuity, with the majority of groundwater levels being at depths of between 7.28 mOD and 7.78 mOD across the site, with a maximum head difference of 0.50 m across the site. It is uncertain what is causing the relatively high groundwater level in RC-BH104, and groundwater was struck at 6.36 mOD during drilling.

- Groundwater levels in Made Ground monitoring wells show a wide variety of groundwater levels with levels varying between 7.64 mOD and 9.62 mOD. The wide range in levels demonstrates that groundwater in Made Ground deposits is not in lateral continuity. The majority of groundwater in Made Ground is also not in vertical continuity with the underlying aquifers, although in places, the level of groundwater within the underlying aquifers is within Made Ground deposits. However, the cohesive clay deposits which typically underlay the Made Ground will generally inhibit downward migration.

10.7 Water Results Summary

The summary of the analytical results obtained from sampling during this investigation are presented in Appendix 14.

Groundwater samples have been screened again Environmental Quality Standards (EQS), which are appropriate for the protection of surface water receptors. No groundwater abstractions occur in the vicinity of the site, and base flow to surface water courses is the most appropriate receptor to consider.

Exceedances of unadjusted EQS GACs were encountered in both perched water in Made Ground and deeper groundwater for the following contaminants:

- Copper (maximum concentration of 3.2 µg/l compared to the unadjusted EQS of 1 µg/l)
- Manganese (maximum concentration of 3,000 µg/l compared to the unadjusted EQS of 123 µg/l)
- Mercury (maximum concentration of 0.34 µg/l compared to the unadjusted EQS of 0.07 µg/l), with the EQS exceeded on only one Made Ground sample
- Nickel (maximum concentration of 7.4 µg/l compared to the unadjusted EQS of 4 µg/l), with EQS exceedances in one Made Ground and two Natural ground samples
- Selenium (maximum concentration of 15 µg/l compared to the EQS of 10 µg/l), with one EQS exceedance in both Made Ground and Natural ground
- Fluoranthene (maximum concentration of 0.06 µg/l compared to the EQS of 0.0063 µg/l NB Laboratory limit of detection is 0.01 µg/l) with three exceedances in Made Ground and one in Natural ground
- Benzo(b)fluoranthene (maximum concentration of 0.04 µg/l compared to the EQS of 0.00017 µg/l NB Laboratory limit of detection is 0.01 µg/l) with two exceedances in Made Ground
- Benzo(a)pyrene (maximum concentration of 0.01 µg/l compared to the EQS of 0.00017 µg/l NB Laboratory limit of detection is 0.01 µg/l) with one exceedance in Made Ground
- TPH (only Aliphatic >C21-C35 in one sample) (concentration of 24 µg/l compared to EQS of 10 µg/l) with one exceedance in Natural ground.

The majority of EQS exceedances show concentrations marginally above the EQS and exceedances are not shown across the whole site. For heavy metals there are no discernible differences between concentrations in perched groundwater in Made Ground and deeper groundwater in Natural deposits. The concentrations present are considered to be typical of regional background concentrations.

Where the exceedances are relatively large, mostly demonstrated for manganese in isolated areas in both Made Ground and Natural ground, these concentrations are likely to result from natural processes from the reduction of manganese bearing minerals both in natural groundwater and perched groundwater. No potential sources of manganese have been identified.

EQS values allocated to some PAH compounds are typically several orders of magnitude lower than commercial laboratories can achieve. Where detected, the concentrations are likely to exceed EQS values, but the concentrations present are generally considered to be very low. In addition, the concentrations recorded are likely to be due to the inclusion of colloids and particulate matter into the sample during sampling, artificially elevating apparent dissolved concentrations.

Use of the metal bioavailability assessment tool (M-BAT) for copper, nickel, zinc and manganese showed that based on other water chemistry parameters (dissolved organic carbon, pH and concentration of calcium), these metals were less bioavailable and higher GACs were calculated, although exceedances still occurred. However, this further demonstrates that risks to controlled water are low. The output of the M-BAT are shown in Appendix 15.

There is no evidence of gross contaminant impact of perched groundwater or natural groundwater from

petroleum hydrocarbons and no LNAPL was observed during monitoring and/or purging of groundwater prior to sampling.

No VOC or SVOC compounds were detected above the laboratory limit of detection.

10.8 Gas Results Summary

The gas monitoring results obtained during these investigations are presented in Appendix 8. The gas results from the monitoring undertaken confirm the CM from the desk study that there is no significant sources of ground gas.

10.9 Risk Assessment

Potential risks to construction workers and future uses of the site were identified in the Desk Study. The findings of the assessment have shown that the only potential concern is from the presence of hexavalent chrome in localised areas of Made Ground, probably related to the presence of slag. Potential risks to construction workers will be mitigated by the appropriate use of personal protective equipment and standard construction hygiene standards.

Following development, even if the Made Ground with hexavalent chromium GAC exceedances remains in-situ, the presence of buildings and hardstanding will break the pathway for exposure to future site users.

Assessment of contaminants in groundwater has not shown any gross levels of contaminants to be present. No visual, olfactory of chemical indications of gross petroleum hydrocarbon impact has been encountered in any soil or groundwater samples. Any potential sources of petroleum hydrocarbons in the southwest of the site in trenches within structures has therefore not impacted the soils and groundwater beneath.

Groundwater observations have shown that groundwater in Made Ground and natural deposits has shown that there is limited hydraulic continuity between perched groundwater in Made Ground and deeper groundwater in aquifers.

Concentrations of heavy metals in groundwater shown a similar distribution within Made Ground and Natural deposits. This suggests that these concentrations are typical of regional contaminant concentrations, including from localised biogeochemical processes. The use of M-BAT shows that site specific screening values taking into account hardness, calcium, pH and dissolved organic carbon for groundwater discharging into surface water courses would be higher than the conservative first pass values. Furthermore, the influent groundwater would be diluted by flow in surface water courses. Groundwater in Made Ground has been shown to have limited vertical and lateral hydraulic continuity so it is unlikely to migrate significantly to surface water courses.

Concentrations of organic contaminants show localised and marginal exceedances of EQS values. Where detectable concentrations were recorded the values very only slightly above the laboratory limit of detection. All VOC and SVOC compounds were not detected above the laboratory limit of detection.

No significant ground gas sources were identified in the Desk Study. Confirmatory ground gas monitoring has confirmed this and no measures are required for ground gas protection measures in any proposed structures.

10.10 Waste Characterisation and Classification

If there is a portion of excess soil this will then have to be sent to a suitable landfill site. A two phase approach is required which comprises:

- Waste Characterisation; and
- Waste Classification (Waste Acceptance Criteria).

Waste Characterisation

The results of the total concentrations from the chemical testing on soil samples have been assessed to determine whether or not they are hazardous in terms of waste classification. The results of this assessment indicate Made Ground from CP-BH102 at 0.5m and Made Ground at WS-BH108 at 1.0m are hazardous due to the concentration of chromium. All of the other the materials encountered during the investigation are classified as none-hazardous.

Hazardous material that is excavated will need to be removed from site. In accordance with the Waste Regulations, pre-treatment of hazardous materials is required prior to disposal. Due to the limited size of the site it is recommended that hazardous material be taken to a soil treatment centre for pre-treatment where the soils hazardous properties may be reduced. The site must register as a producer of Hazardous Waste with Natural Resources Wales and appropriate Duty of Care Waste Transfer procedures

followed.

Waste Classification

All other Made Ground materials on site are therefore likely to be classified as either inert or non-hazardous. As an alternative location for off-site disposal of inert and non-hazardous waste, there are a number of sites which have Environmental Permits for site reclamation and can accept certain categories of inert and non-hazardous wastes.

WAC analysis has shown that non-hazardous soils are suitable for disposal at waste facilities licensed to accept Inert Waste.

Note that the above assessment should only be seen as an initial guide. Defining the class of waste is carried out on the actual waste being disposed of and the destination landfill site will have the final decision on acceptability of the waste. Therefore, it is recommended that if soils are to be removed from the site, the appointed contractor should approach a landfill site with the available chemical data and seek a formal waste characterisation.

Testing Frequency

There are also set requirements for the required sampling and testing frequencies for materials being sent for disposal at landfills. The required testing frequencies for each different waste type are summarised below.

Testing Level	Quantity of Waste	Number of Samples	
		Homogeneous	Heterogeneous & New Wastes
Level 1 Characterisation (Description, Total Concentrations & Leaching)	<100T	2	5
	<500T	3	8
	<1000T	5	14
	10,000 T	11	22
	Per additional 10,000T	+5 pro rata	+10 pro rata
Level 2 Compliance For Regularly Generated Wastes (Total Concentrations & Leaching)		1 per defined waste sub-population per year	3 per defined waste sub-population per year
Level 3 Verification Delivery document & visual check		Visual – Each Load	Visual – Each Load
Chemical testing as per Level 2 suite		1 per year per waste stream	3 per year per waste stream

Materials Management and Reuse of Arisings On-site

When soil is excavated it is technically a waste and it is the responsibility of the holder of a material to form their own view on whether or not it is waste. This includes determining when waste that has been treated in some way can cease to be classed as waste for a particular purpose. Soils can only be re-used if it fulfils the following requirements:

- There is a planned use for the material;
- There is planning permission for the proposed re-use;
- The material when re-used will not be a risk to flora, fauna or controlled waters;
- Appropriate procedures are followed to demonstrate the above criteria are met and the re-use of materials is recorded in a systematic way and appropriate permissions/permits are gained and relevant procedures followed.

As soil is technically a waste when it has been excavated, it cannot be re-used on site unless one of the following four procedures are implemented:

- the procedures are followed in the CL:AIRE Code of Practice 'The Definition of Waste: Development Industry Code of Practice' Version 2 (2011).' If these procedures are followed, excavated arisings can be re-used without them being defined as waste "where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated." or:
- the site registers a waste exemption with Natural Resources Wales in accordance with The Environmental Permitting (England and Wales) Regulations 2016 (as amended) so the material can be placed without an Environmental Permit (note that the rules for permit exemptions have been changed and the maximum quantity covered by a permit exemption for re-using soil is 1,000 T), or;
- the site applies for a full Environmental Permit (either a standard rules permit or a bespoke permit) from the Environment Agency under the Environmental Permitting (England and Wales) Regulations 2016 (as amended); or
- WRAP 'Quality Protocol: Aggregates from inert waste.' Only granular aggregates (e.g. Class 1 or Class 6 materials etc. apply, Class 2 materials are not covered by the WRAP Protocol).

The length of time taken for the above regimes also

needs to be considered:

- CL:AIRE Code of Practice (CoP) takes between 7 and 28 days to gain approval and fees of £40.00 plus £0.01 per m^3 of soil used is payable to CL:AIRE (subject to review);
- An Environmental Permit exemption typically takes up to 7 days to gain approval and there are no fees due;
- Allow a minimum of 12 weeks to develop a Waste Recovery Plan and gain approval or the Environmental Permit from Natural Resources Wales and there are significant costs preparing an application and for the fees payable to Natural Resources Wales (typically in excess of £7,000) for the permit.
- There are no fees to pay for the WRAP Aggregates protocol and there are no notice periods or statutory liaison required.

Given the size and extent of the likely redevelopment it is recommended that the developer applies for an Environmental Permit exemption.

10.11 Conclusions and Recommendations

There are no significant geoenvironmental risks present at the site, with potential risks to construction workers being mitigated via health and safety procedures. Prior to the intrusive investigation, the main area of concern was the presence of separate phase petroleum hydrocarbons due to infiltration of petroleum hydrocarbons through service / draining trenches. However, no evidence of any significant petroleum hydrocarbon impact has been encountered.

No further investigation of geoenvironmental risk is required.

It is recommended that one round of confirmatory groundwater sampling should be undertaken during any subsequent geotechnical investigation. This sampling should be undertaken using the low-flow purging and sampling technique ('micropurging'), as this will minimise the incorporation of colloids and particulate matter into the sample which may then be digested at the laboratory and reported as part of the apparent dissolved phase concentrations. Using this technique will result in a more accurate assessment of actual dissolved phase heavy metals and organic contaminants.

Signed for and on behalf of Geotechnics Limited.

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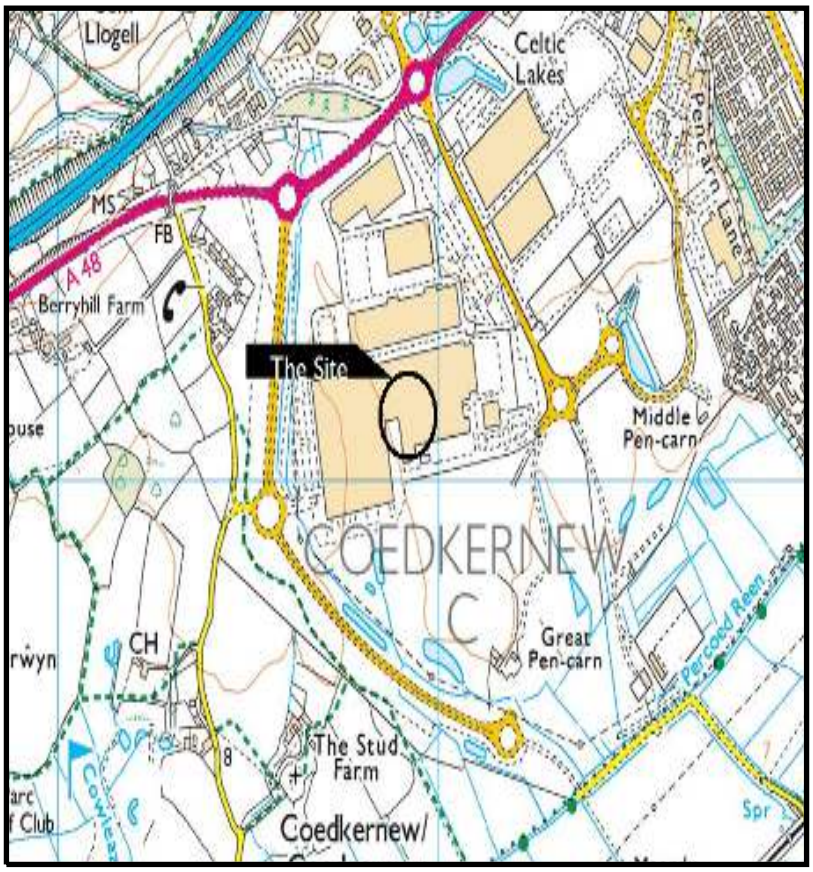
APPENDIX I

The Brief

APPENDIX 2

Site Location Plan

SITE LOCATION PLAN



Ground Investigation
at Former Quinn Radiator Factory
Newport, Wales, NP10 8FS
for
Pinnacle Consulting Engineers Limited

GEOTECHNICS
geotechnical and geoenvironmental specialists

APPENDIX 3

Borehole Records

BOREHOLE RECORD - Cable Percussion

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	CP-BH101
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327897.3 E 183971.2 N	**Ground Level**	9.65 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		9.65
						MADE GROUND: Grey concrete	0.18		9.47
0.30	ES					MADE GROUND: Dark brownish grey and black very sandy slightly silty subangular to subrounded fine to coarse gravel of slag, brick fragments and sandstone.	0.65		9.00
0.30			PID=1.3						
0.50- 0.65	B								
0.50	ES								
0.50			PID=2.0						
0.80	D					Firm brown mottled grey reddish brown slightly sandy slightly gravelly CLAY with a low subangular cobble content of sandstone. Gravel is subangular to subrounded fine to coarse of sandstone. Occasional pockets (<20mm) of yellowish brown and orangish brown fine to medium sand.			
1.00	ES								
1.00			PID=1.8						
1.20- 1.70	B								
1.20- 1.65		(DRY)			C10				
1.80	D								
2.00- 2.40	B								
2.00- 2.45		(DRY)			C10				
							2.40		7.25
2.50- 3.00	B					Firm grey mottled reddish brown and yellowish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of sandstone. Slight organic/peaty odour and occasional pockets of decomposed organic material up to 2mm.			
3.00- 3.45	UT46								
3.00			PID=1.9			Between 3.00-3.45m, low strength.			
3.45- 3.50	D								
3.80	D								
4.00- 4.50	B						4.00		5.65
4.00- 4.45	D	(DRY)			S11	Firm light grey mottled grey slightly sandy slightly gravelly CLAY with occasional pockets of decomposed organic material up to 2mm. Gravel is subangular to rounded fine to coarse of sandstone. Slight organic odour.			
4.20			PID=1.3						
4.80	D								
5.00- 5.45	UT85					Between 5.00-5.45m, low strength.			
							5.30		4.35
5.45- 5.50	D					Extremely weak reddish brown MUDSTONE.	5.50		4.15
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
0.18	0.35	Concrete Core	PO/SW
1.20	0.35	Inspection Pit	PO/SW
5.50	0.20	Cable Percussion	PO/SW

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.		DRY	27/05/21	08:00
5.50		DRY	27/05/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x vial, 1 x plastic jar and 1 amber jar.
The Borehole was terminated at 5.50m depth upon encountering bedrock.
A 50mm standpipe was installed to 5.50m with a geowrapped slotted section from 4.00m to 5.50m with flush lockable protective cover. Backfill details from base of hole: fine gravel filter up to 4.00m, bentonite seal up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 1 of 1

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geotechnics

BOREHOLE RECORD - Cable Percussion

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole** / **Project No**	CP-BH102 / PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327806.2 E, 183913.5 N	**Ground Level**	10.28 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Level m OD
							G.L.	10.28
0.20	ES					MADE GROUND: Grey Concrete.		
0.35			PID=2.2				0.35	9.93
0.50- 1.00	B					MADE GROUND: Dark brown and black slightly silty very sandy angular to subrounded fine to coarse gravel of sandstone. Low subangular cobble content of slag.		
0.50	ES							
0.50			PID=5.1					
1.00	ES						1.00	9.28
1.00			PID=2.4			MADE GROUND: Dense light brown slightly silty sandy subangular to rounded fine to coarse gravel of sandstone. Low subrounded cobble content of sandstone.		
1.20- 1.65		(DRY)			C30			
1.60- 2.00	B						1.60	8.68
2.00	D					Firm reddish brown slightly sandy slightly gravelly CLAY with a medium subangular to subrounded cobble content of sandstone. Gravel is subangular to subrounded fine to coarse of sandstone. At 1.60m, geotextile layer.		
2.00- 2.45		(DRY)			C9			
2.20	ES							
2.20- 2.80	ES							
2.20			PID=1.7					
3.00- 3.50	B							
3.00	D							
3.00- 3.45		(DRY)			C10			
3.60	D							
4.00- 4.50	B							
4.00- 4.45		(DRY)			C11			
4.80	D					Below 4.80m, frequent pockets of grey and yellow fine to medium sand.		
5.00- 5.45		(DRY)			C14			
5.60- 6.00	B						5.60 ▽	4.68
6.20	D					Very soft grey mottled brown slightly sandy slightly gravelly CLAY with occasional pockets of decomposed organic matter (up to 4mm). Gravel is subangular fine of sandstone.		
6.50- 6.95	UT21					Between 6.50-6.95m, low strength.		
6.95- 7.00	D							
7.00- 7.40	B							
7.50	D							
7.60- 8.00	B						7.60	2.68
8.00- 8.44	D	(YES)			S50/ 290	Extremely weak reddish brown MUDSTONE (recovered as reddish brown slightly clayey sandy gravel).		
						End of Borehole	8.44	1.84

Boring

Depth	Hole Dia	Technique	Crew
0.35	0.35	Concrete Core	PO/SW
1.20	0.30	Inspection Pit	PO/SW
8.44	0.20	Cable Percussion	PO/SW

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			24/05/21	13:30
1.20	1.20	Dry	24/05/21	17:00
1.20	1.20	Dry	25/05/21	08:00
8.44	7.50		25/05/21	15:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
5.60	4.50			6.00	Seepage, no rise.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x vial, 1 x plastic jar and 1 amber jar.
The Borehole was terminated at 8.44m depth upon encountering bedrock.
A 50mm standpipe was installed to 8.00m with a slotted section from 4.00m to 8.00m with flush lockable protective cover. Backfill details from base of hole: fine gravel filter up to 4.00m, bentonite seal up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 1 of 1

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geotechnics

BOREHOLE RECORD - Cable Percussion

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	CP-BH103
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327663.0 E 184061.7 N	**Ground Level**	10.60 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		10.60
						MADE GROUND: Black tarmacadam.	0.10		10.50
0.30	ES					MADE GROUND: Brown very sandy slightly silty subangular to subrounded fine to coarse gravel of sandstone. Low cobble content of sandstone.			
0.30			PID=1.7						
0.50- 1.00	B								
0.50	ES								
0.50			PID=2.2						
1.00	ES								
1.00			PID=2.9						
1.20- 1.70	B								
1.20- 1.65		(DRY)			C38		1.30		9.30
1.50	ES					Firm reddish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of sandstone.			
1.50			PID=5.1						
1.80	D								
2.00- 2.50	B								
2.00- 2.45		(DRY)			C11				
2.80	D						2.80		7.80
3.00- 3.45	D	(DRY)			S50	Extremely weak reddish brown MUDSTONE			
						End of Borehole	3.45		7.15

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	PO/SW
3.45	0.20	Cable Percussion	PO/SW

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.		DRY	26/05/21	08:00
3.45	3.20	DRY	26/05/21	13:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 2 x vial, 1 x plastic jar and 2 amber jar.
The Borehole was terminated at 3.45m depth upon encountering bedrock.
A 50mm standpipe was installed to 3.00m with a geowrapped slotted section from 1.00m to 3.00m with flush lockable protective cover. Backfill details from base of hole: fine gravel filter up to 1.00m, bentonite seal up to 0.20m, concrete up to ground level.

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Figure 1 of 1

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Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

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BOREHOLE RECORD - Cable Percussion

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole** / **Project No**	CP-BH105 / PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327938.0 E, 184231.7 N	**Ground Level**	10.80 m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	Strata Description	Depth	Legend	Level m OD
						G.L.		10.80
0.10			PID=2.9		MADE GROUND: Concrete.	0.10		10.70
0.30	ES				MADE GROUND: Reddish brown very sandy silty angular to subangular fine to coarse gravel of sandstone.			
0.50- 0.65	B							
0.50	ES							
0.65			PID=1.9		End of Borehole	0.65		10.15

Boring

Depth	Hole Dia	Technique	Crew
0.10	0.35	Concrete Core	PO/SW
0.65	0.40	Inspection Pit	PO/SW

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			26/05/21	13:00
0.65			26/05/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks The Borehole was terminated at 0.65m depth due to the presence of an obstruction. Unable to break out obstruction due to strong signal from cable avoidance tool.
Backfill details from base of hole: bentonite seal up to 0.20m, tarmacadam up to ground level.

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Figure 1 of 1

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Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

geotechnics

BOREHOLE RECORD - Cable Percussion

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	WS-BH109
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327871.3 E 183968.0 N	**Ground Level**	10.75 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		10.75
						MADE GROUND: Grey reinforced concrete.	0.20		10.55
0.30	ES					MADE GROUND: Dark grey very sandy slightly silty angular to subangular fine to coarse gravel of slag, clinker, firebrick, sandstone, metal, plastic and brick fragments. Some cobble sized fragments of metal.			
0.30			PID=2.1						
0.50- 1.00	B								
0.50	ES								
0.50			PID=2.2						
1.00	ES								
1.00			PID=3.1						
1.20- 1.70	B						1.10		9.65
1.20- 1.65		(DRY)			C14	Firm reddish brown mottled brown slightly sandy slightly gravelly CLAY with a slight organic odour. Gravel is subangular to subrounded fine to coarse of sandstone.			
1.80	D								
2.00- 2.50	B								
2.00- 2.45		(DRY)			C13				
2.00			PID=1.4						
2.80	D								
3.00- 3.50	B								
3.00- 3.45	D	(DRY)			S9				
							3.20		7.55
3.50			PID=1.4			Firm grey mottled brown and black slightly sandy slightly gravelly CLAY with occasional pockets (up to 4mm) of decomposed organic material. Gravel is subangular to subrounded fine to coarse of sandstone.			
3.80	D								
4.00- 4.50	B								
4.00- 4.45	D	(DRY)			S9				
4.50			PID=1.5						
4.80	D								
5.00- 5.50	B					Below 5.00m, frequent pockets (up to 20mm) of decomposed organic material.			
5.00- 5.45	D	(DRY)			S9				
5.80	D								
6.00			PID=1.7						
6.50- 7.00	B								
6.50- 6.95	D	(DRY)			S12				
7.30	D								
8.00- 8.50	B					Below 8.00m, stiff.			
8.00- 8.45		(DRY)			C23				
9.00	D								
							9.40		1.35
9.50- 9.95	D	(DRY)			S50	Extremely weak reddish brown MUDSTONE.			
						End of Borehole	9.95		0.80

Boring

Depth	Hole Dia	Technique	Crew
0.20	0.35	Concrete Core	PO/SW
1.20	0.35	Inspection Pit	PO/SW
9.95	0.20	Cable Percussion	PO/SW

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.		DRY	01/06/21	08:00
9.95		DRY	01/06/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x vial, 1 x plastic jar and 1 amber jar.
A 50mm standpipe was installed to 2.50m with a geowrapped slotted section from 0.50m to 2.50m with flush lockable protective cover. Backfill details from base of hole: bentonite seal up to 2.50m, fine gravel filter up to 0.50m, bentonite seal up to 0.20m, concrete up to ground level.

Logged by EPS

Figure 1 of 1

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Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

geotechnics

APPENDIX 4

Rotary Drillhole Records

BOREHOLE RECORD - Dynamic Sampler and Rotary

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole** / **Project No**	RC-BH101 / PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	328065.2 E, 184061.0 N	**Ground Level**	10.18 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N (FI)	Description	Depth	Legend	Level m OD
							G.L.		10.18
0.00- 0.20	B					MADE GROUND: Soft dark brown slightly sandy slightly gravelly silt with many rootlets. Gravel is subangular to rounded fine to coarse of sandstone, brick, clinker and quartzite.	0.20		9.98
0.10	D								
0.20- 1.20	B					MADE GROUND: Brown very sandy silty gravel with a low subangular cobble content of sandstone. Gravel is angular to subrounded fine to coarse of sandstone, brick and quartzite. Occasional rootlets.			
1.00	D						1.20		8.98
1.20- 2.20	B								
1.20- 1.65	D	1.20			S48				
1.50	D	(DRY)				MADE GROUND: Dense reddish brown clayey sandy gravel with a medium cobble content of subangular sandstone. Gravel is subangular to rounded fine to coarse of sandstone.			
1.50	ES					Between 1.20m and 2.20m, Rotary Open Hole techniques used to surpass obstructive strata.			
2.20- 2.45	D								
2.20- 2.65	D	1.20			S15				
2.45- 3.55	B	(1.60)				Firm brownish red slightly sandy slightly gravelly CLAY. Gravel is subangular fine to medium of mudstone.	2.45		7.73
2.60	D					Between 2.82m and 3.02m, Mottled dark reddish brown and light grey. Gravel absent.			
2.60	ES								
2.82- 3.02	D								
3.20- 3.65	D	3.20 (DRY)			S25				
3.55- 4.05	B						3.55		6.63
3.70- 3.80	D					Stiff brownish red mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone.			
4.05- 4.20	D						4.05		6.13
4.20- 4.59		4.50 (DRY)			C50/ 235	Probable COBBLES or BOULDER of extremely weak brownish red mudstone and grey siltstone.	4.50		5.68

Core Run/Depth (Core Dia/Time)	Depth Cased	TCR/SCR / Type	Length Max/Min	RQD %	SPT (FI)	Continued by Rotary techniques General	Detail	Depth	Legend	Level m OD
4.50- 6.00 (92mm)	4.50 (DRY)	100 11	160 160	11	(NI)	Stiff brownish red mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone.	Between 4.50m and 5.84m, occasional pockets of grey silt.			
					(6)			5.84		4.34
6.00- 7.50 (92mm)	4.50 (DRY)	84 84	680 540	79	(AZCL)	Extremely weak brownish red MUDSTONE with occasional small clasts of grey siltstone. Discontinuities are subvertical medium to widely spaced, undulating and rough.	Between 5.84-6.00m, occasional clasts (up to 70mm) of siltstone.			
6.00- 6.44	4.50 (DRY)				C50/ 285		Between 6.61-6.72m, occasional clasts (up to 70mm) of siltstone.			
6.76- 6.89		C			(2)		Between 7.19-7.50m, occasional clasts (up to 70mm) of siltstone.			
7.50- 7.87	4.50 (DRY)				C50/ 220	End of Borehole		7.50		2.68

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	IJ
2.20	0.12	Rotary Open Hole	IJ
4.20	0.10	Dynamic Sampler	IJ
4.50	0.12	Rotary Open Hole	IJ
7.50	0.12	Rotary Core	IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.		Dry	07/06/21	08:00
7.50	4.50	Dry	07/06/21	18:00
7.50	4.50	Dry	08/06/21	08:00
7.50	4.50	Dry	08/06/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
1.60	1.20	1.50	20	3.20	Inflow.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 2 x vial, 1 x plastic jar and 2 amber jar.
The Borehole was terminated at a depth of 7.50m on the instruction of the Engineer/Client.
Dynamic sample recovery: 2.20-3.20m,100%; 3.20-4.20m,100%.
A 50mm standpipe was installed to 3.00m with a geowrapped slotted section from 1.00m to 3.00m with flush lockable protective cover. Backfill details from base of hole: bentonite up to 3.00m, fine gravel filter up to 1.00m, bentonite up to 0.20m, concrete up to ground level.

Logged in accordance with BS5930:2015 + A1:2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged by EPS

Figure 1 of 1

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geotechnics

BOREHOLE RECORD - Dynamic Sampler and Rotary

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole** / **Project No**	RC-BH102 / PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327884.3 E, 184090.9 N	**Ground Level**	10.35 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N (FI)	Description	Depth	Legend	Level m OD
							G.L.		10.35
						MADE GROUND: Concrete.			
0.20- 0.50	D						0.20		10.15
						MADE GROUND: Dark grey and brown slightly silty sandy subangular to subrounded fine to coarse gravel of sandstone, slag and brick.			
0.50- 1.40	B						0.50		9.85
0.50	D								
						MADE GROUND: Loose reddish brown slightly silty sandy angular to subrounded fine to coarse gravel of sandstone.			
1.00	D								
1.00	ES								
1.20- 1.65	D	(1.20)			S10	Between 1.20m and 2.20m, Rotary Open Hole techniques used to surpass obstructive strata.			
1.40- 1.80	D						1.40		8.95
						MADE GROUND: Dark grey mottled brown clayey slightly gravelly sand. Gravel is subangular to subrounded fine to coarse of sandstone. At 1.40m, Black plastic obstruction.			
2.20- 2.65	D	2.20 (1.20)			S29				
2.50	D								
2.50	ES								
2.70- 4.60	B						2.70		7.65
2.70- 2.90	D					Stiff brownish red slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone.			
3.20- 3.80	UT					Between 3.20-3.80m, high strength.			
3.20- 3.65		3.20 (DRY)			S14				
3.80- 4.25	D								
						Below 4.10m, firm.			
4.10- 4.40	D								
4.60- 4.80	D						4.60		5.75
						Extremely weak brownish red MUDSTONE with occasional clasts (up to 35mm) of grey siltstone. Recovered as gravel.			
4.80- 5.25	D	4.50			S47		4.80		5.55

Continued by Rotary techniques

Core Run/Depth (Core Dia/Time)	Depth Cased	TCR/SCR / Type	Length Max/Min	RQD %	SPT (FI)	General	Detail
					(AZCL)	Extremely weak brownish red MUDSTONE. Discontinuities are subhorizontal to subvertical, very closely to medium spaced, undulating and rough.	Between 4.80m and 6.00m, rare clasts (up to 35mm) of grey siltstone.
4.80- 6.00 (92mm)	6.00	25 0	0 0	0	(NI)		Below 6.00m, extremely weak to very weak.
6.00- 7.50 (92mm)	7.50	64 18	130 60	8	(AZCL)		
6.00- 6.38	6.00				C50/ 230		
6.64- 6.84		C			(>25)		Between 6.67m and 7.00m, Occasional clasts of very weak grey siltstone.
					(NI)		
					(15)		
					(NI)		
7.50- 9.00 (92mm)	9.00	33 0	0 0	0	(>25)		
					(NI)		
					(AZCL)		
7.50- 7.86	7.50				C50/ 205		Between 8.58m and 8.77m, Occasional clasts of very weak grey to weak siltstone.
					(NI)		
8.80- 8.90		C			(>25)		Below 8.87m, Discontinuities are subvertical to subhorizontal, closely to widely spaced, undulating and smooth. Between 9.50m and 12.10m, Occasional clasts of very weak to weak grey siltstone.
9.00-10.50 (92mm)	9.00	66 34	120 10	15	(NI)		
					(23)		
9.00- 9.31	9.00				C50/ 160		
					(AZCL)		

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	IJ
4.80	0.10	Dynamic Sampler	IJ
15.00	0.12	Rotary Core	IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.		DRY	01/06/21	08:00
3.80	3.20	1.20	01/06/21	18:00
3.80	3.20	2.73	02/06/21	08:00
13.50	9.00	2.73	02/06/21	18:00
13.50	9.00	2.73	03/06/21	08:00
15.00	9.00	2.73	03/06/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
1.20		1.20	20	3.20	Inflow - no rise.

Remarks

ES sample = 2 x vial, 1 x plastic jar and 2 amber jar.
Inspection pit hand excavated to 1.20m depth and no services were found.
The Borehole was terminated at a depth of 15.00m on the instruction of the Engineer/Client.
** Driller's description.
Dynamic sample recovery: 2.20-3.20m,100%; 3.80-4.80m,70%.
A 50mm standpipe was installed to 12.00m with a geowrapped slotted section from 3.00m to 12.00m with flush lockable protective cover. Backfill details from base of hole: bentonite seal up to 12.00m, fine gravel filter up to 3.00m, bentonite up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 1 of 2

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geotechnics

BOREHOLE RECORD - Dynamic Sampler and Rotary

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole** / **Project No**	RC-BH102 / PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327884.3 E, 184090.9 N	**Ground Level**	10.35 m OD

Drilling | **Properties/Sampling** | **Strata** | **Scale** 1:50

Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	Type TCR/SCR%	Length Max/Min	RQD %	SPT N (Fl)	Description General	Description Detail	Depth	Legend	Level m OD
					(25)					
					(NI)					
10.39–10.50		C								
					(>25)					
10.50–12.00 (92mm)	9.00	100 77	120 10	45	(NI)					
					(>25)					
11.31–11.41		C			(NI)					
10.50–10.71	9.00				C50/ 135		Between 11.50m and 14.63m, with frequent clasts of very weak grey siltstone.			
					(17)					
12.00–13.50 (92mm)	9.00	100 93	310 30	75	(NI)					
					(14)					
12.62–12.83		C			(NI)					
12.00–12.34	9.00				C50/ 185					
					(9)					
13.34–13.50		C								
13.50–15.00 (92mm)	9.00	86 82	230 30	66	(AZCL)					
13.50–13.80	9.00				C50/ 155 (9)					
14.32–14.49		C			(NI)					
					(8)					
								15.00		-4.65
15.00–15.13	9.00				C50/45	End of Borehole				

Drilling

Depth	Hole Dia	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 2 of 2

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geotechnics

BOREHOLE RECORD - Dynamic Sampler and Rotary — Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole** / **Project No**	RC-BH103 / PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327688.3 E, 183914.9 N	**Ground Level**	9.99 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N (FI)	Description	Depth	Legend	Level m OD
							G.L.		9.99
						MADE GROUND: Concrete.			
0.20- 0.45	B						0.20		9.79
0.30	D					MADE GROUND: Brown slightly silty gravelly fine to coarse sand. Gravel is angular to subrounded fine to coarse of clinker, sandstone and quartzite.			
0.30	ES						0.45		9.54
0.50	D						0.60		9.39
0.60- 1.20	B					MADE GROUND: Reddish brown slightly silty sandy gravel with rare subrounded cobbles of sandstone. Gravel is subangular to rounded fine to coarse of sandstone.			
1.00	D								
1.00	ES								
1.20- 1.65	D	1.20 (DRY)			S33		1.40		8.59
						MADE GROUND: Dense brown sandy silty subangular to subrounded gravel of clinker, slag, sandstone and quartzite.			
1.60	D						1.90		8.09
1.60	ES								
						MADE GROUND: Dense reddish brown silty sandy subangular to subrounded fine to coarse gravel of sandstone.			
2.10	D								
2.10	ES								
2.20- 2.65	D	2.20 (DRY)			S7		2.40		7.59
						Firm reddish brown mottled grey and brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of sandstone.			
						Soft brownish red slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of mudstone. Below 2.65m, Firm. Below 2.95m, stiff.			
3.05- 3.20	D						3.05		6.94
3.20- 3.80	UT87						3.20		6.79
3.20- 3.65		3.20 (2.63)			S42				
						Possible COBBLES of extremely weak brownish red mudstone. Recovered as clayey slightly sandy gravel of mudstone.			
3.80	D				(AZCL)		3.80		6.19
3.80- 4.25	D								
						Stiff brownish red CLAY. Between 3.20-3.80m, high strength.	4.31		5.68

Core Run/Depth (Core Dia/Time)	Depth Cased	TCR/SCR / Type	Length Max/Min	RQD %	SPT (FI)	Continued by Rotary techniques General	Detail		
					(NI)				
3.80- 4.50 (92mm)	4.50 (2.63)	82 27	190 190	27	(11)	Very Stiff brownish red mottled grey slightly sandy slightly gravelly CLAY with occasional pockets of grey silty angular to subangular fine to coarse gravel of mudstone.			
4.50- 5.50 (92mm)	4.50 (2.63)	75 41	320 50	32	(AZCL)				
5.18- 5.40		C			(NI)				
5.40- 5.50		C							
					(10)				
5.50- 7.00 (92mm)	4.50 (2.63)	95 88	230 60	63	(NI)	Extremely weak brownish red MUDSTONE. Discontinuities are subhorizontal very closely to medium spaced, undulating and smooth.	Between 4.40m and 4.44m, occasional clasts of extremely weak grey siltstone. Between 5.18-5.40m, extremely weak to very weak. Between 5.67m and 5.92m, occasional clasts of extremely weak grey siltstone.	6.05	3.94
5.50- 5.86	4.50 (2.63)				C50/ 205			6.39	3.60
					(AZCL)				
					(NI)				
7.00- 8.50 (92mm)	4.50 (2.63)	88 85	360 60	75	(3)				
7.17- 7.31		C			(12)				
					(13)	Very weak grey SILTSTONE. Discontinuities are subhorizontal closely spaced, undulating and rough.			
					(AZCL)				
7.00- 7.23	4.50 (2.63)				C50/ 105				
8.00- 8.19		C			(NI)	Extremely weak to very weak brownish red MUDSTONE. Discontinuities are subhorizontal to inclined (55 degrees) closely to widely spaced, undulating and smooth.	Between 7.50m and 7.63m, occasional clasts of extremely weak grey siltstone. Between 8.44m and 8.50m, occasional clasts of extremely weak grey siltstone.	8.50	1.49
					(8)				
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	IJ
3.80	0.10	Windowless Sampler	IJ
8.50	0.12	Rotary Core	IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.	-	DRY	28/05/21	08:00
3.20	3.20	2.63	28/05/21	18:00
3.20			01/06/21	08:00
8.50	4.50	2.63	01/06/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
2.63	2.00				Inflow. Increasing with depth.

Remarks

ES sample = 2 x vial, 1 x plastic jar and 2 amber jar.
The Borehole was terminated at a depth of 8.50m on the instruction of the Engineer/Client.
Inspection pit hand excavated to 1.20m depth and no services were found.
Dynamic sample recovery: 1.20-2.20m,80%; 2.20-3.20m,100%.
A 50mm standpipe was installed to 8.30m with a geowrapped slotted section from 2.00m to 8.30m with flush lockable protective cover. Backfill details from base of hole: collapsed material up to 8.30m, fine gravel filter up to 2.00m, bentonite up to 0.20m, concrete up to ground level.

Logged in accordance with BS5930:2015 + A1:2020

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged by EPS

Figure 1 of 1

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geotechnics

BOREHOLE RECORD - Dynamic Sampler and Rotary — Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole** / **Project No**	RC-BH104 / PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327644.3 E, 184173.4 N	**Ground Level**	10.86 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N (FI)	Description	Depth	Legend	Level m OD
							G.L.		10.86
0.16- 0.40	B					MADE GROUND: Concrete.	0.16		10.70
0.30	D					MADE GROUND: Brown slightly silt gravelly fine to coarse sand. Gravel is angular to subrounded fine to coarse of clinker, quartzite, ash and sandstone.	0.40		10.46
0.30	ES								
0.40- 1.20	B								
1.00	D					MADE GROUND: Very dense reddish brown sandy slightly silty to silty gravel with a low subrounded cobble content of sandstone. Gravel is subangular to rounded fine to coarse of sandstone. From 1.20m to 2.20m, drilled using Rotary Open Hole techniques to pass obstruction.			
1.00	ES								
1.20- 1.62	D	1.20 (DRY)			S50/ 270				
2.20- 2.65	D	2.20 (DRY)			S15		2.20		8.66
2.30	D					MADE GROUND: Medium dense reddish brown slightly clayey sandy gravel with a low subangular cobble content of sandstone. Gravel is subangular to subrounded fine to coarse of slag and sandstone.	2.50		8.36
2.30	ES								
2.50- 2.80	D								
3.00	D					Firm reddish brown mottled red slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of sandstone. At 3.15m, subrounded cobble of sandstone.			
3.00	ES								
3.20- 3.50	D						3.20		7.66
3.20- 3.65	D	3.20 (DRY)			S12				
3.50- 3.80	D								
3.80- 3.90	D					Stiff brownish red slightly sandy slightly gravelly CLAY with occasional small pockets of light grey silt. Gravel is angular to subangular of mudstone. Below 3.50m, very stiff.	3.80		7.06
3.90- 4.24	D	3.20 (DRY)			S50/ 190				
						Extremely weak brownish red MUDSTONE. Between 3.80m and 3.90m, Recovered as slightly clayey sandy gravel. Between 3.90-4.50m, no recovery.	4.50	▼	6.36

Core Run/Depth (Core Dia/Time)	Depth Cased	TCR/SCR / Type	Length Max/Min	RQD %	SPT (FI)	Continued by Rotary techniques General	Detail	Depth	Legend	Level m OD
4.50- 6.00 (92mm)	4.50 (DRY)	73 56	400 40	34	(AZCL) (NI)	Extremely weak to weak brownish red MUDSTONE. Discontinuities are subhorizontal to subvertical closely to medium spaced, undulating and planar and rough.	At 4.90m, subrounded cobble sized clast of siltstone. Below 5.35m, with occasional clasts (<20mm) of very weak light grey siltstone.			
5.74- 5.90		C			(12) (NI)					
6.00- 7.50 (92mm)	4.50 (DRY)	56 27	230 50	23	(16) (NI)					
6.69- 6.79		C			(8) (AZCL)					
6.00- 6.31	4.50 (DRY)				C50/ 160	Extremely weak to very weak brownish red MUDSTONE. Discontinuities are subvertical to subhorizontal closely spaced, undulating and smooth with dark brown discolouration on aperture surface.	Between 7.02m and 7.50m, set of discontinuities: Subhorizontal, closely spaced, undulating and smooth. Between 7.50m and 8.95m, discontinuities are subvertical closely to medium spaced, undulating and smooth. Between 7.50m and 8.95m, Extremely weak. Between 7.70m and 7.90m, Occasional small pockets (<20mm) of light grey silt. Between 8.95m and 9.96m, Extremely weak to very weak.	7.02		3.84
7.50- 9.00 (92mm)	4.50 (9.00)	95 38	180 10	0	(17) (13) (NI) (NI)					
7.50- 7.72	4.50 (DRY)				(AZCL) C50/ 135					
9.00-10.50 (92mm)	4.50 (4.53)	73 67	200 20	39	(NI) (AZCL)					
9.00- 9.22	4.50 (9.00)				C50/95 (17)					
9.98-10.18		C			(NI)			9.96		0.90

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	IJ
2.20	0.12	Rotary Open Hole	IJ
3.90	0.10	Dynamic Sampler	IJ
4.50	0.12	Rotary Open Hole	IJ
15.10	0.12	Rotary Core	IJ

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.	-	DRY	27/05/21	08:00
12.00	4.50	4.53	27/05/21	18:00
12.00	4.50	2.43	28/05/21	08:00
15.10	4.50	2.43	28/05/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
9.00	4.50	4.53	20		Groundwater encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 2 x vial, 1 x plastic jar and 2 amber jar.
The Borehole was terminated at a depth of 15.00m on the instruction of the Engineer/Client.
Dynamic sample recovery: 2.20-3.20m,100%; 3.20-3.90m,100%.
A 50mm standpipe was installed to 15.00m with a geowrapped slotted section from 3.00m to 15.00m with flush lockable protective cover. Backfill details from base of hole: fine gravel filter up to 3.00m, bentonite up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 1 of 2

09/07/2021

geotechnics

BOREHOLE RECORD - Dynamic Sampler and Rotary

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole** / **Project No**	RC-BH104 / PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327644.3 E, 184173.4 N	**Ground Level**	10.86 m OD

Drilling | **Properties/Sampling** | **Strata** — Scale 1:50

Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	Type TCR/SCR%	Length Max/Min	RQD %	SPT N (FI)	Description General	Description Detail	Depth	Legend	Level m OD
					(17)	Interbedded very weak brownish red MUDSTONE and very weak grey SILTSTONE. Discontinuities are subvertical, very closely to closely spaced, undulating and smooth.		9.96		0.90
10.40-10.50		C			(15)			10.50		0.36
10.50-12.00 (92mm)	4.50 (4.53)	100 96	190 30	66	(10)					
10.50-10.68	4.50 (4.53)				C50/90	Extremely weak to very weak brownish red MUDSTONE. Discontinuities are subvertical to subhorizontal very closely to closely spaced, planar and rough.	Between 10.50m and 12.00m, some fracture surfaces are undulating. Between 10.55m and 10.80m, occasional clasts (<25mm) of very weak grey siltstone. Between 11.80m and 12.00m, occasional clasts (<25mm) of very weak grey siltstone. Below 11.90m, reddish dark brown discolouration on fracture surfaces. Between 12.35m and 12.60m, occasional clasts (<25mm) of very weak grey siltstone. Below 13.00m, very weak to weak in places.			
10.83-11.01		C			(NI)					
					(20)					
12.00-13.50 (92mm)	4.50 (2.43)	75 65	250 20	31	(AZCL)					
12.00-12.20	4.50 (4.53)				C50/ 105					
					(NI)					
					(8)					
13.07-13.17		C			(NI)					
					(22)					
13.50-15.00 (92mm)	4.50 (2.43)	90 77	220 30	40	(AZCL)					
13.50-13.58	4.50 (4.53)				C50/10					
13.65-13.73		C			(16)					
					(NI)					
					(10)					
					(NI)					
					(17)	End of Borehole		15.10		-4.24
15.00-15.10	4.50 (4.53)				C50/20					

Drilling

Depth	Hole Dia	Technique	Crew

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 2 of 2

09/07/2021

geotechnics

BOREHOLE RECORD - Dynamic Sampler and Rotary — Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole** / **Project No**	RC-BH105 / PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	328067.3 E, 184249.6 N	**Ground Level**	10.77 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N (FI)	Description	Depth	Legend	Level m OD
							G.L.		10.77
0.10- 0.40	B					Dark grey ASPHALT.	0.10		10.67
0.40- 2.20	B					MADE GROUND: Brown and grey slightly silty sandy gravel. Gravel is subangular to subrounded fine to coarse of sandstone, brick fragments and quartzite.	0.40		10.37
1.00	D					MADE GROUND: Very dense brown silty sandy gravel with a low subangular to subrounded cobble content of sandstone. Gravel is angular to subrounded fine of coarse of sandstone, brick fragments and quartzite. Between 1.20m and 3.20m, drilled using Rotary Open Hole techniques to pass obstruction.			
1.20- 1.65	D	1.20 (DRY)			S50				
1.80	D								
1.80	ES								
2.20- 3.20	B								
2.20- 2.62	D	1.20 (2.20)			S50/ 270				
2.80	D								
3.20- 3.65	D	3.20 (2.20)			S29	MADE GROUND: Medium dense silty slightly gravelly sand with some small pockets of partially degraded organic material. Gravel is subangular to subrounded fine to coarse of sandstone.	3.20		7.57
3.40	D								
3.40	ES						3.60		7.17
3.80	D								
4.10- 4.20	D					MADE GROUND: Medium dense brownish red clayey sandy gravel with a low subrounded cobble content of sandstone. Gravel is subangular to subrounded fine to coarse of sandstone.	4.10		6.67
4.20- 4.59	D	3.20 (DRY)			S50/ 235				
						Stiff brownish red mottled grey slightly sandy slightly gravelly CLAY. Gravel is angular fine to coarse of mudstone.	4.50		6.27

Core Run/Depth (Core Dia/Time)	Depth Cased	TCR/SCR / Type	Length Max/Min	RQD %	SPT (FI)	Continued by Rotary techniques General	Detail	Depth	Legend	Level m OD
4.50- 6.00 (92mm)	4.50 (DRY)	0 0	0 0	0	(NR)	** MUDSTONE. No recovery.				
6.00- 7.50 (92mm)	4.50 (DRY)	90 90	480 80	76	(AZCL)	Extremely weak to very weak brownish red MUDSTONE with occasional clasts (<85mm) of grey siltstone. Discontinuities are subhorizontal to subvertical very closely to widely spaced, undulating and smooth.	Between 6.00m and 10.50m, some discontinuities with rough fracture surfaces.	6.00		4.77
6.00- 6.40	4.50 (DRY)				C50/ 245					
6.63- 6.84		C			(6)					
7.50- 9.00 (92mm)	4.50 (DRY)	92 92	890 40	90	(AZCL)					
7.50- 7.83	4.50 (DRY)				C50/ 180					
8.06- 8.34		C			(4)					
8.83- 9.00		C								
9.00-10.50 (92mm)	4.50 (DRY)	88 85	370 40	78	(AZCL)					
9.00- 9.30	4.50 (DRY)				C50/ 150 (12)					
9.80-10.00		C			(NI) (6)					

Boring Progress

Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time
1.20	0.40	Inspection Pit	IJ	G.L.	-	DRY	03/06/21	08:00
3.20	0.12	Rotary Open Hole	IJ	4.20	4.50	DRY	03/06/21	18:00
4.50	0.10	Dynamic Sampler	IJ	4.20	4.50	DRY	04/06/21	08:00
10.50	0.12	Rotary Core	IJ	10.50	4.50	DRY	04/06/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
2.20	1.20	2.20	20	3.20	Groundwater Encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 2 x vial, 1 x plastic jar and 2 amber jar.
The Borehole was terminated at a depth of 10.50m under the instruction of the Engineer/Client.
** Driller's description.
Dynamic sample recovery: 3.20-4.20m,100%.
A 50mm standpipe was installed to 4.00m with a geowrapped slotted section from 1.00m to 4.00m with flush lockable protective cover. Backfill details from base of hole: bentonite up to 4.00m, fine gravel filter up to 1.00m, bentonite up to 0.20m, concrete up to ground

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 1 of 2

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geotechnics

BOREHOLE RECORD - Dynamic Sampler and Rotary

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole** / **Project No**	RC-BH105 / PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	328067.3 E, 184249.6 N	**Ground Level**	10.77 m OD

Scale 1:50

Core Run/Depth (Core Dia/Time)	Depth Cased & (to Water)	Type TCR/SCR%	Length Max/Min	RQD %	SPT N (Fl)	Description General	Description Detail	Depth	Legend	Level m OD
10.50-10.80	4.50 (DRY)				C50/ 145	End of Borehole		10.50		0.27

Drilling				Progress					Groundwater					
Depth	Hole Dia	Technique	Crew	Depth of Hole	Depth Cased	Depth to Water	Date	Time	Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater

Remarks AGS level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 2 of 2

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APPENDIX 5

Rotary Drillhole Photographs

PHOTOGRAPHS

Project Number : PN214233

Project : Newport Quinn

RC-BH102 2.2 - 4.8

RC-BH102 4.8 - 6.0

PHOTOGRAPHS

Project Number : PN214233

Project : Newport Quinn

RC-BH102 6.0 - 7.5

RC-BH102 7.5 - 9.0

PHOTOGRAPHS

Project Number : PN214233

Project : Newport Quinn

RC-BH102 10.5 - 12.0

RC-BH102 12.0 - 13.5

PHOTOGRAPHS

Project Number : PN214233

Project : Newport Quinn

RC-BH102 13.5 - 15.0

RC-BH103 1.2 - 3.2

PHOTOGRAPHS

Project Number : PN214233

Project : Newport Quinn

RC-BH103 3.8 - 5.5

RC-BH103 5.5 - 7.0

PHOTOGRAPHS

Project Number : PN214233

Project : Newport Quinn

RC-BH103 7.5 - 8.5

RC-BH104 2.2 - 3.9

PHOTOGRAPHS

Project Number : PN214233

Project : Newport Quinn

RC-BH104 4.5 - 7.5

RC-BH104 7.5 - 9.0

PHOTOGRAPHS

Project Number : PN214233

Project : Newport Quinn

RC-BH104 9.0 - 10.5

RC-BH104 10.5 - 12.0

PHOTOGRAPHS

Project Number : PN214233

Project : Newport Quinn

RC-BH104 12.0-13.5

RC-BH104 13.5 - 15.0

PHOTOGRAPHS

Project Number : PN214233

Project : Newport Quinn

RC-BH105 3.2 - 4.2

APPENDIX 6

Dynamic Probe Test Results

BOREHOLE RECORD - Dynamic Sampler

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	WS-BH101
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	328073.3 E 184133.3 N	**Ground Level**	10.68 m OD

Scale 1:50

Sampling Depth	Sample Type	Depth Cased & (to Water)	Properties Strength kPa	w %	SPT N	Strata Description	Depth	Legend	Level m OD
							G.L.		10.68
0.00- 0.20	B					MADE GROUND: Very soft dark brown slightly sandy silt with many rootlets. Gravel is subangular to rounded fine to coarse of sandstone and quartzite.	0.20		10.48
0.10	D								
0.10	ES								
0.10			PID=1.5						
0.20- 1.20	B					MADE GROUND: Reddish brown very sandy slightly silty subangular to subrounded fine to coarse gravel of sandstone. Medium subangular cobble content of sandstone.			
0.80	D								
0.80	ES								
0.80			PID=2.3						
1.20- 1.65	D	(DRY)			55	MADE GROUND: Very dense yellowish brown very sandy slightly silty subangular to subrounded fine to coarse gravel of sandstone. High subrounded cobble content of sandstone.	1.20		9.48
							1.65		9.03
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/EPS
1.65	0.05	Windowless Sampler	GM/EPS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			27/05/21	08:00
1.65			27/05/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x vial, 1 x plastic jar and 1 amber jar.
The Window Sample Borehole was terminated at 1.65m depth due to cobble obstruction.
Backfill details from base of hole: bentonite up to ground level.

Logged by EPS

Figure 1 of 1

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Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

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BOREHOLE RECORD - Dynamic Sampler

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	WS-BH102
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	328116.8 E 184058.9 N	**Ground Level**	10.47 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		10.47
0.00- 0.30	B					MADE GROUND: Very soft brown slightly sandy slightly gravelly clay with occasional rootlets. Gravel is subangular to subrounded fine to coarse of sandstone.			
0.10	D								
0.10	ES						0.30		10.17
0.10			PID=3.4						
0.30- 1.20	B					MADE GROUND: Light brown very sandy silty subangular to subrounded fine to coarse gravel of sandstone. Medium subangular cobble content of sandstone. Below 1.00m, high subangular cobble content.			
0.50	D								
0.50	ES								
0.50			PID=3.6						
1.00	D								
1.00	ES								
1.00			PID=2.16						
1.20- 2.00	B								
1.20- 1.65	D	(DRY)			S50				
2.00	D					Below 1.00m becomes very dense.			
2.00- 2.28	D	(DRY)			S50/ 185	At 2.28, obstruction encountered.	2.28		8.19
2.00	ES					End of Borehole			
2.00			PID=3.5						

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/EPS
2.28	0.10	Dynamic Sampler	GM

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.		DRY	24/05/21	08:00
2.28			24/05/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
The Dynamic Sample Borehole was terminated at 2.28m depth due to the presence of an obstruction.
ES sample = 2 x vial, 1 x plastic jar and 2 amber jar.
A 50mm standpipe was installed to 2.28m with a geowrapped slotted section from 1.00m to 2.28m with flush lockable protective cover. Backfill details from base of hole: fine gravel filter up to 1.00m, bentonite seal up to 0.10m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 1 of 1

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BOREHOLE RECORD - Dynamic Sampler

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	WS-BH103
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327941.8 E 184024.5 N	**Ground Level**	9.89 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		9.89
0.00- 0.15	B					MADE GROUND: Very soft dark brown slightly sandy slightly gravelly silt with many rootlets. Gravel is subangular to subrounded fine to coarse of sandstone, brick and pottery fragments.	0.15		9.74
0.10	D								
0.10	ES								
0.10			PID=4.1						
0.15- 1.05	B					MADE GROUND: Brown very gravelly silty fine to coarse sand with a medium subangular cobble content of concrete and sandstone. Gravel is angular to rounded fine to coarse of concrete, brick, pottery fragments, sandstone and quartzite.	1.05		8.84
0.50	D								
0.50	ES								
0.50			PID=4.3						
1.00	D								
1.00	ES								
1.00			PID=4.4						
1.20- 1.59	D	(DRY)			S50/ 240	MADE GROUND: Very dense yellowish brown mottled reddish brown very sandy slightly silty subangular fine to coarse gravel of sandstone. Low subangular cobble content of sandstone.	1.80		8.09
1.40	ES								
1.40			PID=1.8						
2.00- 2.45	D	(DRY)			S6	Soft brownish red slightly sandy CLAY with occasional pockets (up to 30mm) of grey slightly sandy silt. At 2.50m, firm.			
2.40	D								
2.40	ES								
2.40			PID=1.7						
2.90- 3.00	D								
3.00- 3.38	D	(DRY)			S50/ 230	At 3.38m, obstruction.	3.38		6.51
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/EPS
2.00	0.09	Dynamic Sampler	GM/EPS
3.38	0.08	Dynamic Sampler	GM/EPS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.		DRY	26/05/21	08:00
3.38			26/05/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
The Dynamic Sample Borehole was terminated at 3.38m depth due to the presence of an obstruction.
A 50mm standpipe was installed to 2.50m with a geowrapped slotted section from 1.00m to 2.50m with flush lockable protective cover. Backfill details from base of hole: fine gravel filter up to 1.00m, bentonite seal up to 0.10m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 1 of 1

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BOREHOLE RECORD - Dynamic Sampler

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	WS-BH104
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327872.2 E 183928.8 N	**Ground Level**	10.07 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		10.07
						MADE GROUND: Grey concrete			
0.25- 0.50	B						0.25		9.82
0.25	D					MADE GROUND: Dark brown mottled black very sandy slightly silty subangular to rounded fine to coarse gravel of slag, limestone and sandstone. Medium subangular cobble content of slag.			
0.25	ES								
0.25			PID=1.6						
0.50- 0.90	B								
0.50	D						0.90	▽	9.17
0.50	ES					MADE GROUND: Light brown sandy slightly silty subangular to rounded fine to coarse gravel of sandstone. Low subrounded cobble content of sandstone.			
0.50			PID=1.4						
0.90- 1.20	B								
1.00	D						1.40		8.67
1.00	ES								
1.00			PID=1.3			Firm reddish brown mottled brown slightly sandy slightly gravelly CLAY with a low rounded cobble content of sandstone. Gravel is subrounded to rounded fine to coarse of sandstone.			
1.20- 1.65	D	(YES)			S13				
1.20- 1.40	D								
1.40- 2.00	B								
2.00	D								
2.00- 2.25	D	(YES)			S50/95	At 2.25m, obstruction.	2.25		7.82
2.00	ES								
2.00			PID=1.5			End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
0.25	0.35	Concrete Core	GM/EPS
1.20	0.40	Inspection Pit	GM/EPS
2.25	0.09	Dynamic Sampler	GM/EPS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			25/05/21	11:00
2.25	2.00		25/05/21	13:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.90					Seepage, no rise.

Remarks

AGS

Inspection pit hand excavated to 1.20m depth and no services were found.
The Dynamic Sample Borehole was terminated at 2.25m depth due to the presence of an obstruction.
A 50mm standpipe was installed to 2.00m with a geowrapped slotted section from 0.50m to 2.00m with flush lockable protective cover. Backfill details from base of hole: fine gravel filter up to 0.50m, bentonite seal up to 0.10m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

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Figure 1 of 1

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BOREHOLE RECORD - Dynamic Sampler

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	WS-BH105
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327743.5 E 183907.3 N	**Ground Level**	10.05 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		10.05
						MADE GROUND: Grey concrete			
0.20- 0.70	B						0.20		9.85
0.20	D					MADE GROUND: Dark brown mottled grey and black very gravelly slightly silty fine to coarse sand with a low subangular cobble content of slag and sandstone. Gravel is subangular to subrounded fine to coarse of slag, brick, concrete and sandstone.			
0.20	ES								
0.20			PID=3.4						
0.50	D								
0.50	ES								
0.50			PID=5.8						
0.70- 1.05	B						1.05		9.00
1.10	D					Stiff reddish brown slightly sandy slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse of sandstone			
1.10	ES								
1.10			PID=3.3						
1.20- 1.65	D	(YES)			S17	At 1.30m, becomes orangish brown mottled brown.			
1.60	D								
1.60	ES						1.90		8.15
1.60			PID=2.9			Stiff reddish brown slightly sandy slightly gravelly CLAY with occasional pockets (up to 40mm) of coarse grey sand. Gravel is subangular to subrounded fine to coarse of sandstone.			
2.00- 2.45	D	(YES)			S19				
2.30	D								
2.30	ES								
2.30			PID=2.4						
2.70- 3.10	D						2.70		7.35
3.00- 3.45	D	(YES)			S13	Firm light grey slightly sandy SILT with occasional pockets (up to 30mm) of grey fine to coarse sand. Frequent pockets (up to 2mm) of decomposed organic material.			
3.10- 3.50	D						3.10		6.95
3.50- 3.90	D					Stiff brownish red slightly sandy CLAY with occasional pockets (up to 20mm) of grey fine to coarse sand.			
							3.90		6.15
3.90- 4.00	D					Extremely weak brownish red MUDSTONE. Recovered as slightly silty gravel.			
4.00- 4.44	D	(YES)			S50/ 285				
							4.44		5.61
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
0.20	0.35	Concrete Core	GM/EPS
1.20	0.40	Inspection Pit	GM/EPS
2.00	0.10	Dynamic Sampler	GM/EPS
3.00	0.09	Dynamic Sampler	GM/EPS
4.44	0.07	Dynamic Sampler	GM/EPS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			26/05/21	08:00
4.44	1.00	0.90	26/05/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
0.90		0.55	20		Slow inflow.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 2 x vial, 1 x plastic jar and 2 amber jar.
The Dynamic Sample Borehole was terminated at 4.44m depth upon encountering bedrock
A 50mm standpipe was installed to 1.00m with a geowrapped slotted section from 0.50m to 1.00m with flush lockable protective cover. Backfill details from base of hole: bentonite seal up to 1.00m, fine gravel filter up to 0.50m, bentonite seal up to 0.10m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

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Figure 1 of 1

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BOREHOLE RECORD - Dynamic Sampler

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	WS-BH106
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327676.1 E 183991.7 N	**Ground Level**	10.40 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		10.40
						MADE GROUND: Black tarmacadam.			
0.18- 0.70	B						0.18		10.22
0.20	D					MADE GROUND: Orangish brown very gravelly slightly silty fine to coarse sand with a low subangular cobble content of sandstone. Gravel is subangular to subrounded fine to coarse of sandstone.			
0.20	ES								
0.20			PID=2.9						
0.50	D						0.70		9.70
0.50	ES								
0.50			PID=2.4			MADE GROUND: Brown very sandy slightly silty subangular to subrounded fine to coarse gravel of sandstone. Medium subangular to subrounded cobble content of sandstone.			
0.70- 1.60	B								
1.00	D								
1.00	ES								
1.00			PID=1.1			At 1.20m, cobble obstruction.			
1.20- 1.58	D	(DRY)			S50/ 230		1.60		8.80
1.60- 3.40	B					Stiff brownish red slightly sandy slightly gravelly CLAY with occasional pockets (up to 35mm) of yellowish brown mottled light grey fine to medium sand. Gravel is subangular fine to coarse of sandstone.			
2.00	D								
2.00- 2.45	D	(DRY)			S19				
2.00	ES								
2.00			PID=1.4						
3.00- 3.45	D	(DRY)			S11	Below 3.00m, firm.			
							3.40		7.00
3.40- 3.80	D					Soft light grey mottled reddish brown slightly sandy SILT with occasional pockets (up to 2mm) of decomposed organic material.			
3.80- 4.00	D						3.80		6.60
4.00- 4.31	D	(DRY)			S50/ 160	Extremely weak to very weak reddish brown MUDSTONE. Recovered as sandy slightly silty gravel.			
							4.31		6.09
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
0.18	0.35	Concrete Core	GM/EPS
1.20	0.40	Inspection Pit	GM/EPS
4.31	0.07	Dynamic Sampler	GM/EPS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			26/05/21	08:00
4.31		DRY	26/05/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 2 x vial, 1 x plastic jar and 2 amber jar.
The Dynamic Sample Borehole was terminated at 4.31m depth upon encountering bedrock.
A 50mm standpipe was installed to 1.50m with a geowrapped slotted section from 0.50m to 1.50m with flush lockable protective cover. Backfill details from base of hole: bentonite seal up to 1.50m, fine gravel filter up to 0.50m, bentonite seal up to 0.10m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 1 of 1

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BOREHOLE RECORD - Dynamic Sampler

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	WS-BH107
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327651.5 E 184120.4 N	**Ground Level**	11.00 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		11.00
0.10- 0.35	B					MADE GROUND: Black tarmacadam.	0.10		10.90
0.10	D								
0.10	ES					MADE GROUND: Orangish brown very gravelly slightly silty fine to coarse sand with a low subangular cobble content of sandstone. Gravel is subangular to subrounded fine to coarse of sandstone.	0.35		10.65
0.10	ES								
0.10			PID=						
0.35- 1.00	B								
0.50	D								
0.50	ES					MADE GROUND: Brown very sandy slightly silty subangular to subrounded fine to coarse gravel of sandstone. Medium subrounded cobble content of sandstone.	1.20		9.80
0.50			PID=						
1.00- 1.20	B								
1.00	D								
1.00	ES								
1.20 1.60			TR=	100%		MADE GROUND: Very dense yellowish brown and dark reddish brown very sandy silty subangular fine to coarse gravel of sandstone. At 1.20m, cobble obstruction. At 1.62m, cobble obstruction.	1.62		9.38
1.20- 1.60	B								
1.20- 1.44	D	(DRY)			50/85				
1.60	D								
1.60- 1.62		(DRY)			50*/ 20				
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.40	Inspection Pit	GM/EPS
1.62	0.10	Dynamic Sampler	GM/EPS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			26/05/21	08:00
1.62			26/05/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

AGS

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x vial, 1 x plastic jar and 1 amber jar.
The Dynamic Sample Borehole was terminated at 1.62m depth upon encountering an obstruction.
Backfill details from base of hole: bentonite seal up to 0.35m, tarmacadam up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Figure 1 of 1

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BOREHOLE RECORD - Dynamic Sampler

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	WS-BH108
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	328245.5 E 184180.5 N	**Ground Level**	13.31 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		13.31
0.00- 0.30	B					MADE GROUND: Very soft slightly sandy slightly gravelly clay with many rootlets. Gravel is subangular to subrounded fine to coarse of sandstone.	0.20		13.11
0.10	D								
0.10	ES								
0.10			PID=4.0						
0.20- 0.80	B					MADE GROUND: Reddish brown sandy to very sandy silty subangular fine to coarse gravel of sandstone. Medium subangular to cobble content of sandstone. Below 0.90m, high angular cobble content of sandstone. At 1.00m, sandstone boulder.			
0.30	D								
0.30	ES								
0.50			PID=1.56						
0.80- 1.20	B								
1.00	D								
1.00	ES								
1.00			PID=4.22						
1.20- 1.60	D	(DRY)			54/ 250		1.60		11.71
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
1.20	0.35	Inspection Pit	GM/EPS
1.20	0.05	Dynamic Sampler	GM/EPS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.		DRY	25/05/21	08:00
1.60			25/05/21	10:45

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x vial, 1 x plastic jar and 1 amber jar.
The Dynamic Sample Borehole was terminated at 1.60m depth upon encountering an obstruction.
Backfill details from base of hole: bentonite seal up to ground level.

Logged by EPS

Figure 1 of 1

09/07/2021

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

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BOREHOLE RECORD - Dynamic Sampler

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	WS-BH110
				Project No	PN214233
				Client Ref.	EPS
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327807.0 E 183961.4 N	**Ground Level**	10.95 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
							G.L.		10.95
0.00			TR=	%		MADE GROUND: Grey reinforced concrete.			
							0.40		10.55
0.40- 0.80	B					MADE GROUND: Brown and black very sandy slightly silty angular to subrounded fine to coarse gravel of sandstone. Medium subangular cobble content of slag.			
0.50	B								
0.50	ES								
0.50			PID=	1.5					
0.80- 1.20	B								
1.00	B								
1.00	ES								
1.00			PID=	1.3			1.40		9.55
1.20- 1.40	D					MADE GROUND: Stiff brown mottled grey slightly sandy slightly gravelly clay. Gravel is subrounded to rounded fine to coarse of sandstone.			
1.20 2.00			TR=	100%					
1.20- 1.65	D	(DRY)			S21				
1.40- 2.10	B					Below 2.10m, becomes very stiff and reddish brown.			
2.00	D								
2.00 2.45			TR=	100%					
2.00- 2.45	D	(DRY)			S30				
2.00	ES						2.40		8.55
2.00			PID=	1.4		MADE GROUND: Yellowish brown very sandy slightly clayey subangular fine to coarse gravel of sandstone. Low cobble content. At 2.50m, cobble obstruction. At 2.70m, pocket (up to 30mm) of light grey silty sand with a strong organic odour. Below 3.00m, loose.			
2.10- 2.40	D								
2.40- 3.00	D								
2.45 3.00			TR=	100%					
2.50- 2.95	D	(DRY)			50/ 295				
3.00- 3.45	D	(DRY)			S5				
2.70			PID=	1.7					
3.00 4.00			TR=	50%					
							3.60		7.35
3.80	D					Soft becoming firm reddish brown slightly sandy slightly gravelly CLAY with a low angular cobble content of sandstone. Gravel is angular to subangular fine to coarse of sandstone.			
3.80	ES								
3.80			PID=	1.4					
4.00- 4.45	D	(DRY)			S13				
						End of Borehole	4.45		6.50

Boring

Depth	Hole Dia	Technique	Crew
0.40	0.35	Concrete Core	PO/SW
1.20	0.35	Inspection Pit	GM/EPS
4.45	0.35	Windowless Sampler	GM/EPS

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
G.L.			25/05/21	08:00
4.45			25/05/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

AGS

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x vial, 1 x plastic jar and 1 amber jar.
A 50mm standpipe was installed to 4.00m with a geowrapped slotted section from 2.00m to 4.00m with flush lockable protective cover. Backfill details from base of hole: fine gravel filter up to 2.00m, bentonite up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 1 of 1

09/07/2021

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BOREHOLE RECORD - Cable Percussion

Preliminary

Project	NEWPORT QUINN SDD RFP	**Engineer**	PINNACLE CONSULTING ENGINEERS LIMITED	**Borehole**	WS-BH111
				Project No	PN214233
Client	PINNACLE CONSULTING ENGINEERS LIMITED	**National Grid Coordinates**	327709.5 E 183945.3 N	**Ground Level**	10.92 m OD

Scale 1:50

Depth	Sample Type	Depth Cased & (to Water)	Strength kPa	w %	SPT N	Description	Depth	Legend	Level m OD
						MADE GROUND: Grey reinforced concrete.	G.L.		10.92
							0.40		10.52
0.40	ES					MADE GROUND: Brown very sandy silty angular to subrounded fine to coarse gravel of slag and sandstone. Low to medium subangular cobble content. At 0.40m, black plastic membrane.			
0.40			PID=1.9						
0.50- 1.00	B								
1.00	ES					Below 1.00m, slag is absent.			
1.00			PID=2.0			At 1.20m, cobble obstruction.			
1.20- 1.70	B								
1.20- 1.50		(DRY)			C50/ 150				
1.80	D								
2.00- 2.50	B						2.00		8.92
2.00- 2.27		(DRY)			C50/ 150	MADE GROUND: Very dense reddish brown very sandy slightly silty subrounded fine to coarse gravel of sandstone. Medium subangular to subrounded cobble content of sandstone. Occasional pockets (up to 10mm) of fine to coarse sand.			
2.80	D								
3.00- 3.30	B						3.00		7.92
3.00- 3.45	D	(DRY)			S50	Extremely weak reddish brown MUDSTONE			
							3.45		7.47
						End of Borehole			

Boring

Depth	Hole Dia	Technique	Crew
0.40	0.35	Concrete Core	PO/SW
1.20	0.35	Inspection Pit	PO/SW
3.45	0.20	Cable Percussion	PO/SW

Progress

Depth of Hole	Depth Cased	Depth to Water	Date	Time
3.45	3.00	DRY	27/05/21	08:00
0.00			27/05/21	18:00

Groundwater

Depth Struck	Depth Cased	Rose to	in Mins	Depth Sealed	Remarks on Groundwater
					None encountered.

Remarks

Inspection pit hand excavated to 1.20m depth and no services were found.
ES sample = 1 x vial, 1 x plastic jar and 1 amber jar.
The Borehole was terminated at 3.45m depth upon encountering bedrock.
A 50mm standpipe was installed to 3.00m with a geowrapped slotted section from 2.00m to 3.00m with flush lockable protective cover. Backfill details from base of hole: fine gravel filter up to 2.00m, bentonite seal up to 0.20m, concrete up to ground level.

Symbols and abbreviations are explained on the accompanying key sheet.

All dimensions are in metres.

Logged in accordance with BS5930:2015 + A1:2020

Logged by EPS

Figure 1 of 1

09/07/2021

geotechnics

APPENDIX 7

Exploratory Hole Location Plan

Key

- Locations By Type - Empty
- Locations By Type - CP
- Locations By Type - DS
- Locations By Type - DS+RC

GEOTECHNICS
geotechnical and geoenvironmental specialists

Unit 1B Borders Industrial Park
River Lane
Saltney
Chester CH4 8RJ

Phone: 01244 671117
Email: mail@geotechnics.co.uk
www.geotechnics.co.uk

Engineer:
Pinnacle Consulting Engineers Limited

Client:
Pinnacle Consulting Engineers Limited

Project:
NEWPORT QUINN SDD RFP

Drawing Title:
Exploratory Hole Location Plan

Scale:	Date:
1:3500 at A3	**20/07/2021**
Project No.: **PN214233**	**Exploratory Hole Location Plan**

APPENDIX 8

Monitoring Results

FIELDWORK - Insitu Gas Monitoring - Daily Record

Project NEWPORT QUINN SDD RFP

Project No PN214233

Date 17/06/2021

Client Pinnacle Consulting Engineers Limited

Sheet No. 1 (1 of 3)

Equipment Used

GI Infra Red Gas Analyser — MK1 [ ] MK2 [ ] GA2000 [ ]

Other Gas Data GFM435;

Weather / Site Conditions

Wind	Still [ ]	Light [x]	Moderate [ ]	Strong [ ]
Cloud Cover	None [ ]	Slight [ ]	Cloudy [x]	Overcast [ ]
Precipitation	Dry [x]	Slight [ ]	Moderate [ ]	Heavy [ ]

Borehole	Depth to Base (m)	Depth to Water (m bgl)	Current Hole Depth (m bgl)	Methane (Peak) CH4 (% VOL)	Methane (Steady) CH4 (% VOL)	Carbon Dioxide (Peak) (% VOL)	Carbon Dioxide (Steady) (% VOL)	Oxygen O2 (% VOL)	Remarks
CP-BH101	5.50	2.00	4.87	0.0	0.0	0.6	0.6	19.7	
CP-BH102	8.00	3.00	8.17	1.4	1.2	0.0	0.0	19.6	
CP-BH103	3.00	1.33	3.04	0.0	0.0	1.0	0.9	18.3	
RC-BH101	3.00	2.54	2.85	0.0	0.0	0.0	0.0	15.5	
RC-BH102	12.00	2.61	11.86	0.0	0.0	0.3	0.0	19.9	
RC-BH103	8.30	2.21	8.24	0.0	0.0	0.2	0.0	12.2	
RC-BH104	15.00	2.50	14.80	0.0	0.0	0.5	0.5	14.5	
RC-BH105	4.00	2.29	4.00	0.0	0.0	0.1	0.0	19.8	
WS-BH102	2.28	Dry	1.85	0.0	0.0	1.8	1.8	19.2	
WS-BH103	2.50	2.13	2.50	0.0	0.0	0.0	0.0	20.0	
WS-BH104	2.00	1.88	1.91	0.0	0.0	0.0	0.0	20.0	
WS-BH105	1.00	0.71	0.96	0.0	0.0	0.0	0.0	18.3	
WS-BH106	1.50	1.46	1.53	0.0	0.0	1.1	1.0	18.6	
WS-BH109	2.50	1.13	2.54	0.0	0.0	0.0	0.0	19.7	
WS-BH110	4.00	2.84	4.00	0.0	0.0	0.2	0.2	18.0	
WS-BH111	3.00	3.00	3.14	0.0	0.0	0.0	0.0	17.6	

Remarks

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FIELDWORK - Insitu Gas Monitoring - Daily Record

Project NEWPORT QUINN SDD RFP

Project No PN214233

Date 17/06/2021

Client Pinnacle Consulting Engineers Limited

Sheet No. 1 (2 of 3)

Equipment Used

GI Infra Red Gas Analyser — MK1 [ ] MK2 [ ] GA2000 [ ]

Other Gas Data GFM435;

Weather / Site Conditions

Wind	Still [ ]	Light [x]	Moderate [ ]	Strong [ ]
Cloud Cover	None [ ]	Slight [ ]	Cloudy [x]	Overcast [ ]
Precipitation	Dry [x]	Slight [ ]	Moderate [ ]	Heavy [ ]

Borehole	Depth to Base (m)	Oxygen (Steady) (% VOL)	Hydrogen Sulphide H2S (ppm)	Carbon Monoxide CO (ppm)	Barometric Pressure (mbar)	Diff. Pressure (Pa)	Flow Rate (Peak) (l/hr)	Flow Rate (Steady) (l/hr)	Remarks
CP-BH101	5.50	19.7	0	1	1006	0	0.0	0.0	
CP-BH102	8.00	19.8	0	6	1007	0	0.0	0.0	
CP-BH103	3.00	18.5	0	11	1006	0	0.0	0.0	
RC-BH101	3.00	15.5	25	136	1006	0	0.0	0.0	
RC-BH102	12.00	20.3	0	1	1006	0	0.0	0.0	
RC-BH103	8.30	12.2	0	0	1006	0	0.0	0.0	
RC-BH104	15.00	14.5	0	77	1007	0	119.8	0.0	
RC-BH105	4.00	20.4	0	1	1008	0	0.0	0.0	
WS-BH102	2.28	19.2	0	18	1006	0	0.0	0.0	
WS-BH103	2.50	20.3	0	0	1006	0	0.0	0.0	
WS-BH104	2.00	20.6	0	0	1007	0	0.0	0.0	
WS-BH105	1.00	20.4	0	0	1007	0	0.0	0.0	
WS-BH106	1.50	18.8	0	3	1007	0	0.0	0.0	
WS-BH109	2.50	20.2	0	1	1006	0	0.0	0.0	
WS-BH110	4.00	18.2	0	1	1006	0	0.0	0.0	
WS-BH111	3.00	17.6	0	3	1006	0	0.0	0.0	

Remarks

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FIELDWORK - Insitu Gas Monitoring - Daily Record

Project NEWPORT QUINN SDD RFP

Project No PN214233

Date 17/06/2021

Client Pinnacle Consulting Engineers Limited

Sheet No. 1 (3 of 3)

Equipment Used

GI Infra Red Gas Analyser MK1 [ ] MK2 [ ] GA2000 [ ]

Other Gas Data GFM435;

Weather / Site Conditions

Wind	**Still**	[ ]	**Light**	[x]	**Moderate**	[ ]	**Strong** [ ]
Cloud Cover	**None**	[ ]	**Slight**	[ ]	**Cloudy**	[x]	**Overcast** [ ]
Precipitation	**Dry**	[x]	**Slight**	[ ]	**Moderate**	[ ]	**Heavy** [ ]

Borehole	Depth to Base (m)	PID Reading (ppm)	Remarks
CP-BH101	5.50	1.0	
CP-BH102	8.00	1.6	
CP-BH103	3.00	1.0	
RC-BH101	3.00	1.0	
RC-BH102	12.00	1.0	
RC-BH103	8.30	1.0	
RC-BH104	15.00	1.0	
RC-BH105	4.00	1.0	
WS-BH102	2.28	1.0	
WS-BH103	2.50	1.0	
WS-BH104	2.00	1.0	
WS-BH105	1.00	1.0	
WS-BH106	1.50	1.0	
WS-BH109	2.50	1.0	
WS-BH110	4.00	1.0	
WS-BH111	3.00	1.0	

Remarks

geotechnics

APPENDIX 9

Laboratory Test Results - Geotechnical

Certificate of Analysis

Certificate Number	21-13747	*Issued:*	05-Jul-21

Client Geotechnics LTD
The Geotechnical Centre
Unit 1B Borders Ind. Park
River Lane
Saltney
Chester
CH4 8RJ

Our Reference	21-13747
Client Reference	PN214233
Order No	ON29740
Contract Title	Newport
Description	One Soil sample.
Date Received	01-Jun-21
Date Started	30-Jun-21
Date Completed	05-Jul-21
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 21-13747
Client Ref PN214233
Contract Title Newport

Lab No	1869237
.Sample ID	WS-BH103
Depth	2.40
Other ID	
Sample Type	ES
Sampling Date	26/05/2021
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	18
Inorganics				
pH	DETSC 2008#		pH	7.7
Chloride Aqueous Extract	DETSC 2055	1	mg/l	5.9
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	36
Sulphur as S, Total	DETSC 2320	0.01	%	< 0.01
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.03

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 21-13747
Client Ref PN214233
Contract Newport

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1869237	WS-BH103 2.40 SOIL	26/05/21	PT 1L (1kg)		

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Certificate of Analysis

Certificate Number	21-13748	*Issued:*	06-Jul-21

Client Geotechnics LTD
The Geotechnical Centre
Unit 1B Borders Ind. Park
River Lane
Saltney
Chester
CH4 8RJ

Our Reference	21-13748
Client Reference	PN214233
Order No	ON28458
Contract Title	Newport
Description	3 Soil samples.
Date Received	28-May-21
Date Started	30-Jun-21
Date Completed	06-Jul-21
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 21-13748
Client Ref PN214233
Contract Title Newport

	Lab No	1869238	1869239	1869240
	.Sample ID	WS-BH102	WS-BH108	CP-BH102
	Depth	0.50	1.00	2.20
	Other ID			
	Sample Type	ES	ES	ES
	Sampling Date	24/05/2021	25/05/2021	24/05/2021
	Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**	
Metals				
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	10	< 10	23
Inorganics				
pH	DETSC 2008#		pH			9.4
Chloride Aqueous Extract	DETSC 2055	1	mg/l	< 1.0	14	180
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	< 1.0	2.1	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	300	83	92
Sulphur as S, Total	DETSC 2320	0.01	%	0.03	0.10	0.02
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.07	0.24	0.06

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 21-13748
Client Ref PN214233
Contract Newport

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1869238	WS-BH102 0.50 SOIL	24/05/21	PT 1L (1kg)	Ammonia Aqueous Extract (3 days)	
1869239	WS-BH108 1.00 SOIL	25/05/21	PT 1L (1kg)		
1869240	CP-BH102 2.20 SOIL	24/05/21	PT 1L (1kg)	Ammonia Aqueous Extract (3 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Certificate of Analysis

Certificate Number	21-13750	*Issued:*	06-Jul-21

Client Geotechnics LTD
The Geotechnical Centre
Unit 1B Borders Ind. Park
River Lane
Saltney
Chester
CH4 8RJ

Our Reference	21-13750
Client Reference	PN214233
Order No	ON29764
Contract Title	Newport
Description	3 Soil samples.
Date Received	04-Jun-21
Date Started	30-Jun-21
Date Completed	06-Jul-21
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 21-13750
Client Ref PN214233
Contract Title Newport

			Lab No	1869243	1869244	1869245
			.Sample ID	CP-BH101	WS-BH109	RC-BH104
			Depth	4.20	6.00	3.00
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	27/05/2021	27/05/2021	01/06/2021
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Metals						
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10	< 10	< 10
Inorganics						
pH	DETSC 2008#		pH	7.4	11.5	10.4
Chloride Aqueous Extract	DETSC 2055	1	mg/l	4.8	42	1200
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	< 1.0	8.7	< 1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	33	38	550
Sulphur as S, Total	DETSC 2320	0.01	%	0.02	0.12	0.18
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.04	0.32	0.55

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 21-13750
Client Ref PN214233
Contract Newport

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1869243	CP-BH101 4.20 SOIL	27/05/21	PT 1L (1kg)	Ammonia Aqueous Extract (3 days), Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
1869244	WS-BH109 6.00 SOIL	27/05/21	PT 1L (1kg)	Ammonia Aqueous Extract (3 days), Total Sulphur ICP (7 days), pH + Conductivity (7 days)	
1869245	RC-BH104 3.00 SOIL	01/06/21	PT 1L (1kg)		

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Laboratory Test Certificate

Form REP008 Rev 3

Issued To	Geotechnics Ltd The Geotechnical Centre Unit 1B, Borders Industrial Estate River Lane, Saltney Chester CH4 8RJ	**Date of issue**	30/06/2021
		Issue No.	1
		Client Ref. No.	N/A
		Samples / Material Source	
		Samples Recv'd	22/06/2021
Testing Start Date	25/06/2021	Sample State	As received
Testing Complete	28/06/2021	Sampled by	Geotechnics Limited
Comments			
Project No	PN214233		
Project Name	NEWPORT QUINN SDD RFP		

Summary of Tests

Standard	Test Description	Test Quantity	UKAS
ISRM Suggested Method (1985)	Point Load Strength of Rock (up to 1 Determination)	4	Yes
ISRM Suggested Method (1985)	Point Load Strength of Rock (up to 3 Determination)	13	Yes
ISRM Suggested Method (1985)	Point Load Strength of Rock (up to 10 Determination)	2	Yes

Note: Any descriptions, opinions or interpretations are outside the scope of UKAS accreditation.
The results within this report relate only to the samples tested and received from the client.

UKAS TESTING 1365

Test Results checked and approved for issue.
Signed for and on behalf of Geotechnics Limited

Will Elson (Laboratory Systems Manager)

GEOTECHNICS
geotechnical and geoenvironmental specialists

203 Torrington Avenue, Tile Hill,
Coventry, CV4 9UT

LABORATORY RESULTS - Point Load Strength Determination

Project NEWPORT QUINN SDD RFP **Project No:** PN214233

Sample					w	W	D	Fail Load	Test Type/ Direction	De	De^2	Is	F	Is_{50}
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	%	mm	mm	kN		mm	mm^2	MN/m^2		MN/m^2
RC-BH101	6.76-6.89 (6.76-6.89)	C	N83558	Extremely weak brownish red MUDSTONE.		86 86 86	86 59 58	0.21 0.16 0.12	D/PL A/PD A/PD	86.00 80.38 79.69	7396 6460 6351	0.028 0.024 0.018	1.276 1.238 1.233	0.036 0.030 0.022
RC-BH102	6.64-6.84 (6.64-6.84)	C	N83559	Extremely weak brownish red MUDSTONE.		86	81	0.17	A/PD	94.18	8869	0.020	1.330	0.026
RC-BH102	8.80-8.90 (8.80-8.90)	C	N83560	Weak grey SILTSTONE.		86 86	87 79	5.06 2.30	D/PL A/PD	87.00 93.01	7569 8650	0.668 0.266	1.283 1.322	0.857 0.352
RC-BH102	10.39-10.50 (10.39-10.50)	C	N83561	Weak grey SILTSTONE.		86 86 86	86 60 44	1.34 1.66 1.18	D/PL A/PD A/PD	86.00 81.06 69.41	7396 6570 4818	0.181 0.252 0.246	1.276 1.243 1.159	0.232 0.313 0.285
RC-BH102	11.31-11.41 (11.31-11.41)	C	N83562	Extremely weak brownish red MUDSTONE.		86 87 87	87 59 45	0.12 0.15 0.93	D/PL A/PD A/PD	87.00 80.84 70.60	7569 6536 4985	0.015 0.022 0.187	1.283 1.241 1.168	0.020 0.028 0.218
RC-BH102	13.34-13.50 (13.34-13.50)	C	N83564	Very weak brownish red MUDSTONE.		87 87 87	87 81 41	0.91 0.61 0.83	D/PL A/PD A/PD	87.00 94.72 67.39	7569 8973 4542	0.120 0.068 0.183	1.283 1.333 1.144	0.154 0.091 0.210
RC-BH102	14.32-14.49 (14.32-14.49)	C	N83580	Very weak brownish red MUDSTONE.		86	82	0.56	A/PD	94.76	8979	0.063	1.333	0.084
RC-BH103	5.40-5.50 (5.40-5.50)	C	N83566	Extremely weak brownish red MUDSTONE.		85 85 85	85 52 49	0.08 0.07 0.08	D/PL A/PD A/PD	85.00 75.02 72.82	7225 5628 5303	0.011 0.012 0.016	1.270 1.200 1.184	0.014 0.015 0.019
RC-BH103	7.17-7.31 (7.17-7.31)	C	N83567	Very weak to weak brownish red MUDSTONE.		86 87 87	87 72 69	1.68 3.44 2.20	D/PL A/PD A/PD	87.00 89.31 87.43	7569 7976 7643	0.222 0.431 0.288	1.283 1.298 1.286	0.284 0.559 0.370
RC-BH103	8.00-8.19 (8.00-8.19)	C	N83568	Extremely weak to very weak brownish red MUDSTONE.		86 86 86 86	86 86 69 62	0.18 0.30 0.30 0.31	D/PL D/PL A/PD A/PD	86.00 86.00 86.92 82.39	7396 7396 7555 6789	0.025 0.041 0.040 0.046	1.276 1.276 1.283 1.252	0.032 0.052 0.051 0.057
RC-BH104	5.74-5.90 (5.74-5.90)	C	N83569	Extremely weak brownish red MUDSTONE.		86 86 86	86 59 51	0.06 0.07 0.08	D/PL A/PD A/PD	86.00 80.38 74.73	7396 6460 5584	0.009 0.011 0.015	1.276 1.238 1.198	0.011 0.013 0.017

Remarks AGS

Test Type D - Diametral, A - Axial, I - Lump or Irregular Test
Direction PL - parallel to planes of weakness, R - Random or unknown orientation, PD - perpendicular to planes of weakness
Fail Load UF - unacceptable failure
For Standards followed see Laboratory Test Certificate

GEOTECHNICS
geotechnical and geoenvironmental specialists

LABORATORY RESULTS - Point Load Strength Determination

Project NEWPORT QUINN SDD RFP **Project No:** PN214233

Sample					w	W	D	Fail Load	Test Type/ Direction	De	De^2	Is	F	Is_{50}
Hole	Depth (Specimen Depth) m	Type	Sample Ref	Description	%	mm	mm	kN		mm	mm^2	MN/m^2		MN/m^2
RC-BH104	6.69-6.79 (6.69-6.79)	C	N83570	Extremely weak brownish red MUDSTONE.		86	69	0.08	A/PD	86.92	7555	0.011	1.283	0.014
RC-BH104	10.40-10.50 (10.40-10.50)	C	N83572	Weak grey SILTSTONE.		86	72	3.44	A/PD	88.79	7884	0.436	1.295	0.565
RC-BH104	10.83-11.01 (10.83-11.01)	C	N83573	Very weak brownish red MUDSTONE.		87	87	0.53	D/PL	87.00	7569	0.070	1.283	0.090
						87	87	1.01	D/PL	87.00	7569	0.133	1.283	0.171
						87	69	1.57	A/PD	87.43	7643	0.205	1.286	0.264
						87	71	1.73	A/PD	88.68	7865	0.220	1.294	0.284
RC-BH104	13.07-13.17 (13.07-13.17)	C	N83574	Weak brownish red MUDSTONE.		87	87	2.78	D/PL	87.00	7569	0.367	1.283	0.471
						87	49	4.56	A/PD	73.67	5428	0.840	1.191	1.000
						87	28	1.78	A/PD	55.69	3102	0.575	1.050	0.604
RC-BH104	13.65-13.73 (13.65-13.73)	C	N83575	Weak brownish red MUDSTONE.		87	87	3.80	D/PL	87.00	7569	0.502	1.283	0.644
						87	52	3.99	A/PD	75.90	5760	0.692	1.207	0.835
						85	48	5.60	A/PD	72.08	5195	1.077	1.179	1.270
RC-BH105	6.63-6.84 (6.63-6.84)	C	N83576	Extremely weak brownish red MUDSTONE.		85	86	0.25	D/PL	86.00	7396	0.033	1.276	0.042
						86	81	0.20	A/PD	94.18	8869	0.023	1.330	0.031
						86	78	0.21	A/PD	92.42	8541	0.024	1.318	0.032
RC-BH105	8.83-9.00 (8.83-9.00)	C	N83578	Very weak brownish red MUDSTONE.		86	86	0.40	D/PL	86.00	7396	0.054	1.276	0.069
						86	67	0.40	A/PD	85.65	7336	0.054	1.274	0.069
						86	82	0.37	A/PD	94.76	8979	0.041	1.333	0.055
RC-BH105	9.80-10.00 (9.80-10.00)	C	N83579	Extremely weak brownish red MUDSTONE.		87	88	0.20	D/PL	88.00	7744	0.026	1.290	0.033
						88	79	0.17	A/PD	94.08	8852	0.019	1.329	0.025
						88	59	0.10	A/PD	81.31	6611	0.015	1.245	0.019

Remarks AGS

Test Type D - Diametral, A - Axial, I - Lump or Irregular Test
Direction PL - parallel to planes of weakness, R - Random or unknown orientation, PD - perpendicular to planes of weakness
Fail Load UF - unacceptable failure
For Standards followed see Laboratory Test Certificate

GEOTECHNICS
geotechnical and geoenvironmental specialists

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24776		

Site Ref / Hole ID:	CP BH0101	**Depth (m):**	1.20 - 1.70
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown very gravelly sandy CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	23 June 2021

Test Results

Moisture Content (%)	15.9

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	23/06/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

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

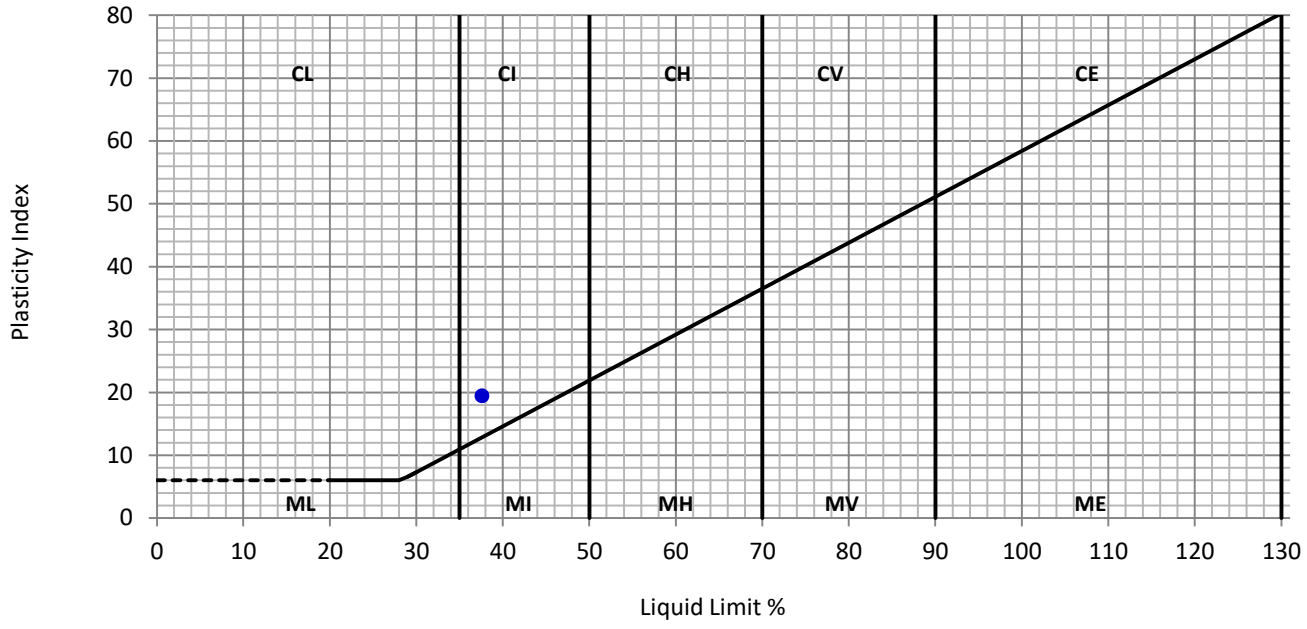
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24776		

Site Ref / Hole ID:	CP BH0101	**Depth (m):**	1.20 - 1.70
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown very gravelly sandy CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	23 June 2021

Test Results

Liquid Limit	38	%
Plastic Limit	18	%
Plasticity Index	19	%

Preparation:	4.2.4 Sieved Specimen	
Proportion retained on 425µm sieve:	55	%



Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig.
BS1377 - 2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	L Davis	23/06/2021	**ATT**
	7771	L Davis, Quality Manager		

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24777		

Site Ref / Hole ID:	CPBH102	**Depth (m):**	2.00 -
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown very gravelly sandy CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	22 June 2021

Test Results

Moisture Content (%)	10.9

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	22/06/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

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

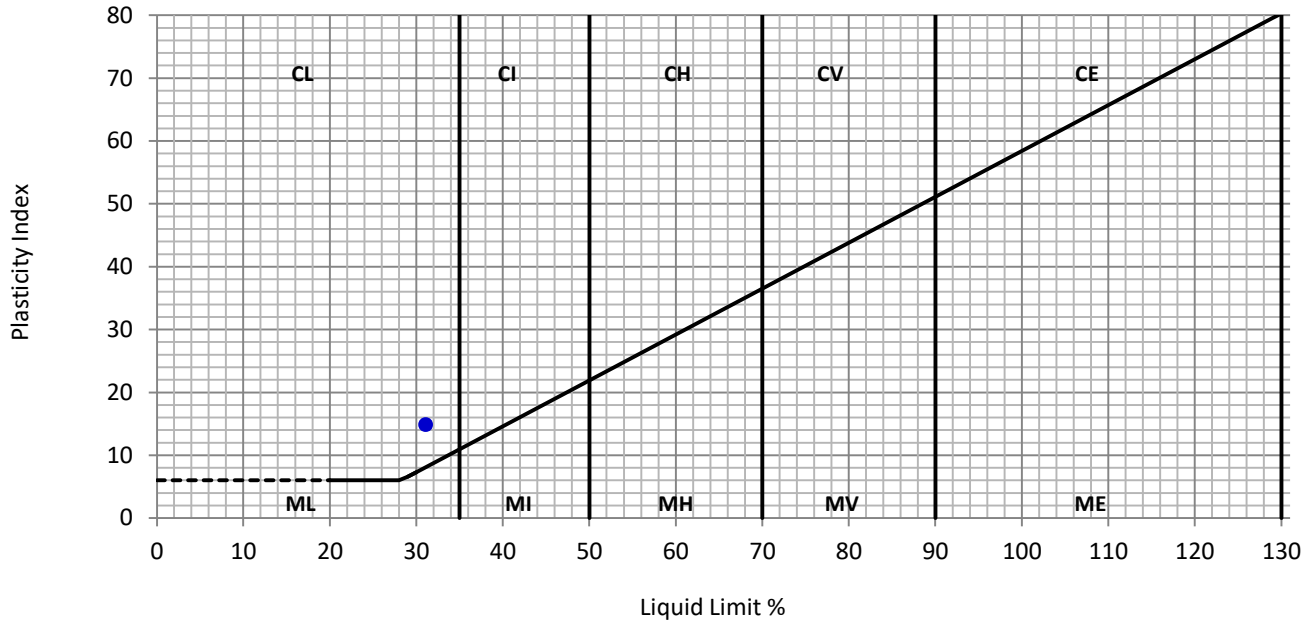
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24777		

Site Ref / Hole ID:	CPBH102	**Depth (m):**	2.00 -
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown very gravelly sandy CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	22 June 2021

Test Results

Liquid Limit	31	%
Plastic Limit	16	%
Plasticity Index	15	%

Preparation:	4.2.4 Sieved Specimen	
Proportion retained on 425µm sieve:	49	%



Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig.
BS1377 - 2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	L Davis	22/06/2021	**ATT**
	7771	L Davis, Quality Manager		

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24778		

Site Ref / Hole ID:	RC BH101	**Depth (m):**	2.82 - 3.02
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	22 June 2021

Test Results

Moisture Content (%)	32.1

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	22/06/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

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

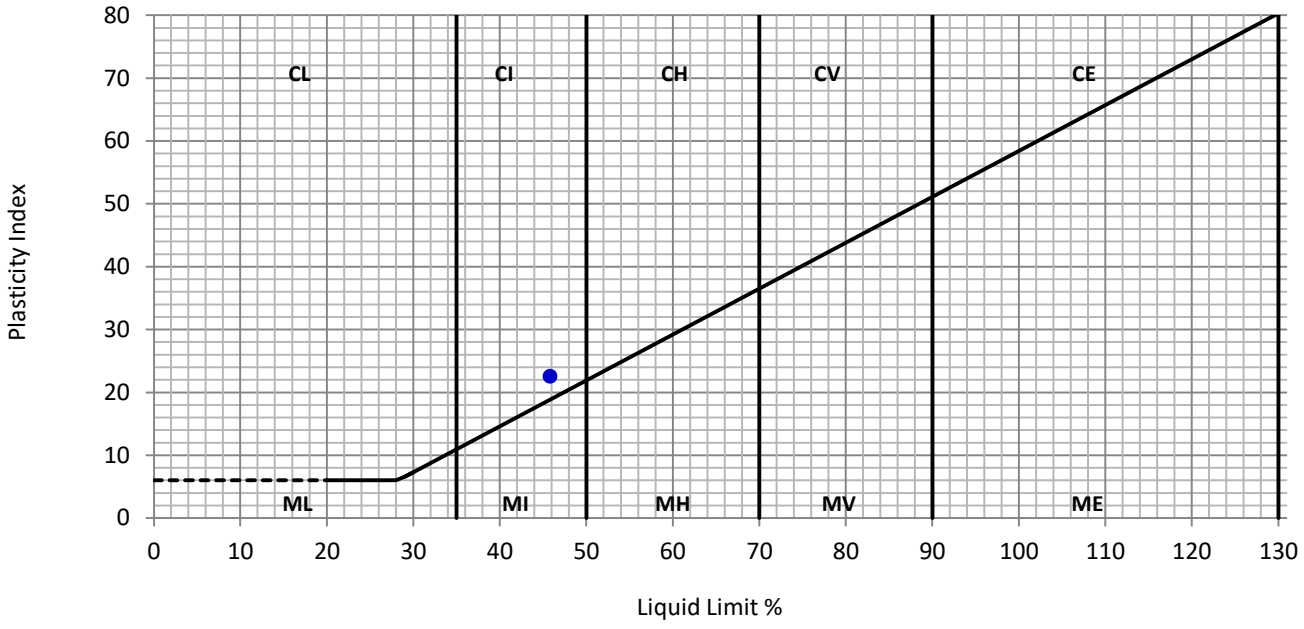
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24778		

Site Ref / Hole ID:	RC BH101	**Depth (m):**	2.82 - 3.02
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	21 June 2021

Test Results

Liquid Limit	46	%
Plastic Limit	23	%
Plasticity Index	23	%

Preparation:	4.2.3 Natural Specimen	
Proportion retained on 425µm sieve:	0	%



Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig.
BS1377 - 2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	L Davis	22/06/2021	**ATT**
	7771	L Davis, Quality Manager		

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24779		

Site Ref / Hole ID:	RC BH102	**Depth (m):**	2.70 - 2.90
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	22 June 2021

Test Results

Moisture Content (%)	19.6

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	22/06/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

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

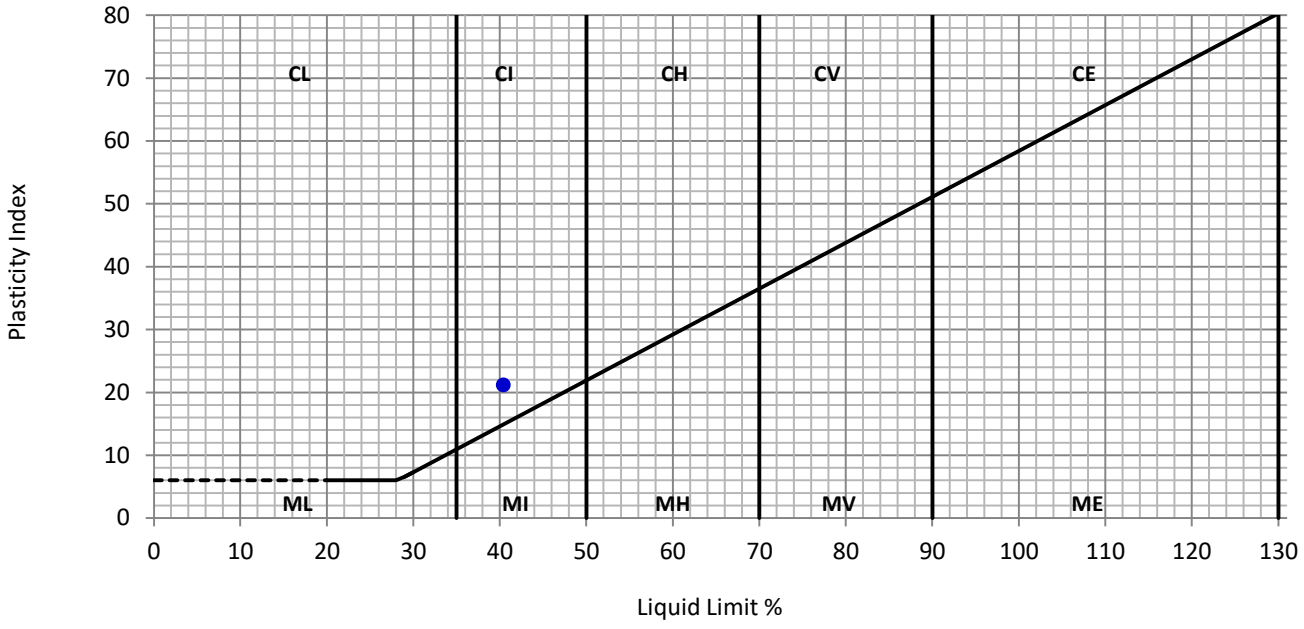
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24779		

Site Ref / Hole ID:	RC BH102	**Depth (m):**	2.70 - 2.90
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	21 June 2021

Test Results

Liquid Limit	40	%
Plastic Limit	19	%
Plasticity Index	21	%

Preparation:	4.2.3 Natural Specimen	
Proportion retained on 425µm sieve:	0	%



Remarks:

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24780		

Site Ref / Hole ID:	RC BH103	**Depth (m):**	3.05 - 3.20
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown gravelly sandy CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	22 June 2021

Test Results

Moisture Content (%)	9.1

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	22/06/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

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

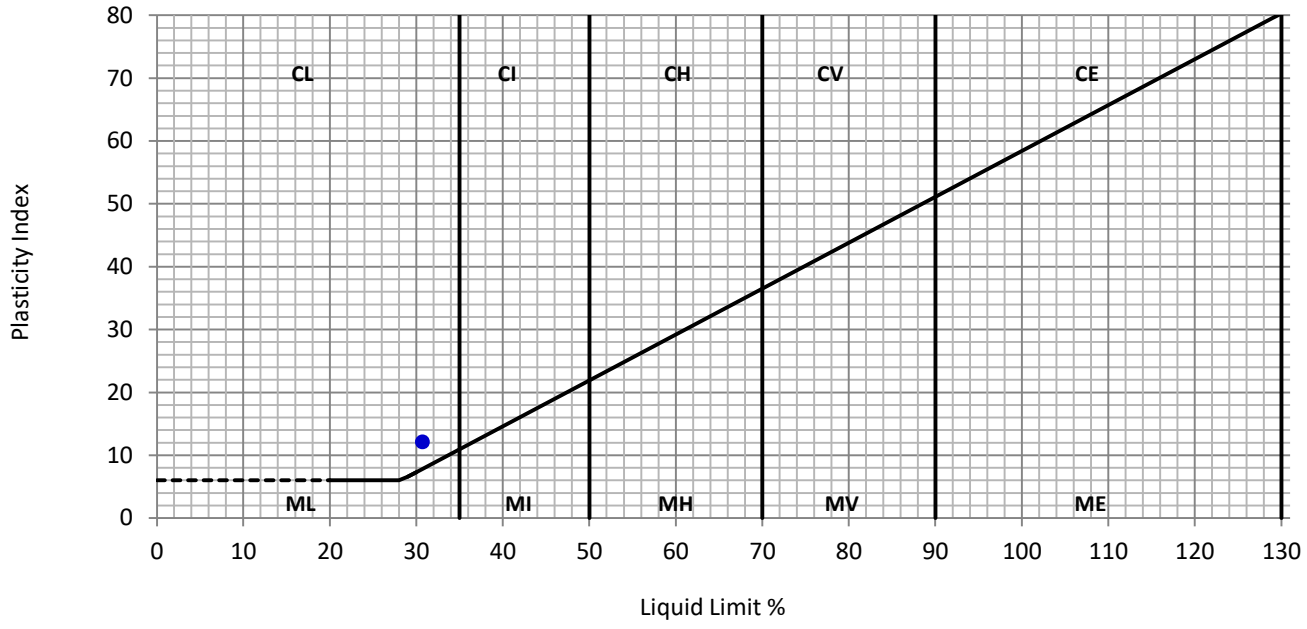
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24780		

Site Ref / Hole ID:	RC BH103	**Depth (m):**	3.05 - 3.20
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown gravelly sandy CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	21 June 2021

Test Results

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

Preparation:	4.2.4 Sieved Specimen	
Proportion retained on 425µm sieve:	11	%



Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig.
BS1377 - 2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	L Davis	22/06/2021	**ATT**
	7771	L Davis, Quality Manager		

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24783		

Site Ref / Hole ID:	WS BH103	**Depth (m):**	2.40 -
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown slightly gravelly CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	22 June 2021

Test Results

Moisture Content (%)	38.1

Remarks:

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

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

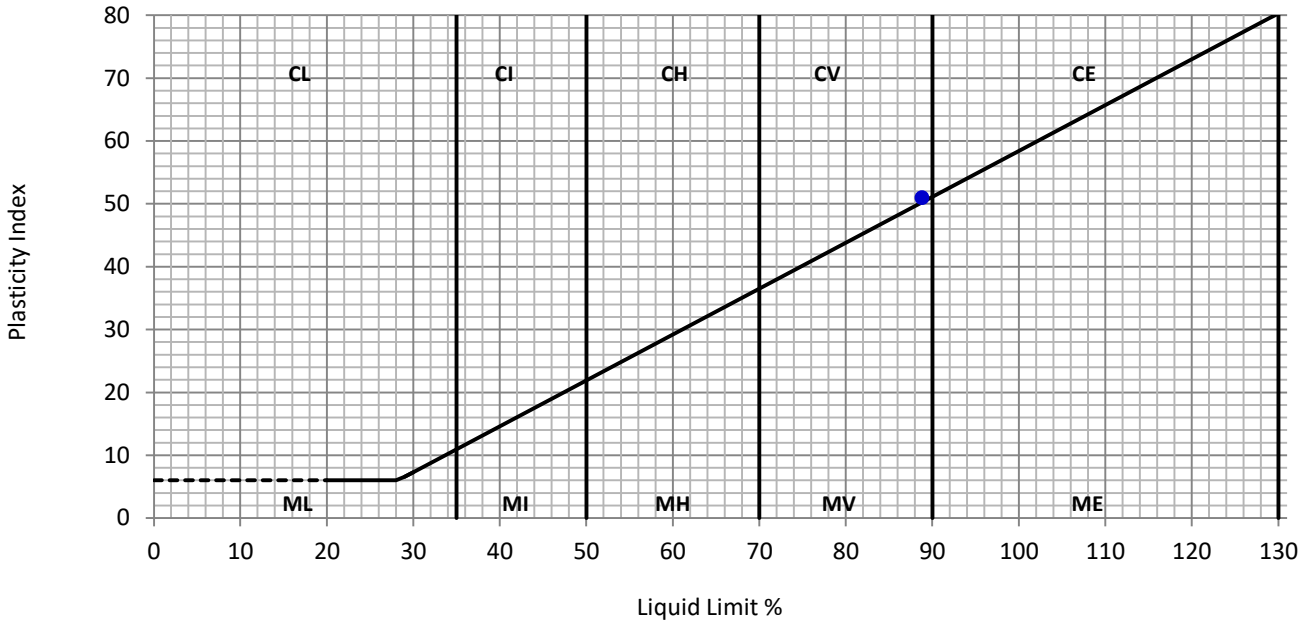
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24783		

Site Ref / Hole ID:	WS BH103	**Depth (m):**	2.40 -
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown slightly gravelly CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	21 June 2021

Test Results

Liquid Limit	89	%
Plastic Limit	38	%
Plasticity Index	51	%

Preparation:	4.2.4 Sieved Specimen	
Proportion retained on 425µm sieve:	11	%



Remarks:

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24784		

Site Ref / Hole ID:	WS BH105	**Depth (m):**	1.10 -
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown very gravelly sandy CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	22 June 2021

Test Results

Moisture Content (%)	8.6

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	22/06/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

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

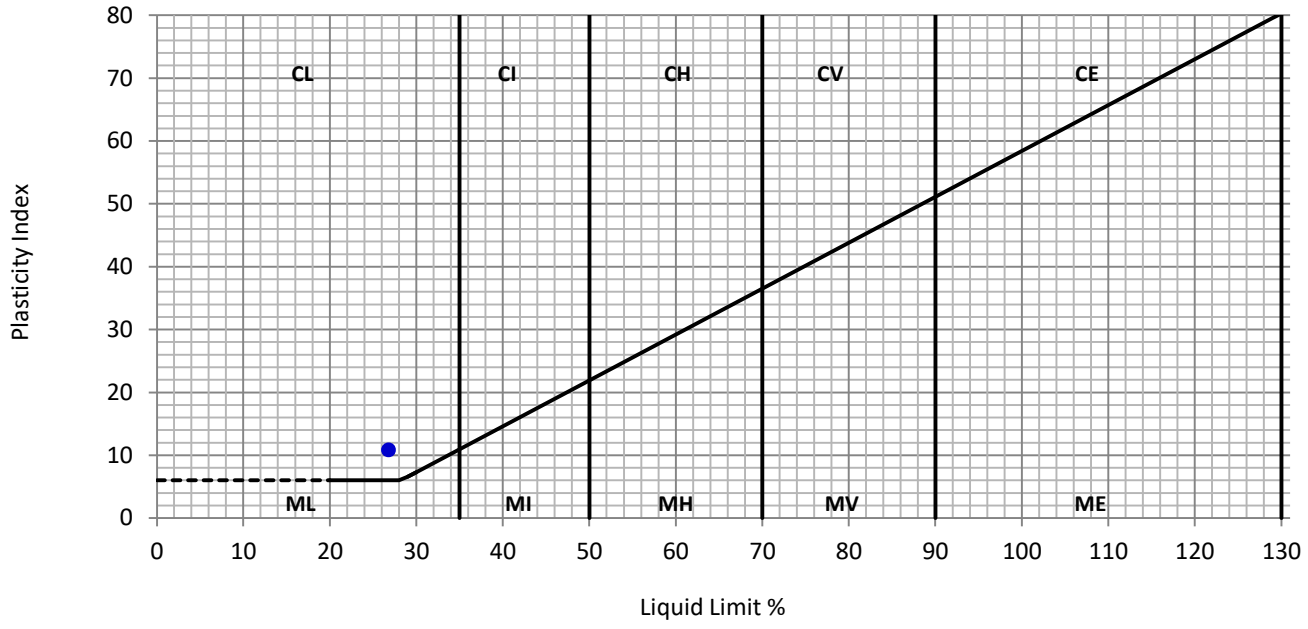
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24784		

Site Ref / Hole ID:	WS BH105	**Depth (m):**	1.10 -
Sample No:		**Sample Type:**	Disturbed
Sampling Certificate Received:	No	**Material Description:**	Brown very gravelly sandy CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	22 June 2021

Test Results

Liquid Limit	27	%
Plastic Limit	16	%
Plasticity Index	11	%

Preparation:	4.2.4 Sieved Specimen	
Proportion retained on 425µm sieve:	48	%



Remarks:

TEST REPORT

Determination Of Water Content

ISO 17892-1: 2014

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24786		

Site Ref / Hole ID:	WS BH109	**Depth (m):**	1.20 - 1.70
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown very gravelly sandy CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	23 June 2021

Test Results

Moisture Content (%)	16.4

Remarks:

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig
EN ISO 17892-1:2014 E	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	23/06/2021	**MC**
			A Grogan, Laboratory Manager		

TEST REPORT

LIQUID LIMIT, PLASTIC LIMIT & PLASTICITY INDEX

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

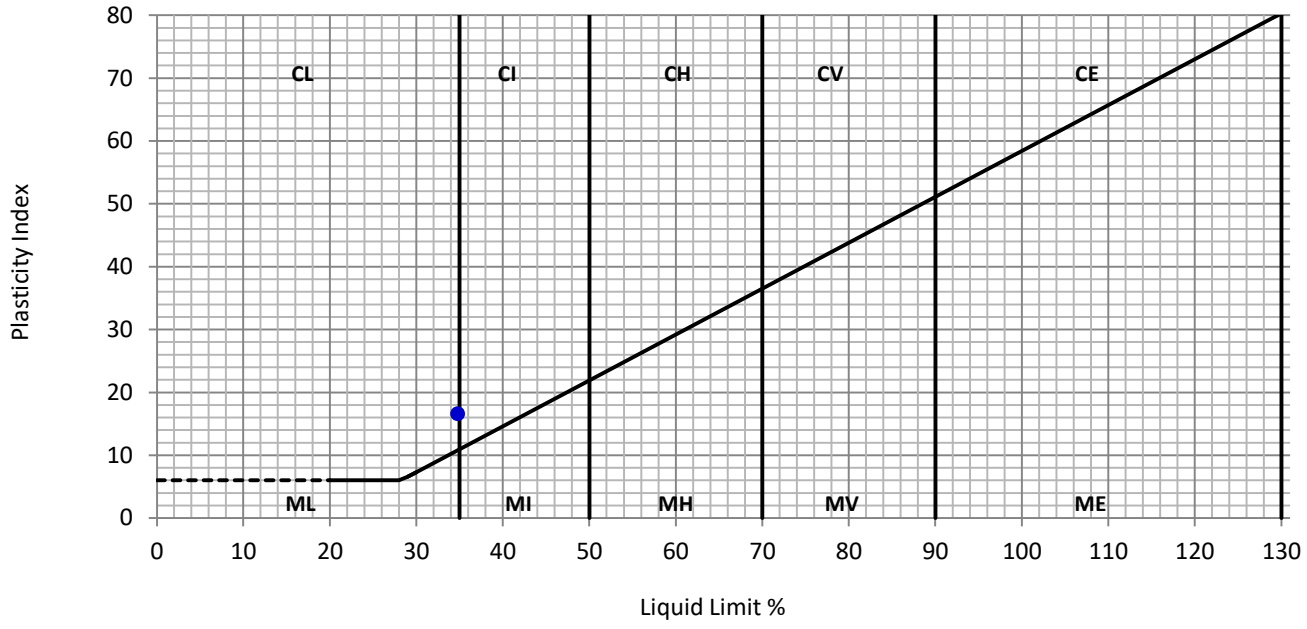
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24786		

Site Ref / Hole ID:	WS BH109	**Depth (m):**	1.20 - 1.70
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown very gravelly sandy CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	23 June 2021

Test Results

Liquid Limit	35	%
Plastic Limit	18	%
Plasticity Index	17	%

Preparation:	4.2.4 Sieved Specimen	
Proportion retained on 425µm sieve:	42	%



Remarks:

QA Ref.	**Apex Testing Solutions**	Approver	Date	Fig.
BS1377 - 2 Rev. 2.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	L Davis	23/06/2021	**ATT**
	7771	L Davis, Quality Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

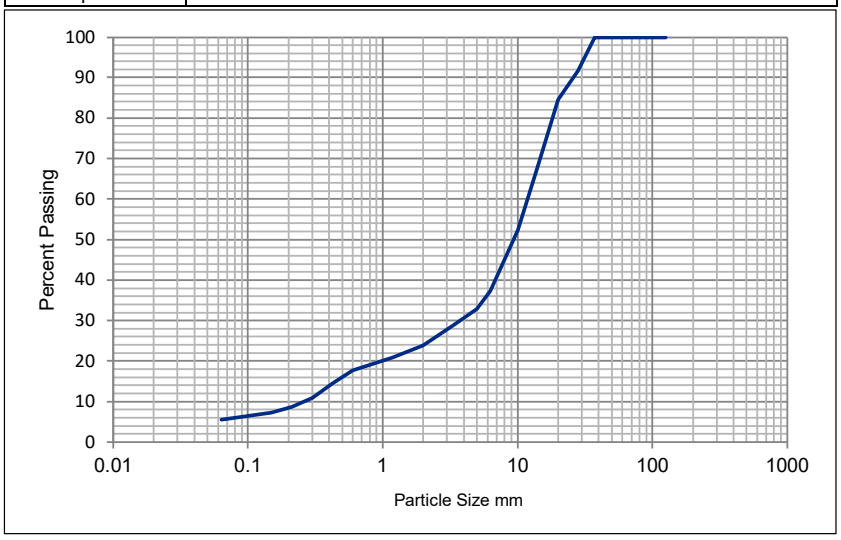
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24781		

Site Ref / Hole ID:	RC BH104	**Depth (m):**	0.40 - 1.20
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown silty sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	**BS1377**
Date Received:	16 June 2021	**Date Tested:**	22 June 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	100
37.5	100
28	92
20	85
14	68
10	52
6.3	37
5.0	33
3.35	29
2.00	24
1.18	21
0.600	18
0.425	15
0.300	11
0.212	9
0.150	7
0.063	6

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	76		
Sand	18	**Dry mass of sample, kg**	
Silt / Clay	6	5.1	N/A

Remarks:

QA Ref.			Approver	Date	Fig
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	22/06/2021	**PSD**
			A Grogan, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

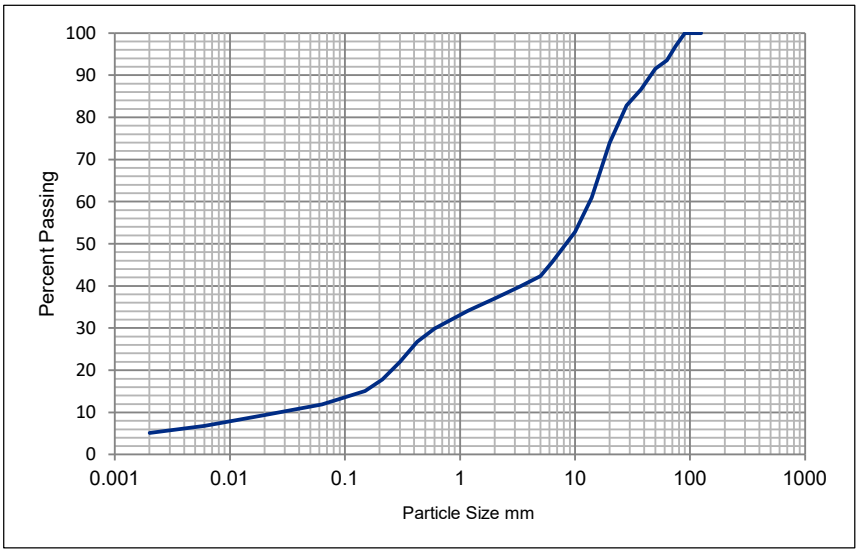
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24782		

Site Ref / Hole ID:	WS BH102	**Depth (m):**	0.30 - 1.20
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown slightly silty sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	28 June 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	97
63	94
50	92
37.5	87
28	83
20	74
14	61
10	53
6.3	46
5.0	42
3.35	40
2.00	37
1.18	34
0.600	30
0.425	27
0.300	22
0.212	18
0.150	15
0.063	12

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	as BS1377



Sedimentation	
Particle Size mm	% Passing
0.0201	9
0.0060	7
0.0020	5

Sample Portions		Particle Density Mg/m3		Uniformity Coefficient
Cobbles / Boulders	6	2.65	assumed	D_{60} / D_{10}
Gravel	57			
Sand	25	**Dry mass of sample, kg**		
Silt	7	21.3		
Clay	5			

Remarks:

QA Ref.					
BS1377 - 2 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	Approver A Grogan A Grogan, Laboratory Manager	Date 28/06/2021	Fig **PSD**

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

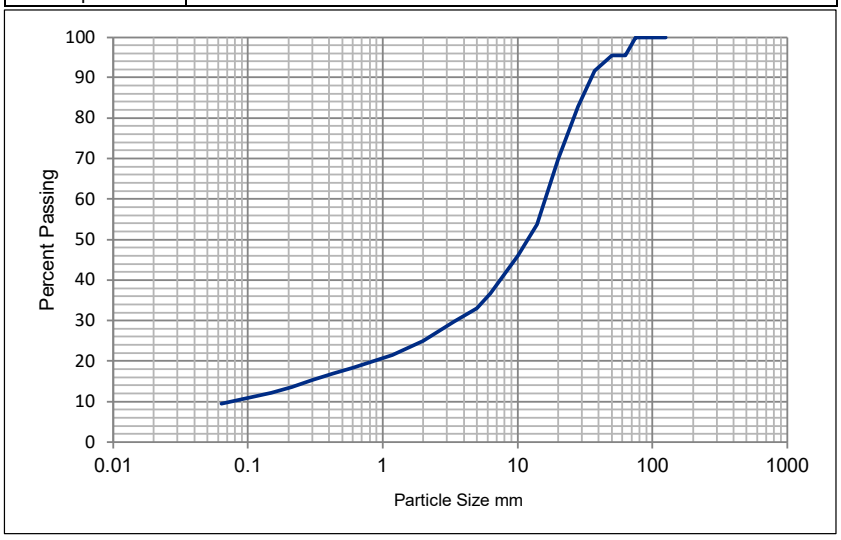
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24785		

Site Ref / Hole ID:	WS BH108	**Depth (m):**	0.80 - 1.20
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown silty sandy GRAVEL with low cobble content
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	**BS1377**
Date Received:	16 June 2021	**Date Tested:**	22 June 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	95
50	95
37.5	92
28	83
20	70
14	54
10	46
6.3	37
5.0	33
3.35	30
2.00	25
1.18	21
0.600	18
0.425	17
0.300	15
0.212	14
0.150	12
0.063	10

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	5	N/A	D_{60} / D_{10}
Gravel	70		
Sand	15	**Dry mass of sample, kg**	
Silt / Clay	10	13.4	N/A

Remarks:

QA Ref.			Approver	Date	Fig
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	22/06/2021	**PSD**
			A Grogan, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

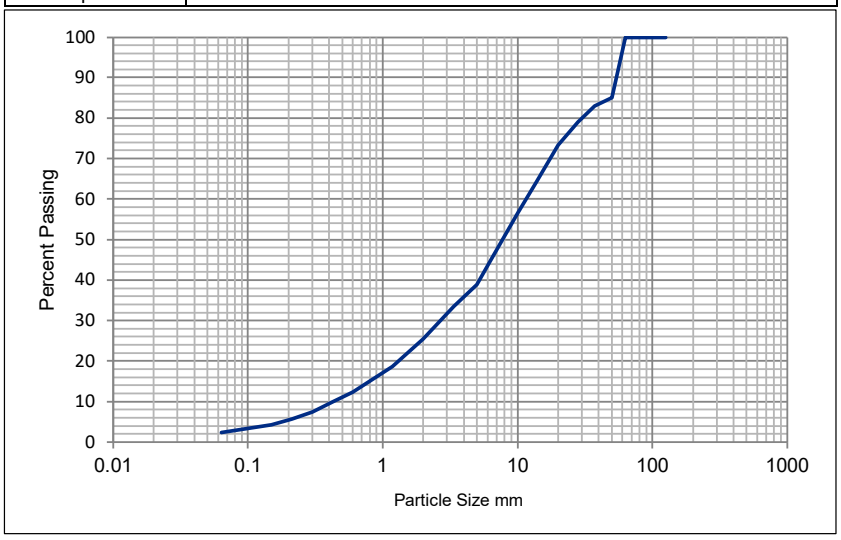
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24787		

Site Ref / Hole ID:	WS BH110	**Depth (m):**	0.40 - 0.80
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Grey & black sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	**BS1377**
Date Received:	16 June 2021	**Date Tested:**	22 June 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	100
75	100
63	100
50	85
37.5	83
28	79
20	73
14	64
10	57
6.3	45
5.0	39
3.35	33
2.00	25
1.18	19
0.600	12
0.425	10
0.300	8
0.212	6
0.150	4
0.063	3

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	



Sample Portions		Particle Density Mg/m3	Uniformity Coefficient
Cobbles / Boulders	0	N/A	D_{60} / D_{10}
Gravel	75		
Sand	23	**Dry mass of sample, kg**	
Silt / Clay	3	8.9	N/A

Remarks:

QA Ref.			Approver	Date	Fig
BS1377 - 4 Rev. 1.0	**Apex Testing Solutions** Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096	7771	A Grogan	22/06/2021	**PSD**
			A Grogan, Laboratory Manager		

TEST REPORT
PARTICLE SIZE DISTRIBUTION ANALYSIS
BS1377:Part 2:1990

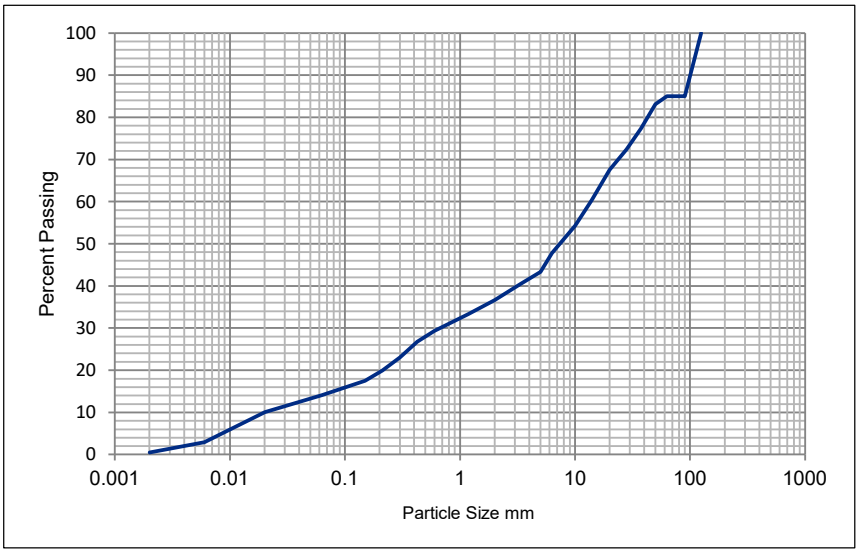
Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24788		

Site Ref / Hole ID:	WS BH111	**Depth (m):**	0.50 - 1.00
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Dark brown silty sandy GRAVEL with high cobble content
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	28 June 2021

Test Results

Sieving	
Particle Size mm	% Passing
125	100
90	85
75	85
63	85
50	83
37.5	77
28	72
20	68
14	60
10	54
6.3	48
5.0	43
3.35	40
2.00	37
1.18	33
0.600	29
0.425	27
0.300	23
0.212	20
0.150	18
0.063	14

Preparation / Pretreatment	
Sieve:	Pre dried
Pipette:	as BS1377



Sedimentation	
Particle Size mm	% Passing
0.0201	10
0.0060	3
0.0020	1

Sample Portions		Particle Density Mg/m3		Uniformity Coefficient
Cobbles / Boulders	15	2.65	assumed	D_{60} / D_{10}
Gravel	48			
Sand	23	Dry mass of sample, kg		
Silt	14	13.1		
Clay	1			

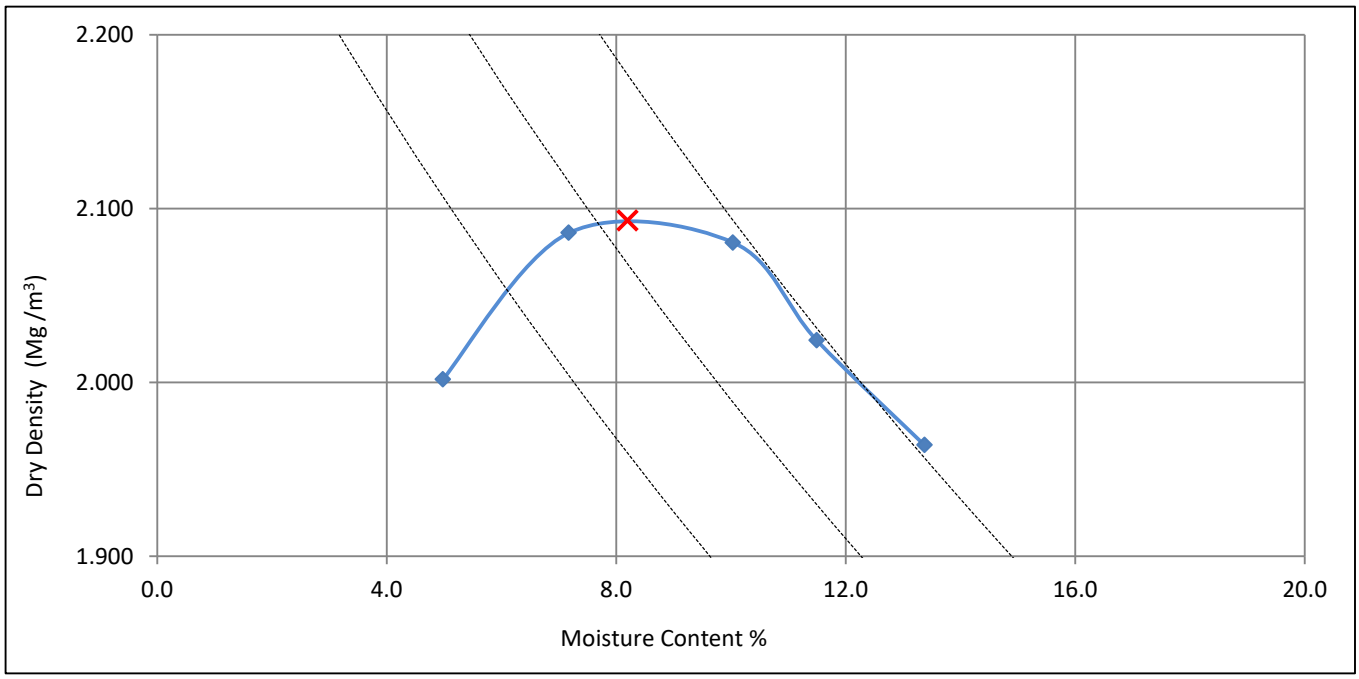
Remarks:

QA Ref.	Apex Testing Solutions	Approver	Date	Fig
BS1377 - 2 Rev. 1.0	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096 7771	A Grogan	28/06/2021	PSD
		A Grogan, Laboratory Manager		

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24782		

Site Ref / Hole ID:	WSBH102	**Depth (m):**	0.3-1.2
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown clayey sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	22 June 2021



Test Method:	BS 1377: part 4: 1990: clause 3.3, 2.5kg rammer in a 1 litre mould
Preparation:	Original sample was oven dried @ 105 oC, single specimen tested

Particle Density, Mg/m^3	2.65	assumed
Material > 37.5mm	13	%
Material < 37.5mm > 20mm	13	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	2.09
Optimum Moisture Content %	8.2

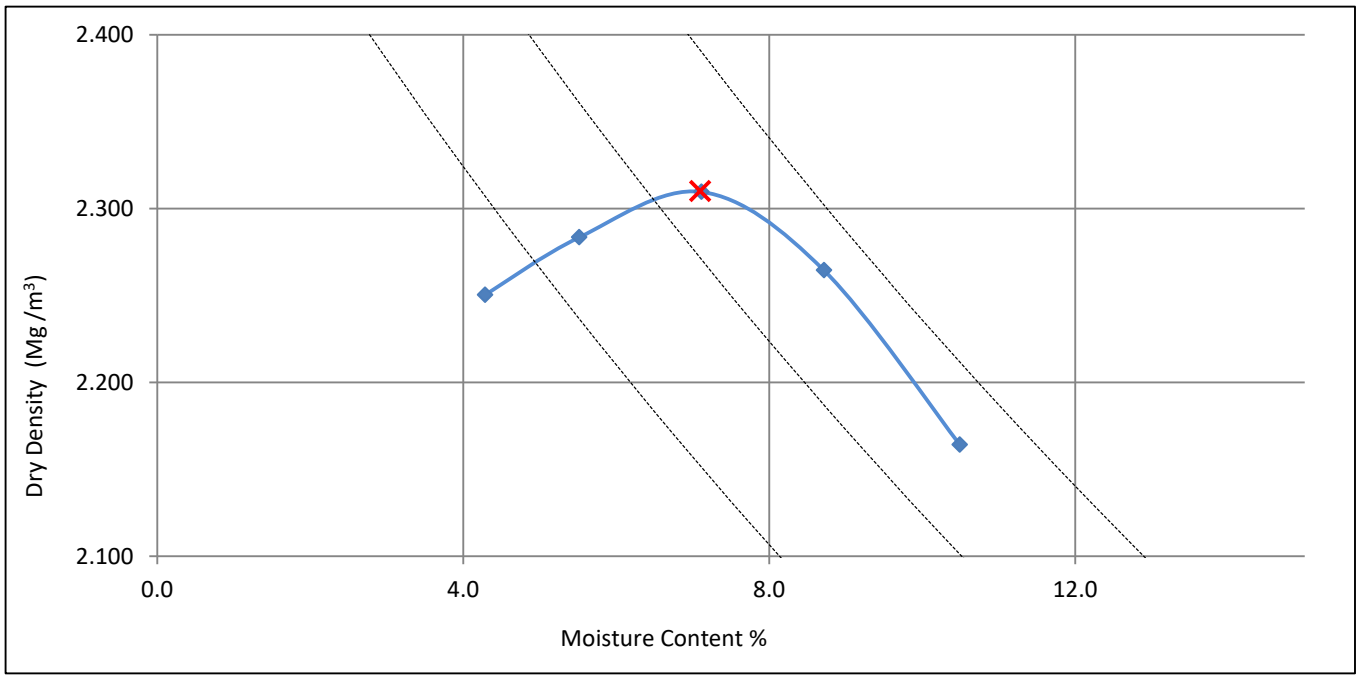
Remarks: Natural MC = 10.5, Tested as an "X" sample due to oversize

QA Ref.	**Apex Testing Solutions**		Approver	Date	Fig.
BS1377 - 4	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ	7771	L Davis	22/06/2021	**COMP**
Rev. 2.0	Tel: 01656 746762 Fax: 01656 749096		L Davis, Quality Manager		

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24786		

Site Ref / Hole ID:	WSBH108	**Depth (m):**	0.8-1.2
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown silty sandy GRAVEL with low cobble content
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	25 June 2021



Test Method:	BS 1377: part 4: 1990: clause 3.3, 2.5kg rammer in a 1 litre mould
Preparation:	Original sample was oven dried @ 105 oC, single specimen tested

Particle Density, Mg/m^3	2.88	assumed
Material > 37.5mm	8	%
Material < 37.5mm > 20mm	23	%

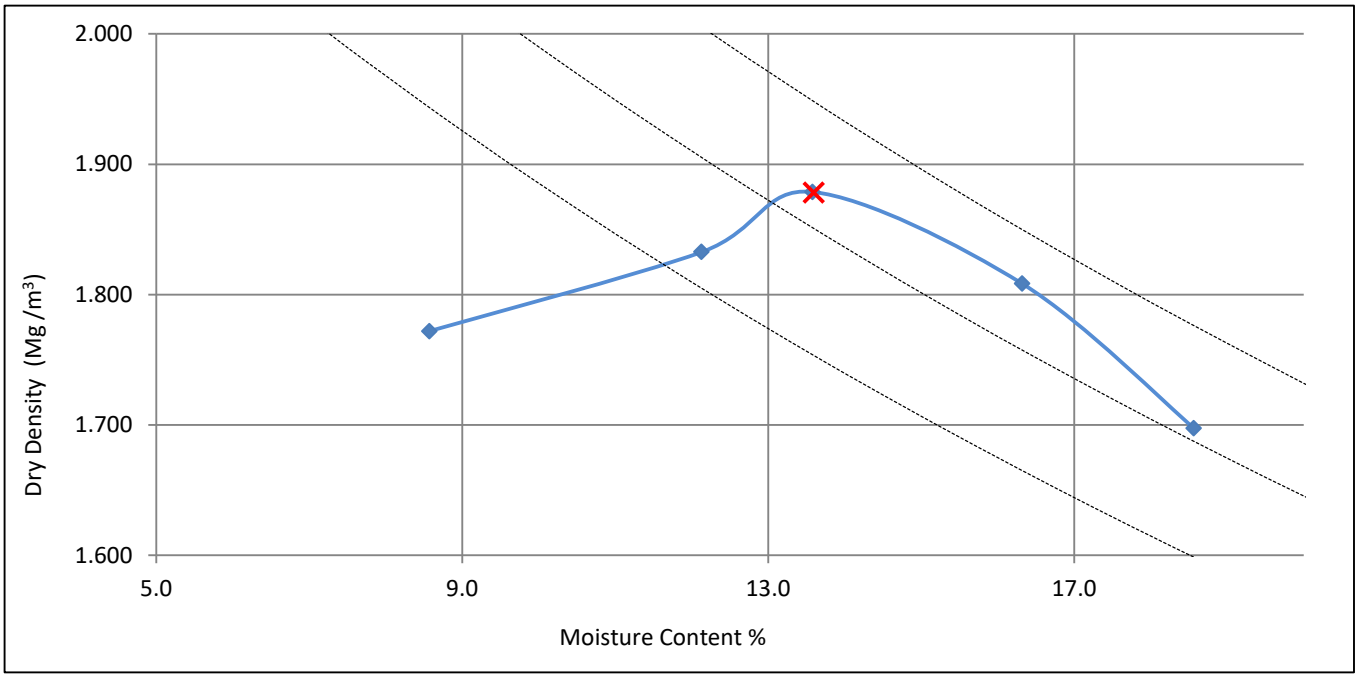
Derived Parameters ×	
Maximum Dry Density, Mg/m^3	2.31
Optimum Moisture Content %	7.1

Remarks: Natural MC = 5.7, Tested as an "X" sample due to oversize

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24786		

Site Ref / Hole ID:	WSBH109	**Depth (m):**	1.2-1.7
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Brown very gravelly sandy CLAY
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	25 June 2021



Test Method:	BS 1377: part 4: 1990: clause 3.3, 2.5kg rammer in a 1 litre mould
Preparation:	Original sample was oven dried @ 105 oC, single specimen tested

Particle Density, Mg/m^3	2.65	assumed
Material > 37.5mm	8	%
Material < 37.5mm > 20mm	3	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	1.88
Optimum Moisture Content %	13.6

Remarks: Natural MC = 16.4, Tested as an "X" sample due to oversize

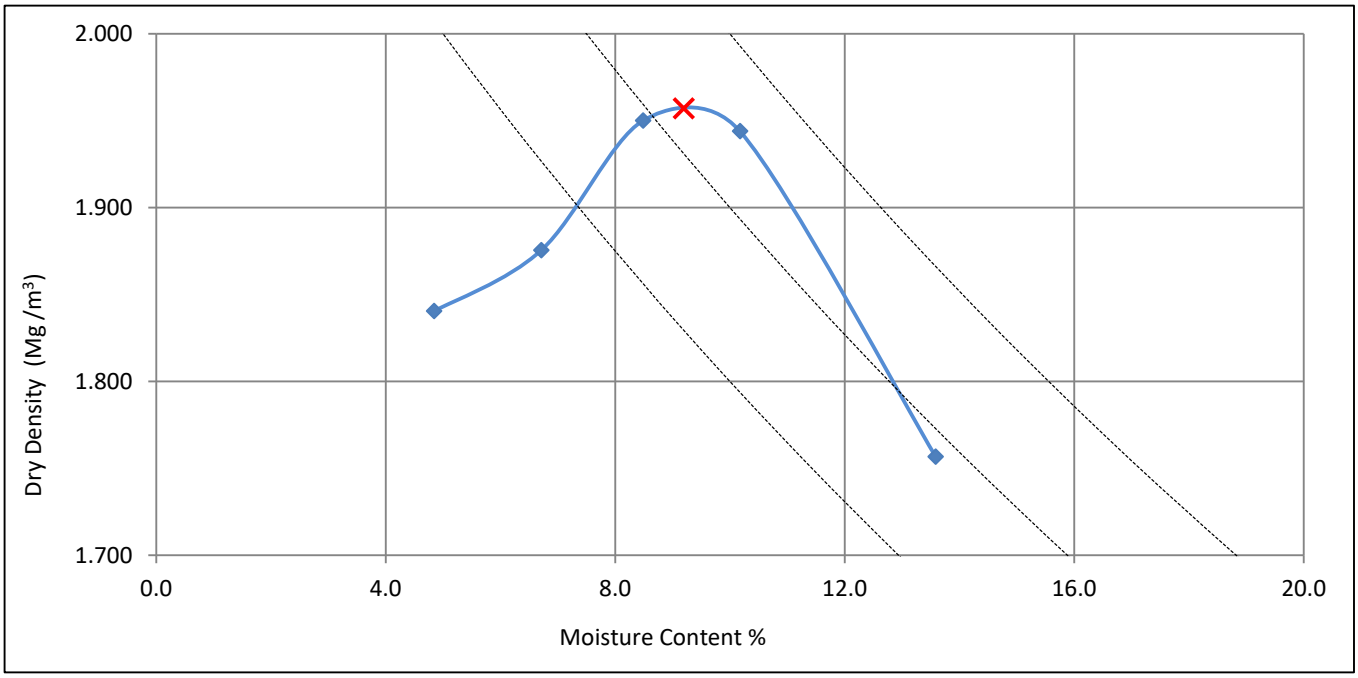
Apex Testing Solutions
Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ
Tel: 01656 746762 Fax: 01656 749096
7771

Approver	Date	Fig.
L Davis	25/06/2021	COMP
L Davis, Quality Manager		

TEST REPORT
DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377:Part 4:1990: Clause 3.4

Project No:	D21327	**Client:**	Geotechnics
Project Name:	Newport Quinn SDD RFP	**Address:**	Unit 1 Borders Industrial Park River Lane Saltney Chester CH4 8RJ
ATS Sample No:	24787		

Site Ref / Hole ID:	WSBH110	**Depth (m):**	0.4-0.8
Sample No:		**Sample Type:**	Bulk
Sampling Certificate Received:	No	**Material Description:**	Grey & black sandy GRAVEL
Location in Works:	N/A	**Material Source:**	Site Generated
Date Sampled:	16 June 2021	**Material Supplier:**	Site Generated
Sampled By:	Geotechnics	**Specification:**	BS1377
Date Received:	16 June 2021	**Date Tested:**	25 June 2021



Test Method:	BS 1377: part 4: 1990: clause 3.3, 2.5kg rammer in a 1 litre mould
Preparation:	Original sample was oven dried @ 105 oC, single specimen tested

Particle Density, Mg/m^3	2.50	assumed
Material > 37.5mm	17	%
Material < 37.5mm > 20mm	10	%

Derived Parameters ×	
Maximum Dry Density, Mg/m^3	1.96
Optimum Moisture Content %	9.2

Remarks: Natural MC = 10.2, Tested as an "X" sample due to oversize

Laboratory Report

GEO Site & Testing Services Ltd

Contract Number: 54502

Client Ref:

Report Date: **01-07-2021**

Client PO: **D21327**

Client **Apex Drilling Services Ltd**
Sturmi Way
Village Farm Industrial Estate, Pyle
Bridgend
CF33 6BZ

Contract Title: **Newport Quinn SDD RFP**

For the attention of: **Andrew Grogan**

Date Received: **16-06-2021**

Date Completed: **01-07-2021**

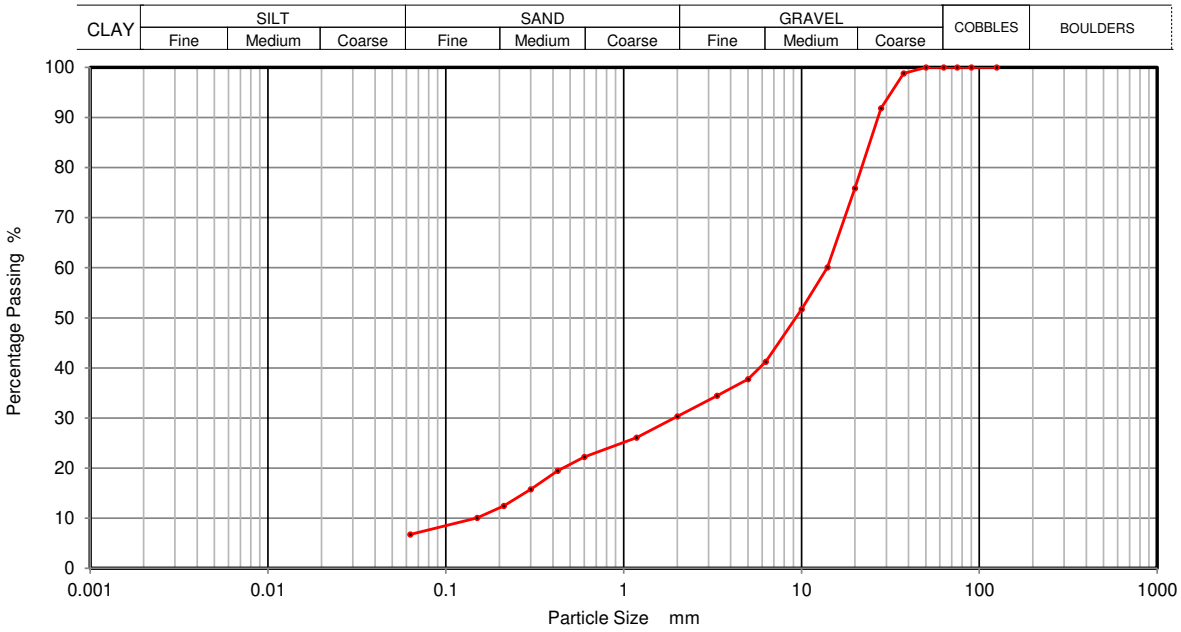
Test Description	Qty
PSD Wet Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	2
CBR: Remoulded Specimen and tested at top only BS 1377:1990 - Part 4 : 7 - * UKAS	3
Quick Undrained Triaxial Compression test - single specimen at one confining pressure (100mm or 38mm diameter) BS 1377:1990 - Part 7 : 8 - * UKAS	5
One-dimensional Consolidation 75mm or 50mm diameter specimens (5 days) BS 1377:1990 - Part 5 : 3 - * UKAS	3
Samples Received - @ Non Accredited Test	11
Disposal of samples for job	1

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

Approved Signatories:
Emma Sharp (Office Manager) - Paul Evans (Director) - Richard John (Quality/Technical Manager)
Shaun Jones (Laboratory manager) - Wayne Honey (Administrative Assistant / Health and Safety)

GEO Site & Testing Services Ltd
Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN
Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	54502
		Borehole/Pit No.	RC-BH101
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL	Depth Top	0.20
		Depth Base	1.20
Date Tested	29/06/2021	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	99		
28	92		
20	76		
14	60		
10	52		
6.3	41		
5	38		
3.35	34		
2	30		
1.18	26		
0.6	22		
0.425	19		
0.3	16		
0.212	12		
0.15	10		
0.063	7		

Sample Proportions	% dry mass
Cobbles	0
Gravel	70
Sand	23
Silt and Clay	7

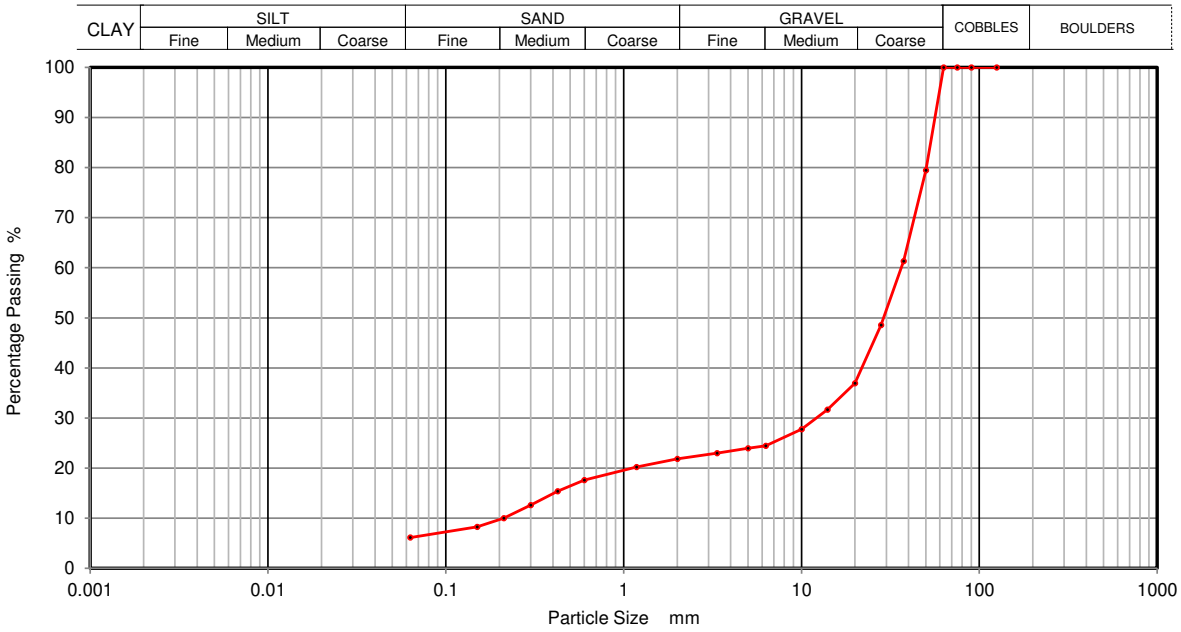
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	05/07/2021	Richard John	
David	Approved	06/07/2021	Paul Evans	

UKAS TESTING
4798

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	54502
		Borehole/Pit No.	RC-BH103
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL	Depth Top	0.60
		Depth Base	1.20
Date Tested	29/06/2021	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	79		
37.5	61		
28	49		
20	37		
14	32		
10	28		
6.3	24		
5	24		
3.35	23		
2	22		
1.18	20		
0.6	18		
0.425	15		
0.3	13		
0.212	10		
0.15	8		
0.063	6		

Sample Proportions	% dry mass
Cobbles	0
Gravel	78
Sand	16
Silt and Clay	6

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator	Checked	05/07/2021	Richard John	
David	Approved	06/07/2021	Paul Evans	

UKAS TESTING
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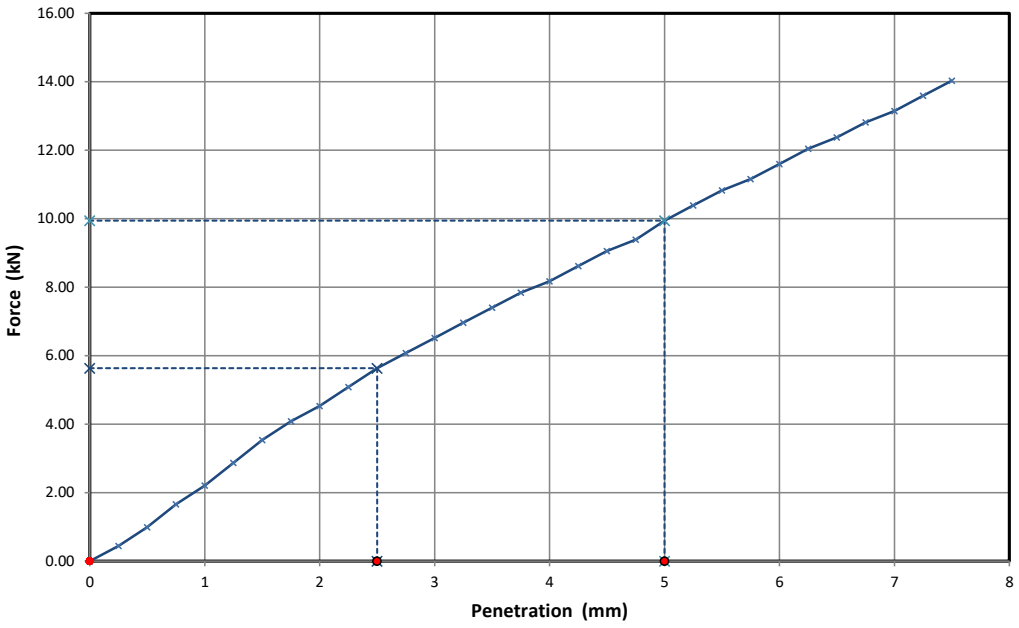
GSTL	California Bearing Ratio BS 1377: Part 4: 1990 Clause 7	Contract Number	54502
		Borehole/Pit No.	CP-BH102
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Brown fine to coarse gravelly clayey sandy SILT	Depth Top	0.50
Compaction Method	2.5 Kg Rammer	Depth Base	1.00
Retained 20mm (%)	12	Sample Type	B
Date Tested	22/06/2021		



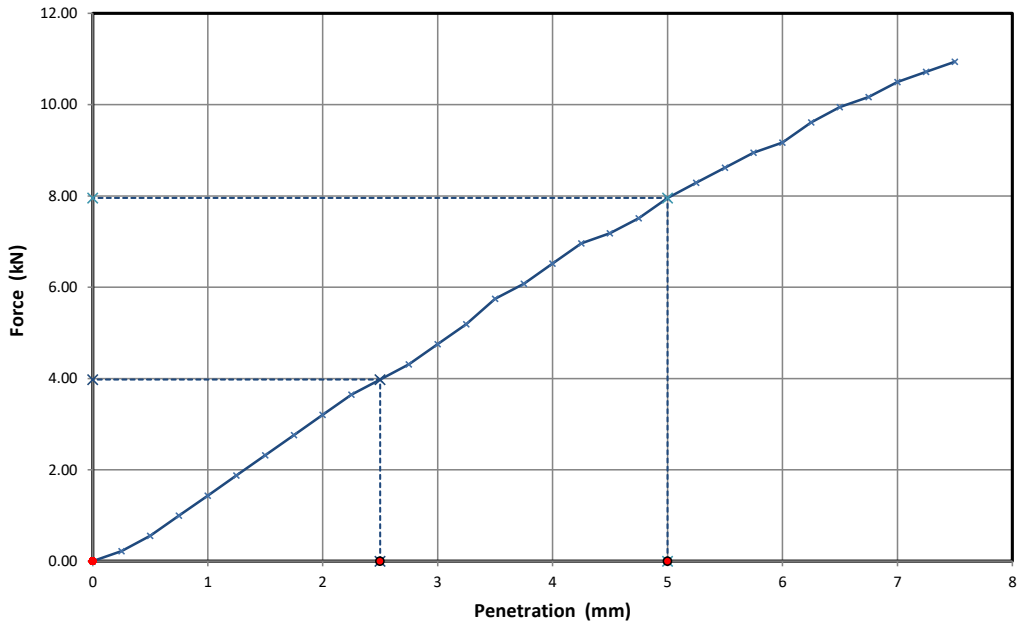
Initial Sample Conditions	
Moisture Content (%)	10
Moisture Top (%)	10
Moisture Bottom (%)	
Bulk Density (Mg/m3)	2.28
Dry Density (Mg/m3)	2.07

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	N/A
Swelling (mm)	N/A
Remarks	

CBR Test Values			
2.5mm Top	43	2.5mm Bottom	
5mm Top	50	5mm Bottom	
CBR Value %	**50**	**CBR Value %**	

Operators	Checked	05/07/2021	Richard John	
Conal	Approved	06/07/2021	Paul Evans	

GSTL	California Bearing Ratio BS 1377: Part 4: 1990 Clause 7	Contract Number	54502
		Borehole/Pit No.	CP-BH103
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Brown fine to medium gravelly silty SAND	Depth Top	0.50
Compaction Method	2.5 Kg Rammer	Depth Base	1.00
Retained 20mm (%)	0	Sample Type	B
Date Tested	22/06/2021		



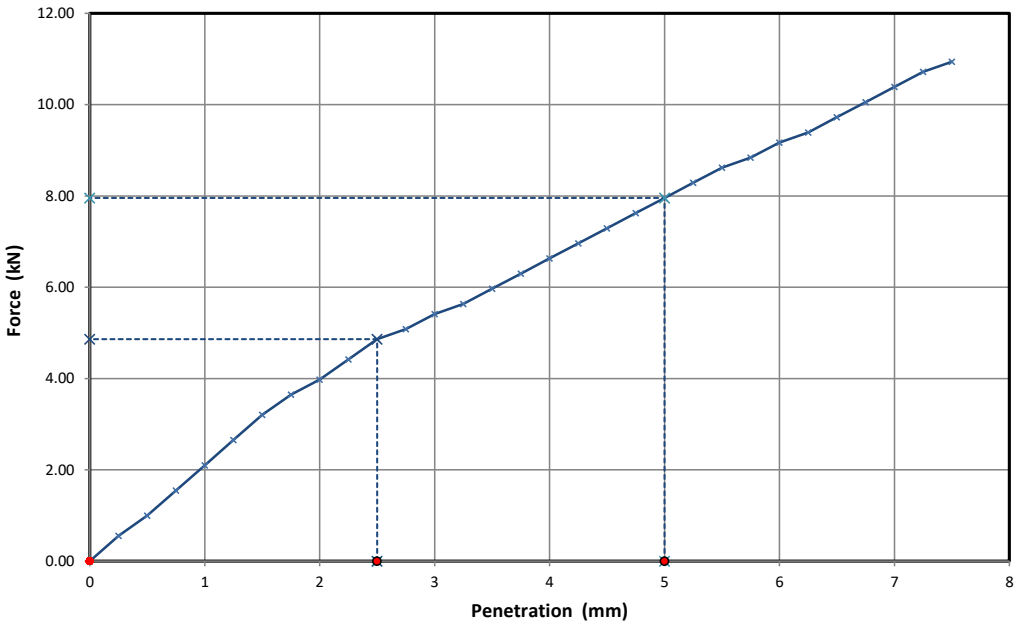
Initial Sample Conditions	
Moisture Content (%)	6.4
Moisture Top (%)	6.4
Moisture Bottom (%)	
Bulk Density (Mg/m3)	2.17
Dry Density (Mg/m3)	2.04

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	N/A
Swelling (mm)	N/A
Remarks	

CBR Test Values			
2.5mm Top	30	2.5mm Bottom	
5mm Top	40	5mm Bottom	
CBR Value %	**40**	**CBR Value %**	

Operators	Checked	05/07/2021	Richard John	
Conal	Approved	06/07/2021	Paul Evans	

GSTL	California Bearing Ratio BS 1377: Part 4: 1990 Clause 7	Contract Number	54502
		Borehole/Pit No.	RC-BH101
Site Name	Newport Quinn SDD RFP	Sample No.	
		Depth Top	0.20
Compaction Method	2.5 Kg Rammer	Depth Base	1.20
Retained 20mm (%)	24	Sample Type	B
Date Tested	22/06/2021		



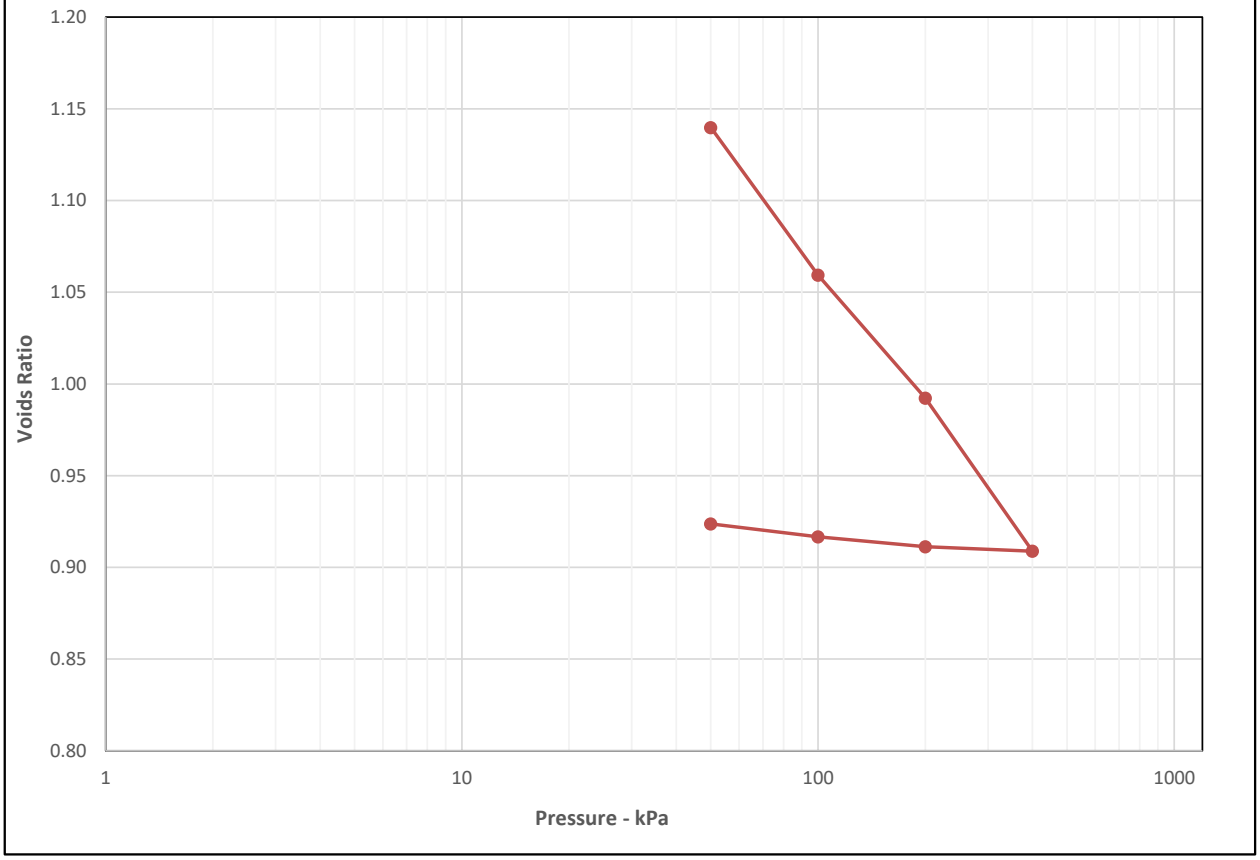
Initial Sample Conditions	
Moisture Content (%)	11
Moisture Top (%)	11
Moisture Bottom (%)	
Bulk Density (Mg/m3)	2.17
Dry Density (Mg/m3)	1.95

Specified Testing Parameters	
Surcharge (Kg)	2
Soaking Time (hours)	N/A
Swelling (mm)	N/A
Remarks	

CBR Test Values			
2.5mm Top	37	2.5mm Bottom	
5mm Top	40	5mm Bottom	
CBR Value %	**40**	**CBR Value %**	

Operators	Checked	05/07/2021	Richard John	
Conal	Approved	06/07/2021	Paul Evans	

GSTL	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3	Contract Number	54502
		Borehole/Trialpit No.	CP-BH102
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Dark brown sandy silty CLAY	Depth Top (m)	6.50
		Depth Base (m)	6.95
Lab Temperature	20°c	Sample Location	Top
Remarks	Cv Calculated Using T90 Particle Density Assumed Unless Stated Otherwise	Sample Type	U
Date Tested	17/06/2021		



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	50	0	-	50	1.5	8.5		-			
Bulk Density (Mg/m3)	1.72	50	-	100	0.75	2.1		-			
Dry Density (Mg/m3)	1.14	100	-	200	0.33	3.6		-			
Voids Ratio	1.3148	200	-	400	0.21	4.5		-			
Degree of saturation	100.7	400	-	200	0.0065	14		-			
Height (mm)	19.72	200	-	100	0.028	14		-			
Diameter (mm)	75.1	100	-	50	0.073	7.3		-			
Particle Density (Mg/m3)	2.65		-					-			

Operators	Checked	05/07/2021	Richard John	
Wayne W	Approved	06/07/2021	Paul Evans	

UKAS TESTING
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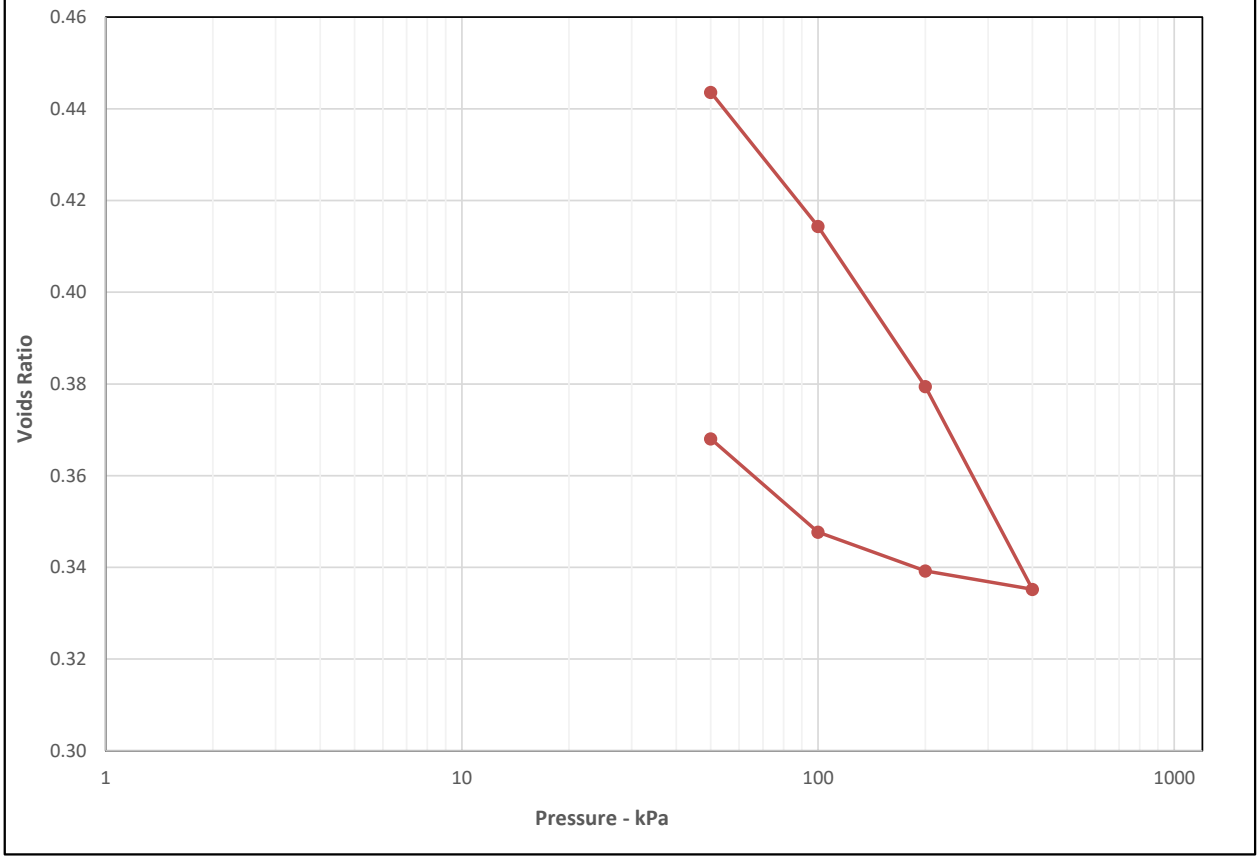
GSTL	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3	Contract Number	54502
		Borehole/Trialpit No.	RC-BH102
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Reddish brown silty CLAY	Depth Top (m)	3.20
		Depth Base (m)	3.80
Lab Temperature	20°c	Sample Location	Top
Remarks	Cv Calculated Using T90 Particle Density Assumed Unless Stated Otherwise	Sample Type	U
Date Tested	17/06/2021		



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	21	0	-	50	1.0	8.8		-			
Bulk Density (Mg/m3)	2.12	50	-	100	0.41	2.3		-			
Dry Density (Mg/m3)	1.75	100	-	200	0.25	9.3		-			
Voids Ratio	0.5165	200	-	400	0.16	3.9		-			
Degree of saturation	110.3	400	-	200	0.015	3.8		-			
Height (mm)	19.8	200	-	100	0.063	2.2		-			
Diameter (mm)	75.51	100	-	50	0.3	5.3		-			
Particle Density (Mg/m3)	2.65		-					-			

Operators	Checked	05/07/2021	Richard John	
Wayne W	Approved	06/07/2021	Paul Evans	

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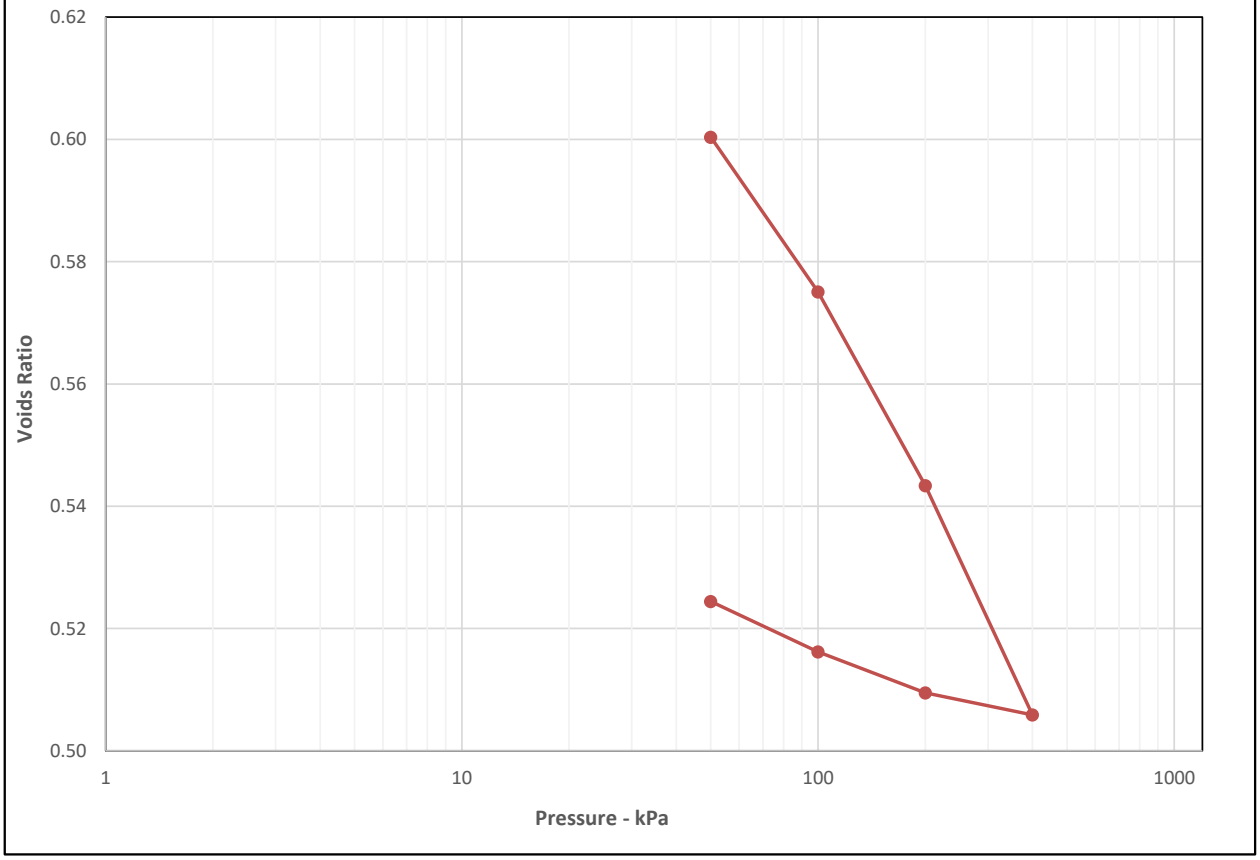
GSTL	ONE DIMENSIONAL CONSOLIDATION TEST BS1377:Part 5:1990, clause 3	Contract Number	54502
		Borehole/Trialpit No.	RC-BH103
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Reddish brown gravelly silty CLAY	Depth Top (m)	3.20
		Depth Base (m)	3.80
Lab Temperature	20°c	Sample Location	Top
Remarks	Cv Calculated Using T90 Particle Density Assumed Unless Stated Otherwise	Sample Type	U
Date Tested	17/06/2021		



Initial Sample Conditions		Pressure Range			Mv m2/MN	Cv m2/yr	Pressure Range			Mv m2/MN	Cv m2/yr
Moisture Content (%)	27	0	-	50	1.0	2.5		-			
Bulk Density (Mg/m3)	2.00	50	-	100	0.32	1.1		-			
Dry Density (Mg/m3)	1.57	100	-	200	0.2	1.5		-			
Voids Ratio	0.6830	200	-	400	0.12	1.4		-			
Degree of saturation	103.8	400	-	200	0.012	8.6		-			
Height (mm)	19.61	200	-	100	0.044	5.8		-			
Diameter (mm)	74.92	100	-	50	0.11	6.2		-			
Particle Density (Mg/m3)	2.65		-					-			

Operators	Checked	05/07/2021	Richard John	
Wayne W	Approved	06/07/2021	Paul Evans	

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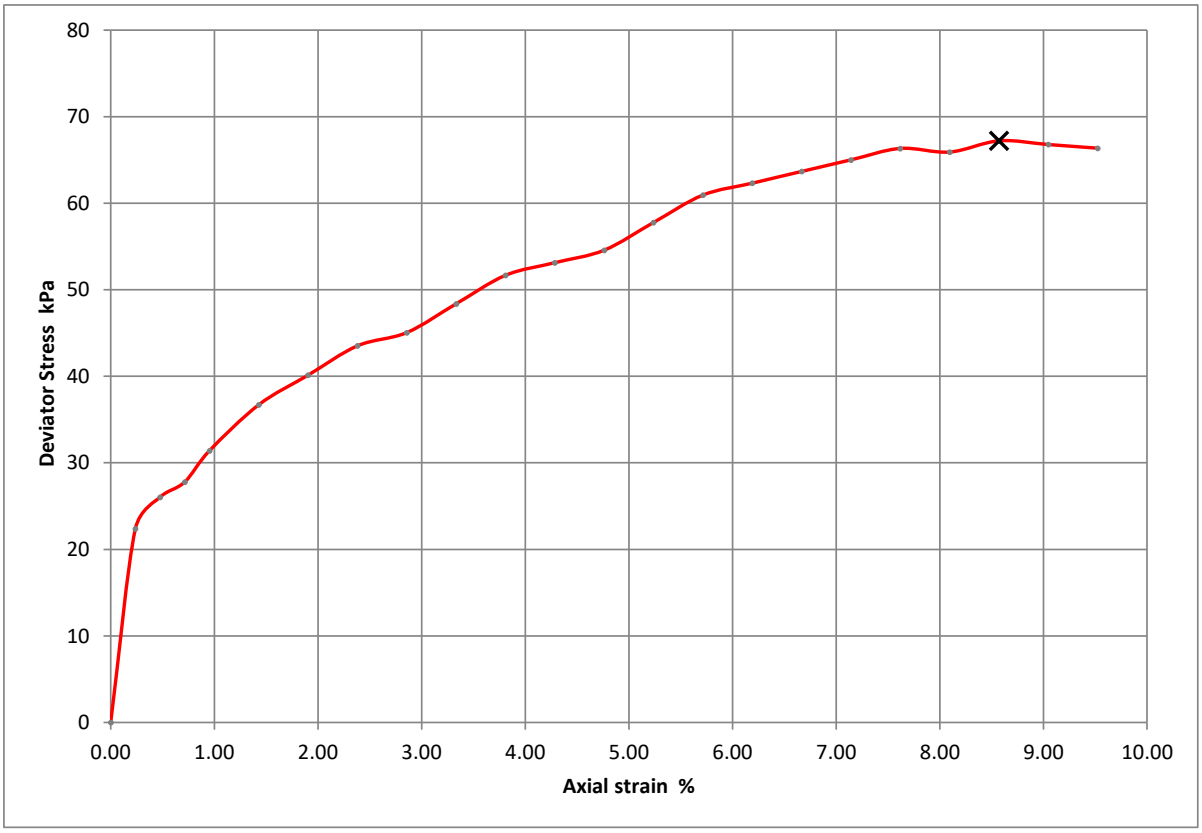
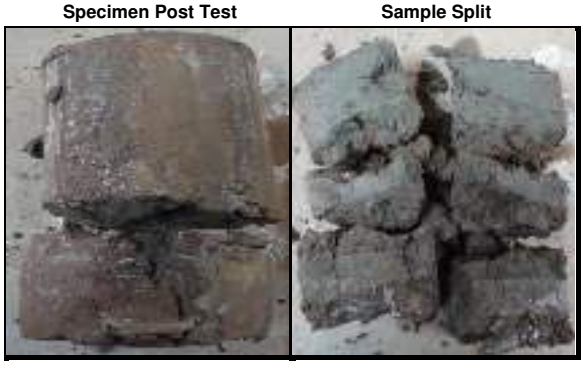
GSTL	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	54502
		Borehole/Pit No.	CP-BH101
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Brown fine to medium gravelly silty CLAY	Depth Top (m)	3.00
		Depth Base (m)	3.45
Date Tested	26/06/2021	Sample Type	UT
		Technician	Daniel B



Moisture Content (%)	30
Bulk Density (Mg/m^3)	1.77
Dry Density (Mg/m^3)	1.36
Specimen Length (mm)	210
Specimen Diamteter (mm)	105
Cell Pressure (kPa)	60
Deviator Stress (kPa)	67
Undrained Shear Strength (kPa)	34
Failure Strain (%)	9
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Specimen Post Test **Sample Split**



Checked	05/07/2021	Richard John	
Approved	06/07/2021	Paul Evans	

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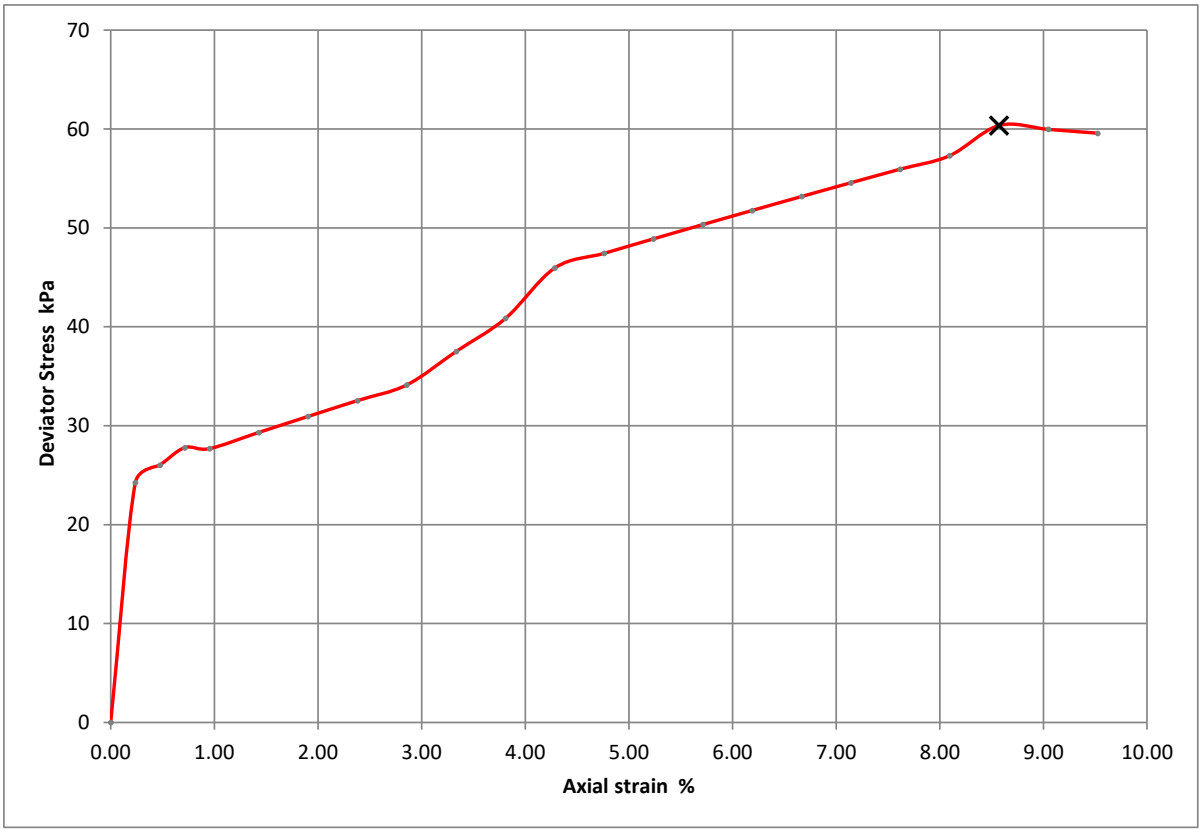
GSTL	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	54502
		Borehole/Pit No.	CP-BH101
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Brown fine to medium gravelly sandy silty CLAY	Depth Top (m)	5.00
		Depth Base (m)	5.45
Date Tested	26/06/2021	Sample Type	UT
		Technician	Daniel B



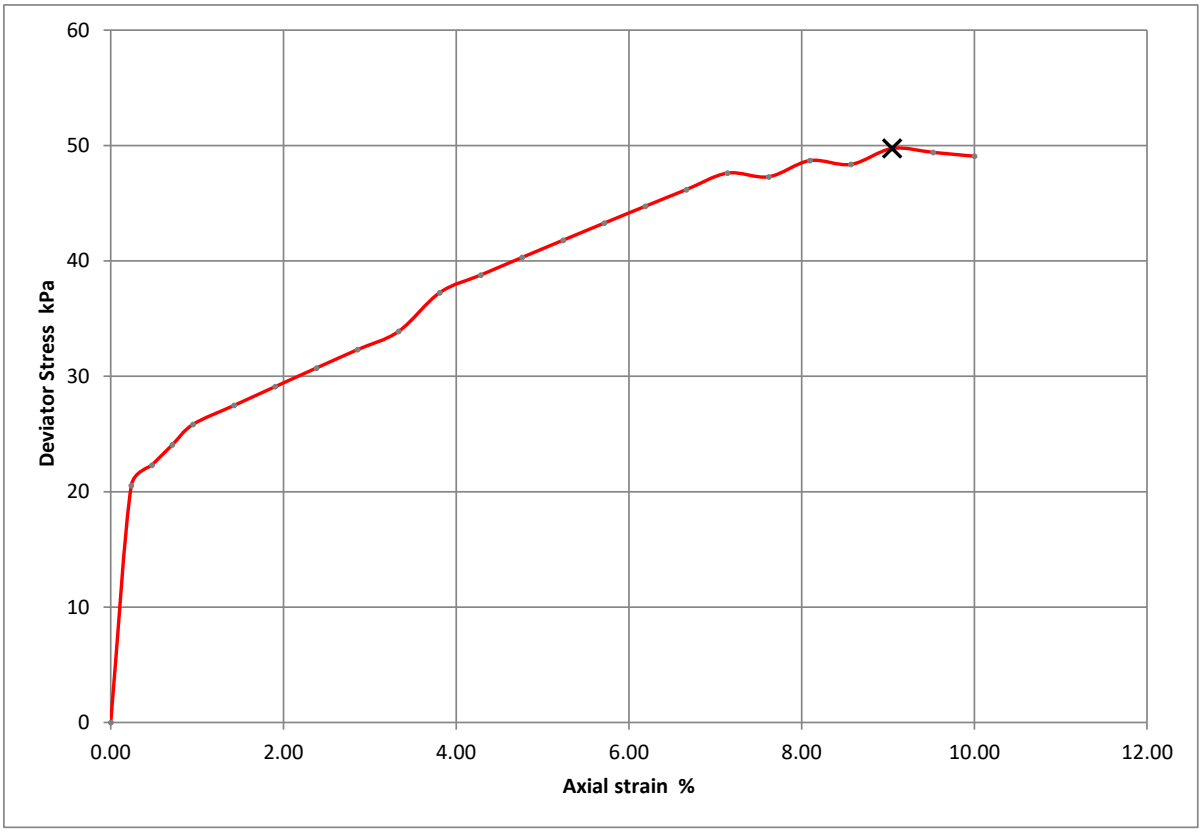
Moisture Content (%)	25
Bulk Density (Mg/m^3)	1.81
Dry Density (Mg/m^3)	1.46
Specimen Length (mm)	210
Specimen Diamteter (mm)	105
Cell Pressure (kPa)	100
Deviator Stress (kPa)	60
Undrained Shear Strength (kPa)	30
Failure Strain (%)	9
Mode Of Failure	Plastic
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Specimen Post Test **Sample Split**

Checked	05/07/2021	Richard John	
Approved	06/07/2021	Paul Evans	

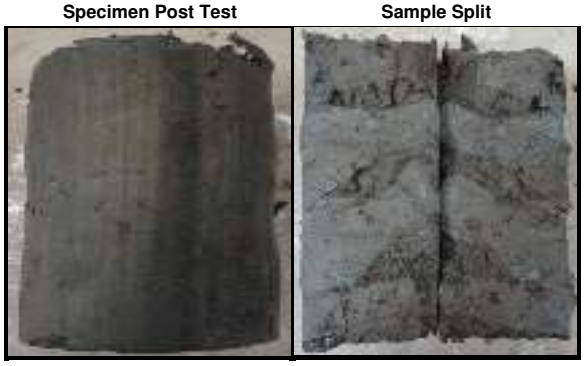
UKAS TESTING 4788

GSTL	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	54502
		Borehole/Pit No.	CP-BH102
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Brown silty CLAY	Depth Top (m)	6.50
		Depth Base (m)	6.95
Date Tested	26/06/2021	Sample Type	UT
		Technician	Daniel B



Moisture Content (%)	51
Bulk Density (Mg/m^3)	1.94
Dry Density (Mg/m^3)	1.28
Specimen Length (mm)	210
Specimen Diamteter (mm)	105
Cell Pressure (kPa)	30
Deviator Stress (kPa)	50
Undrained Shear Strength (kPa)	25
Failure Strain (%)	9
Mode Of Failure	Plastic
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

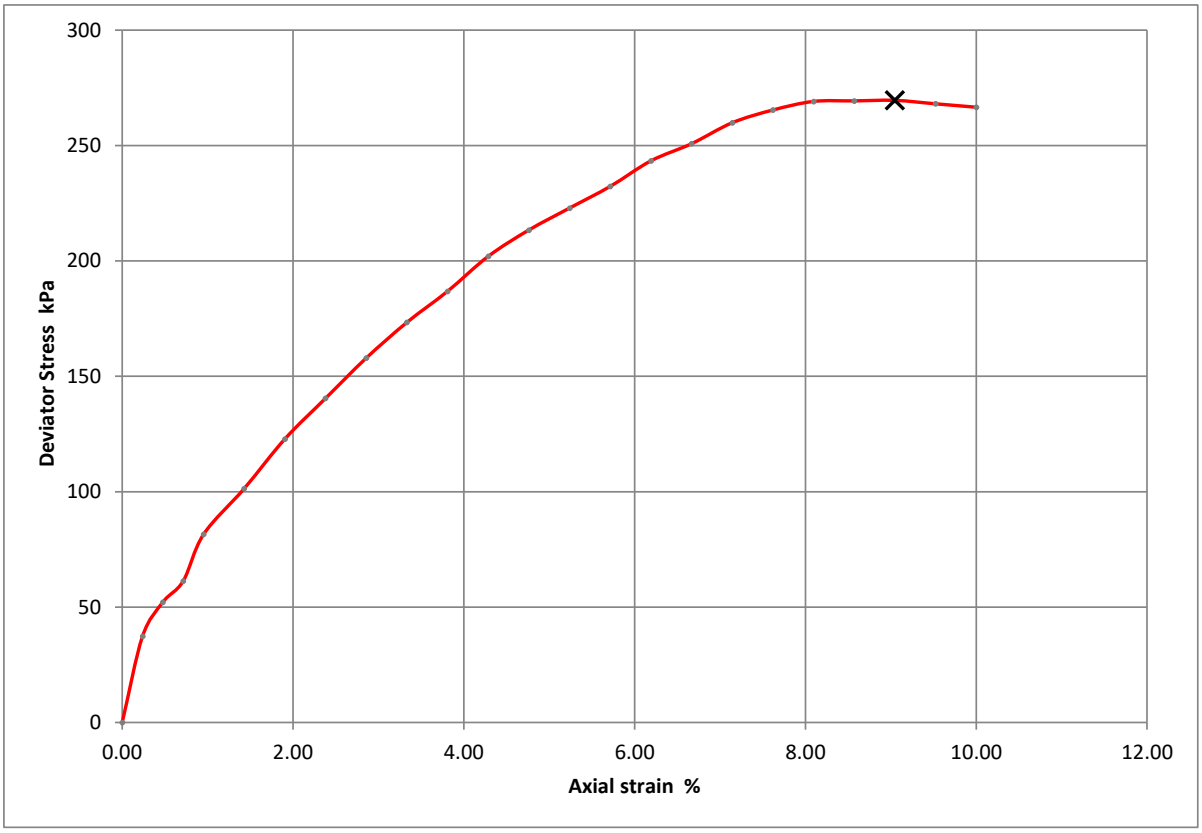
Specimen Post Test **Sample Split**



Checked	05/07/2021	Richard John	
Approved	06/07/2021	Paul Evans	

UKAS TESTING 4788

GSTL	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	54502
		Borehole/Pit No.	RC-BH102
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Brown silty CLAY	Depth Top (m)	3.20
		Depth Base (m)	3.80
Date Tested	26/06/2021	Sample Type	UT
		Technician	Daniel B



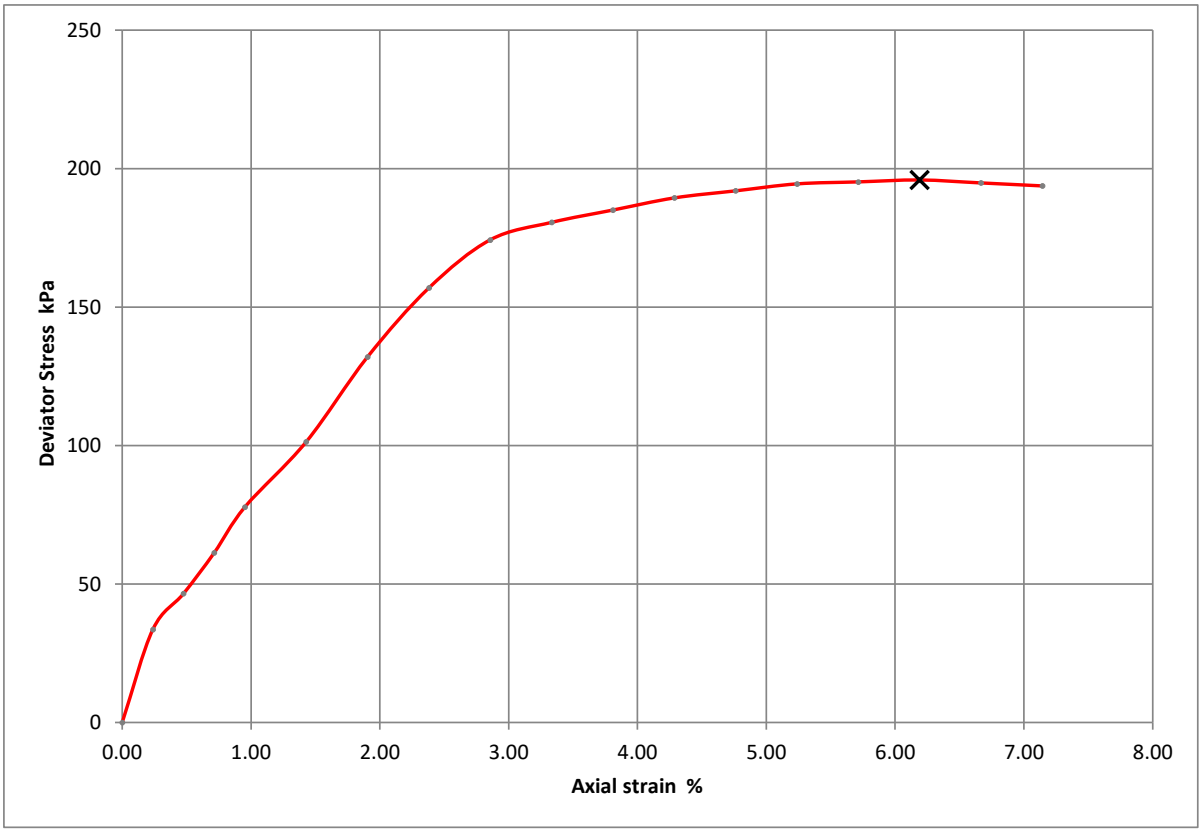
Moisture Content (%)	16
Bulk Density (Mg/m^3)	2.08
Dry Density (Mg/m^3)	1.80
Specimen Length (mm)	210
Specimen Diamteter (mm)	105
Cell Pressure (kPa)	60
Deviator Stress (kPa)	270
Undrained Shear Strength (kPa)	135
Failure Strain (%)	9
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Specimen Post Test **Sample Split**

Checked	05/07/2021	Richard John	
Approved	06/07/2021	Paul Evans	

UKAS TESTING 4788

GSTL	Single Stage Unconsolidated-Undrained Triaxial Test BS 1377 : 1990 Part 7 : 8	Contract Number	54502
		Borehole/Pit No.	RC-BH103
Site Name	Newport Quinn SDD RFP	Sample No.	
Soil Description	Brown silty CLAY	Depth Top (m)	3.20
		Depth Base (m)	3.80
Date Tested	26/06/2021	Sample Type	UT
		Technician	Daniel B



Moisture Content (%)	16
Bulk Density (Mg/m^3)	2.21
Dry Density (Mg/m^3)	1.91
Specimen Length (mm)	210
Specimen Diamteter (mm)	105
Cell Pressure (kPa)	60
Deviator Stress (kPa)	196
Undrained Shear Strength (kPa)	98
Failure Strain (%)	6
Mode Of Failure	Brittle
Membrane Used/Thickness	Rubber/0.3mm
Rate of Strain (%/min)	1.43

Specimen Post Test

Sample Split

Checked	05/07/2021	Richard John	
Approved	06/07/2021	Paul Evans	

UKAS TESTING 4788

LABORATORY TEST CERTIFICATE

10 Queenslie Point
Queenslie Industrial Estate
120 Stepps Road
Glasgow
G33 3NQ

Tel: 0141 774 4032

email: info@mattest.org
Website: www.mattest.org

Certificate No : **21/753 - 01**

To : **Colin Dodd**

Client : **Geotechnics Limited**
The Geotechnical Centre
Unit 1 Borders Industrial Park
River Lane, Saltney
Chester
CH4 8RJ

Dear Sirs,

LABORATORY TESTING OF ROCK

Introduction

We refer to samples taken from Newport Quinn SDD RFP and delivered to our laboratory on 24th June 2021.

Material & Source

Sample Reference	:	See Report Plates
Sampled By	:	Client
Sampling Certificate	:	Not Supplied
Location	:	See Report Plates
Description	:	Rock Cores
Date Sampled	:	Not Supplied
Date Tested	:	24th June 2021 Onwards
Source	:	PN214233 - Newport Quinn SDD RFP

Test Results;

As Detailed On Page 2 to Page 5 inclusive

Comments;

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation
This report should not be reproduced except in full without the written approval of the laboratory
All remaining samples for this project will be disposed of 28 days after issue of this test certificate

Remarks;

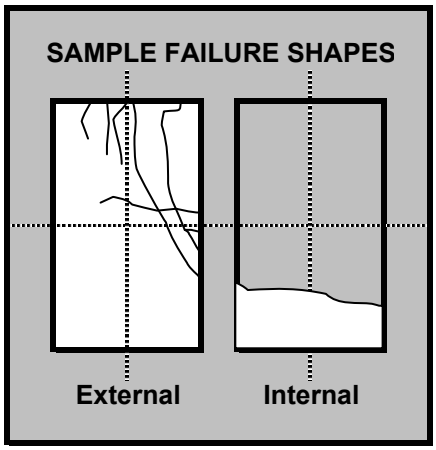
Approved for Issue

T McLelland (Director)

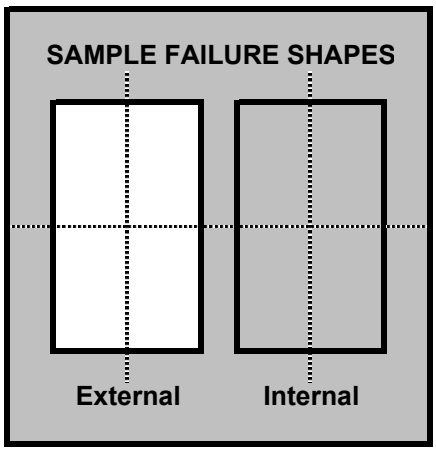
Date 01/07/2021

UKAS
2643

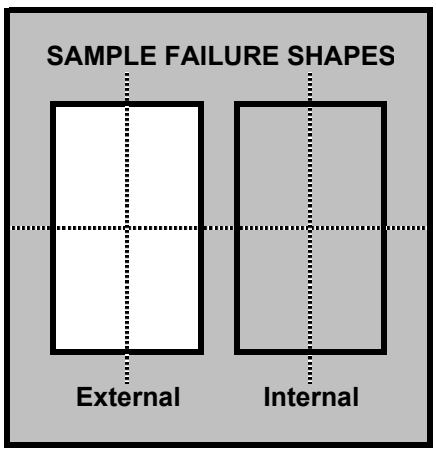
BOREHOLE		**RC-BH102**
SAMPLE		**C**
DEPTH	m	**12.62-12.88**
SAMPLE DIAMETER	mm	**85.71**
SAMPLE HEIGHT	mm	**180.38**
TEST CONDITION		**As Received**
RATE OF LOADING	kN/s	**0.1**
TEST DURATION	min.sec	**3.08**
DATE OF TESTING		**29/06/2021**
LOAD FRAME USED		**50kN**
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		**Unknown**
FAILURE LOAD	kN	**20.8**
UNCONFINED COMPRESSIVE STRENGTH	MPa	**3.60**
WATER CONTENT (ISRM Suggested Methods)	%	**7.6**
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.29**
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.13**



BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	



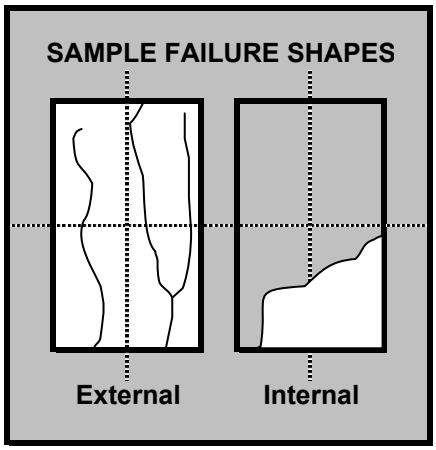
BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	



Tested in accordance with ASTM D7012 - 14

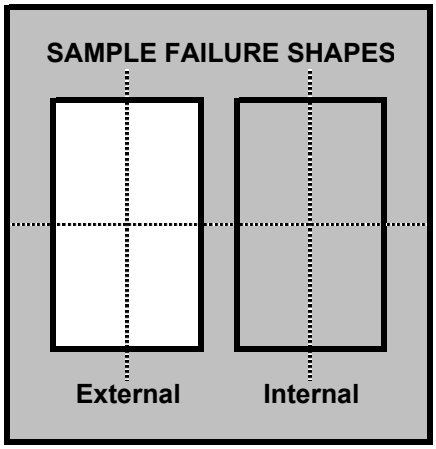
SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH

BOREHOLE		**RC-BH103**
SAMPLE		**C**
DEPTH	m	**5.18-5.40**
SAMPLE DIAMETER	mm	**86.07**
SAMPLE HEIGHT	mm	**103.22**
TEST CONDITION		**As Received**
RATE OF LOADING	kN/s	**0.05**
TEST DURATION	min.sec	**2.08**
DATE OF TESTING		**29/06/2021**
LOAD FRAME USED		**50kN**
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		**Unknown**
FAILURE LOAD	kN	**6.1**
UNCONFINED COMPRESSIVE STRENGTH	MPa	**1.05**
WATER CONTENT (ISRM Suggested Methods)	%	**11.3**
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.30**
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.06**

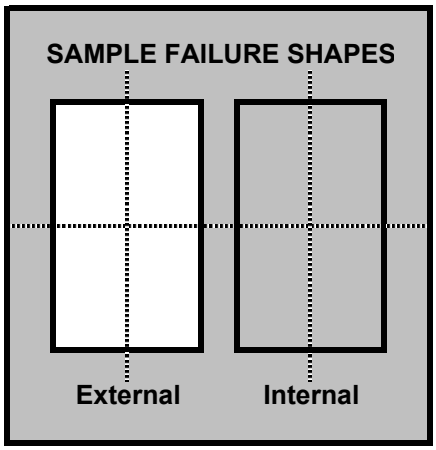


Test specimen does not meet specified length / diameter ratio requirements

BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	



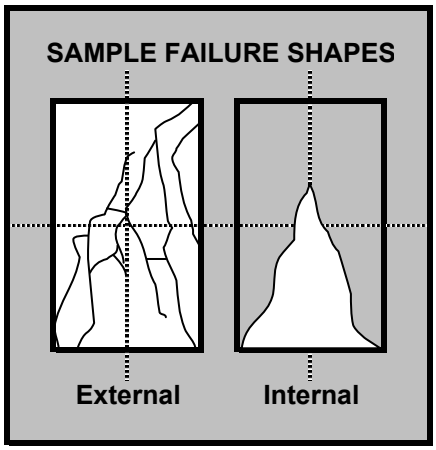
BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	



Tested in accordance with ASTM D7012 - 14

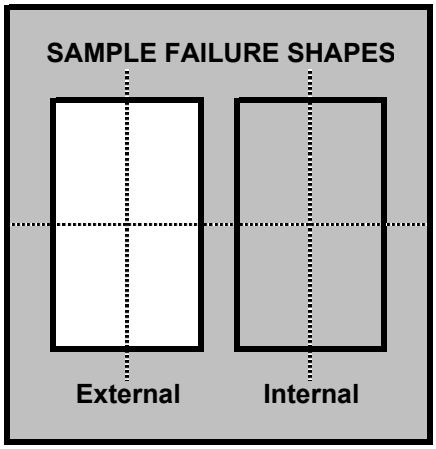
SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH

BOREHOLE		**RC-BH104**
SAMPLE		**C**
DEPTH	m	**9.98-10.18**
SAMPLE DIAMETER	mm	**85.56**
SAMPLE HEIGHT	mm	**148.88**
TEST CONDITION		**As Received**
RATE OF LOADING	kN/s	**0.1**
TEST DURATION	min.sec	**4.21**
DATE OF TESTING		**29/06/2021**
LOAD FRAME USED		**50kN**
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		**Unknown**
FAILURE LOAD	kN	**23.9**
UNCONFINED COMPRESSIVE STRENGTH	MPa	**4.16**
WATER CONTENT (ISRM Suggested Methods)	%	**6.3**
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.41**
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.27**

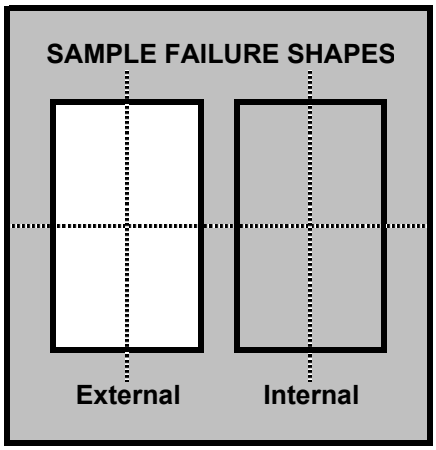


Test specimen does not meet specified length / diameter ratio requirements

BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	



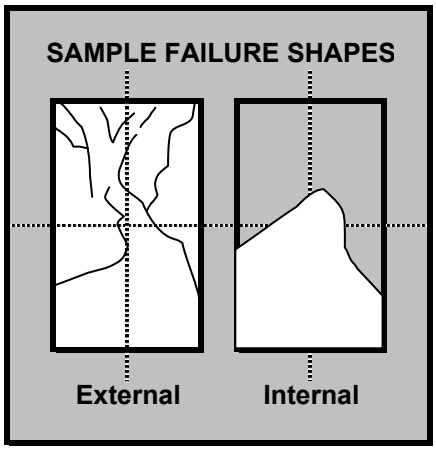
BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	



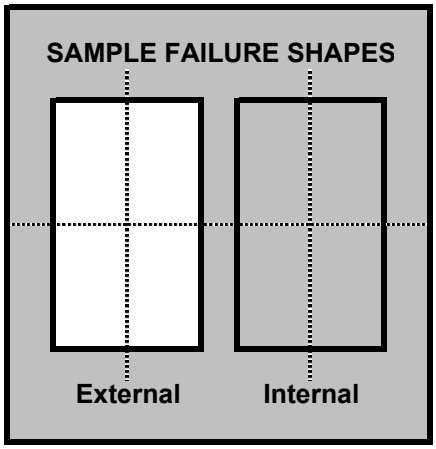
Tested in accordance with ASTM D7012 - 14

SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH

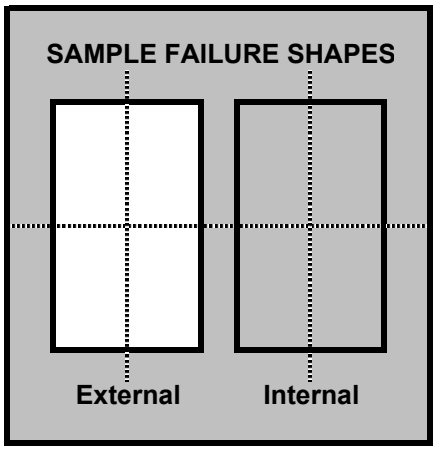
BOREHOLE		**RC-BH105**
SAMPLE		**C**
DEPTH	m	**8.06-8.34**
SAMPLE DIAMETER	mm	**86.63**
SAMPLE HEIGHT	mm	**181.72**
TEST CONDITION		**As Received**
RATE OF LOADING	kN/s	**0.01**
TEST DURATION	min.sec	**2.01**
DATE OF TESTING		**29/06/2021**
LOAD FRAME USED		**50kN**
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		**Unknown**
FAILURE LOAD	kN	**1.6**
UNCONFINED COMPRESSIVE STRENGTH	MPa	**0.271**
WATER CONTENT (ISRM Suggested Methods)	%	**17.2**
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	**2.07**
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	**1.77**



BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	



BOREHOLE		
SAMPLE		
DEPTH	m	
SAMPLE DIAMETER	mm	
SAMPLE HEIGHT	mm	
TEST CONDITION		
RATE OF LOADING	kN/s	
TEST DURATION	min.sec	
DATE OF TESTING		
LOAD FRAME USED		
LOAD DIRECTION WITH RESPECT TO LITHOLOGY		
FAILURE LOAD	kN	
UNCONFINED COMPRESSIVE STRENGTH	MPa	
WATER CONTENT (ISRM Suggested Methods)	%	
BULK DENSITY (ISRM Suggested Methods)	Mg/m^3	
DRY DENSITY (ISRM Suggested Methods)	Mg/m^3	



Tested in accordance with ASTM D7012 - 14

SUMMARY OF UNCONFINED COMPRESSIVE STRENGTH

Soil Environment Services Ltd

LABORATORY TEST CERTIFICATE

10768

Client:	Geotechnics Limited Unit 1B, Borders Industrial Park River Lane, Saltney Chester CH4 8RJ
Contact:	**Colin Dodd**
Client Job Ref.:	Newport Quinn
Samples Received:	09/07/2021
Analysis Completed:	27/0/2021
Certificate Issued:	28/07/2021
Material:	Natural Soils
Tests:	Thermal resistivity dry out curve - test method (ASTM D5334-14)

Notes:

1. Bulk samples disposed of 28 days from date of receipt unless otherwise instructed.
2. Unless otherwise stated, Soil Environment Services Ltd was not responsible for sampling.
3. This report shall not be reproduced, except in full, without written approval of Soil Environment Services Ltd.
4. Results reported relate only to the samples supplied.

Tested on behalf of ***Soil Environment Services*** by:

Rowan Davies BEng MSc AMIMechE
Consultant Engineer

Approved by:

Dr Robin S Davies BSc PhD (Soil Physics) F.I.SoilSci
Managing Director

Quality and Standards

SES Ltd is UKAS accredited to ISO 17025 2017. (Lab No. 10768)

We test to the requirements of the following specifications.

ENA TS 97-1, Issue 2 2016
ASTM D5334 - 14
IEEE Std 442 – 2017
National Grid TS 3.05.07
BS 1377

All test equipment is calibrated to manufacturer's requirements.

Soil Environment Services Ltd

Unit 8, Stocksfield Hall, Stocksfield,
Northumberland, NE43 7TN
Tel: 01661 844827
Email: rowan@soilenvironmentservices.co.uk

www.soilenvironmentservices.co.uk

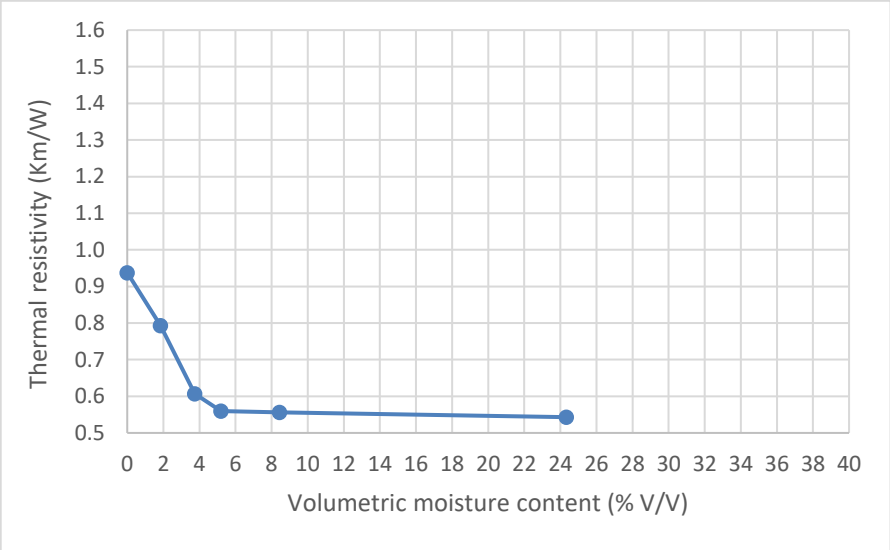
Company Registration Number 4538894 England and Wales
Directors: Dr R S Davies BSc PhD F.I.SoilSci. Dr M T Davies BSc PhD MA

Newport Quinn - Dry out Curves	
Sample Reference	**Strata Description**
BH 6 (1.2 - 1.7 m)	Red brown clayey sandy GRAVEL
BH 110 (1.4 - 2.1 m)	Red brown firm CLAY

Notes: Samples re-compacted at as received moisture using BS1377 2.5 kg hammer.

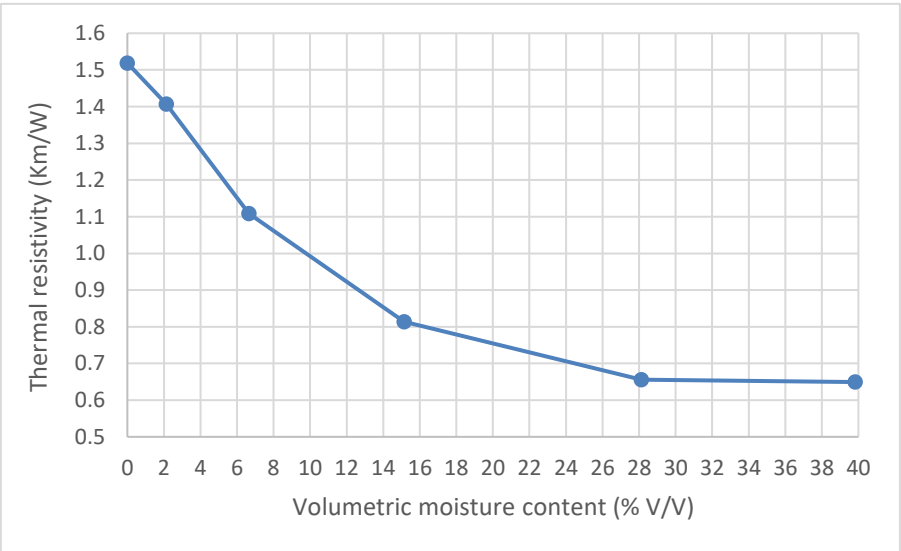
BH 6 (1.2-1.7 m)

Vol MC (%)	TR (Km/W)
24.33	0.543
8.45	0.556
5.20	0.559
3.75	0.607
1.84	0.793
0.00	0.938



BH 110 (1.4-2.1 m)

Vol MC (%)	TR (Km/W)
39.82	0.649
28.11	0.656
15.14	0.814
6.65	1.109
2.12	1.407
0.00	1.519



A Test specifications

1. Thermal test method: *Standard Test Method for Determination of Thermal Conductivity of Soil and Soft Rock by Thermal Needle Probe Procedure. ASTM Designation D5334-14, 2015.*

B Test equipment

1. TEMPOS or similar Thermal analyser.
2. ELE Proctor ~1 litre mould with an ELE 2.5 kg hammer. Or ~80 mm dia aluminium cores.
3. Impact Test Equipment soil drying oven set at 105°C.

C Notes

1. The sample received was compacted to a uniform 'field density' prior to testing.
2. Drying was at ~ 20°C apart from penultimate drying point at 60°C and final drying point at 105°C.

APPENDIX 10

Laboratory Test Results – Contamination (Soil) and Waste Acceptance Criteria

Certificate of Analysis

Certificate Number	21-11311	*Issued:*	09-Jun-21

Client Geotechnics LTD
The Geotechnical Centre
Unit 1B Borders Ind. Park
River Lane
Saltney
Chester
CH4 8RJ

Our Reference	21-11311
Client Reference	PN214233
Order No	ON28458
Contract Title	Newport
Description	7 Soil samples.
Date Received	28-May-21
Date Started	28-May-21
Date Completed	09-Jun-21
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 21-11311
Client Ref PN214233
Contract Title Newport

Test	Method	LOD	Units	Lab No	1854280	1854281	1854282	1854283	1854284	1854285	1854286
				.Sample ID	WS-BH102	WS-BH110	WS-BH110	WS-BH108	WS-BH104	CP-BH102	CP-BH102
				Depth	0.50	2.70	3.80	1.00	1.00	0.50	2.20
				Other ID							
				Sample Type	ES	ES	ES	ES	ES	ES	ES
				Sampling Date	24/05/2021	25/05/2021	25/05/2021	25/05/2021	25/05/2021	24/05/2021	24/05/2021
				Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Metals											
Arsenic	DETSC 2301#	0.2	mg/kg		5.4	7.8	2.4	2.4	3.1	2.8	
Barium	DETSC 2301#	1.5	mg/kg		50	540	750	170	380	540	
Beryllium	DETSC 2301#	0.2	mg/kg		0.7	0.6	1.0	< 0.2	0.4	0.4	
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg		< 0.2	0.6	< 0.2	0.4	3.4	6.4	
Cadmium	DETSC 2301#	0.1	mg/kg		0.1	0.8	< 0.1	< 0.1	0.4	0.6	
Chromium	DETSC 2301#	0.15	mg/kg		15	16	29	10	670	1600	
Copper	DETSC 2301#	0.2	mg/kg		13	18	11	6.3	130	120	
Lead	DETSC 2301#	0.3	mg/kg		16	21	12	5.7	26	37	
Mercury	DETSC 2325#	0.05	mg/kg		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Nickel	DETSC 2301#	1	mg/kg		24	17	30	3.2	27	24	
Selenium	DETSC 2301#	0.5	mg/kg		< 0.5	< 0.5	< 0.5	< 0.5	4.0	7.3	
Vanadium	DETSC 2301#	0.8	mg/kg		17	19	40	9.1	180	270	
Zinc	DETSC 2301#	1	mg/kg		55	90	56	19	190	210	
Inorganics											
pH	DETSC 2008#		pH		9.7	9.3	8.6	8.6	7.5	11.1	
Cyanide, Total	DETSC 2130#	0.1	mg/kg		< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1	
Total Organic Carbon	DETSC 2084#	0.5	%		< 0.5	< 0.5	0.8	5.7	2.2	0.6	
Ammonia Aqueous Extract as N	DETSC 2119	10	mg/l		< 10			< 10			< 10
Ammoniacal Nitrogen as NH4	DETSC 2119	0.5	mg/kg		5.0	11	65	2.8	1.3	1.0	
Petroleum Hydrocarbons											
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg		< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg		< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg		< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg		< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	20	
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg		< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	
Aliphatic C10-C44	DETSC 3072*	10	mg/kg		< 10	< 10	< 10	< 10	< 10	21	
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg		< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg		< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg		< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg		< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	74	
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg		< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	43	
Aromatic C10-C44	DETSC 3072*	10	mg/kg		< 10	< 10	< 10	< 10	< 10	110	
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg		< 10	< 10	< 10	< 10	< 10	130	
C5-C10 Gasoline Range Organics (GRO)	DETSC 3321*	0.1	mg/kg		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 21-11311
Client Ref PN214233
Contract Title Newport

			Lab No	1854280	1854281	1854282	1854283	1854284	1854285	1854286
			.Sample ID	WS-BH102	WS-BH110	WS-BH110	WS-BH108	WS-BH104	CP-BH102	CP-BH102
			Depth	0.50	2.70	3.80	1.00	1.00	0.50	2.20
			Other ID							
			Sample Type	ES	ES	ES	ES	ES	ES	ES
			Sampling Date	24/05/2021	25/05/2021	25/05/2021	25/05/2021	25/05/2021	24/05/2021	24/05/2021
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
C10-C24 Diesel Range Organics (DRO)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	
PAHs										
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.05	
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.09	
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.08	
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03	
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.04	
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.06	
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	0.03	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.35	
PCBs										
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg		< 0.01	< 0.01			< 0.01	
PCB 52	DETSC 3401#	0.01	mg/kg		< 0.01	< 0.01			< 0.01	
PCB 101	DETSC 3401#	0.01	mg/kg		< 0.01	< 0.01			< 0.01	
PCB 118	DETSC 3401#	0.01	mg/kg		< 0.01	< 0.01			< 0.01	
PCB 153	DETSC 3401#	0.01	mg/kg		< 0.01	< 0.01			< 0.01	
PCB 138	DETSC 3401#	0.01	mg/kg		< 0.01	< 0.01			< 0.01	
PCB 180	DETSC 3401#	0.01	mg/kg		< 0.01	< 0.01			< 0.01	
PCB 7 Total	DETSC 3401#	0.01	mg/kg		< 0.01	< 0.01			< 0.01	
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 21-11311
Client Ref PN214233
Contract Title Newport

			Lab No	1854281	1854282	1854285
			.Sample ID	WS-BH110	WS-BH110	CP-BH102
			Depth	2.70	3.80	0.50
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	25/05/2021	25/05/2021	24/05/2021
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
VOCs						
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 21-11311
Client Ref PN214233
Contract Title Newport

			Lab No	1854281	1854282	1854285
			.Sample ID	WS-BH110	WS-BH110	CP-BH102
			Depth	2.70	3.80	0.50
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	25/05/2021	25/05/2021	24/05/2021
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
SVOCs						
Phenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dibenzofuran	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Diethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Diphenylamine	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 21-11311
Client Ref PN214233
Contract Title Newport

			Lab No	1854281	1854282	1854285
			.Sample ID	WS-BH110	WS-BH110	CP-BH102
			Depth	2.70	3.80	0.50
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	25/05/2021	25/05/2021	24/05/2021
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Hexachlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Azobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1

Key: * -not accredited. n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 21-11311
Client Ref PN214233
Contract Title Newport

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1854280	WS-BH102 0.50	SOIL	NAD	none	Emma Stacey
1854281	WS-BH110 2.70	SOIL	NAD	none	Emma Stacey
1854282	WS-BH110 3.80	SOIL	NAD	none	Emma Stacey
1854283	WS-BH108 1.00	SOIL	NAD	none	Emma Stacey
1854284	WS-BH104 1.00	SOIL	NAD	none	Emma Stacey
1854285	CP-BH102 0.50	SOIL	NAD	none	Emma Stacey

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 21-11311
Client Ref PN214233
Contract Newport

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1854280	WS-BH102 0.50 SOIL	24/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia Aqueous Extract (3 days)	Ammoniacal Nitrogen as NH4
1854281	WS-BH110 2.70 SOIL	25/05/21	GJ 250ml, GJ 60ml, PT 1L		Ammoniacal Nitrogen as NH4
1854282	WS-BH110 3.80 SOIL	25/05/21	GJ 250ml, GJ 60ml, PT 1L		Ammoniacal Nitrogen as NH4
1854283	WS-BH108 1.00 SOIL	25/05/21	GJ 250ml, GJ 60ml, PT 1L		Ammoniacal Nitrogen as NH4
1854284	WS-BH104 1.00 SOIL	25/05/21	GJ 250ml, GJ 60ml, PT 1L		Ammoniacal Nitrogen as NH4
1854285	CP-BH102 0.50 SOIL	24/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia (3 days)	Ammoniacal Nitrogen as NH4
1854286	CP-BH102 2.20 SOIL	24/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia Aqueous Extract (3 days)	

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Certificate of Analysis

Certificate Number	21-11553	*Issued:*	14-Jun-21

Client Geotechnics LTD
The Geotechnical Centre
Unit 1B Borders Ind. Park
River Lane
Saltney
Chester
CH4 8RJ

Our Reference 21-11553

Client Reference PN214233

Order No ON29740

Contract Title Newport

Description 7 Soil samples, 1 Leachate sample.

Date Received 01-Jun-21

Date Started 01-Jun-21

Date Completed 14-Jun-21

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis

Soil Samples

Our Ref 21-11553
Client Ref PN214233
Contract Title Newport

			Lab No	1855645	1855646	1855647	1855648	1855649	1855650	1855651
			.Sample ID	WS-BH103	WS-BH103	WS-BH105	WS-BH106	WS-BH107	CP-BH105	WS-BH101
			Depth	1.00	2.40	1.10	1.00	0.50	0.50	0.80
			Other ID							
			Sample Type	ES	ES	ES	ES	ES	ES	ES
			Sampling Date	26/05/2021	26/05/2021	26/05/2021	26/05/2021	26/05/2021	27/05/2021	27/05/2021
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Metals										
Arsenic	DETSC 2301#	0.2	mg/kg	7.3		2.8	7.8	6.1	5.5	5.7
Barium	DETSC 2301#	1.5	mg/kg	160		210	710	220	2200	2200
Beryllium	DETSC 2301#	0.2	mg/kg	0.4		0.7	0.6	0.6	< 0.2	0.3
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	0.9		< 0.2	< 0.2	< 0.2	0.5	3.6
Cadmium	DETSC 2301#	0.1	mg/kg	0.6		< 0.1	2.3	0.1	4.3	6.1
Chromium	DETSC 2301#	0.15	mg/kg	110		23	16	13	5.4	100
Copper	DETSC 2301#	0.2	mg/kg	20		13	17	12	17	22
Lead	DETSC 2301#	0.3	mg/kg	18		9.5	48	8.8	110	130
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05		< 0.05	< 0.05	0.05	0.06	0.07
Nickel	DETSC 2301#	1	mg/kg	24		23	20	22	4.2	9.0
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5		< 0.5	< 0.5	< 0.5	< 0.5	0.9
Vanadium	DETSC 2301#	0.8	mg/kg	27		30	24	19	5.0	22
Zinc	DETSC 2301#	1	mg/kg	86		45	210	54	280	500
Inorganics										
pH	DETSC 2008#		pH	10.3		7.6	8.1	8.1	9.1	10.1
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	0.2
Total Organic Carbon	DETSC 2084#	0.5	%	< 0.5		< 0.5	< 0.5	< 0.5	7.1	2.8
Ammonia Aqueous Extract as N	DETSC 2119	10	mg/l		< 10					
Ammoniacal Nitrogen as NH4	DETSC 2119	0.5	mg/kg	2.2		16	3.1	3.2	1.9	3.3
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2		< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5		< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4		< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4		< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10		< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	42		< 0.9	28	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	30		< 0.5	18	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	15		< 0.6	8.2	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	22		< 1.4	10	< 1.4	< 1.4	< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	9.4		< 1.4	4.1	< 1.4	< 1.4	< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg	130		< 10	61	< 10	< 10	< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	130		< 10	64	< 10	< 10	< 10

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis

Soil Samples

Our Ref 21-11553
Client Ref PN214233
Contract Title Newport

			Lab No	1855645	1855646	1855647	1855648	1855649	1855650	1855651
			.Sample ID	WS-BH103	WS-BH103	WS-BH105	WS-BH106	WS-BH107	CP-BH105	WS-BH101
			Depth	1.00	2.40	1.10	1.00	0.50	0.50	0.80
			Other ID							
			Sample Type	ES	ES	ES	ES	ES	ES	ES
			Sampling Date	26/05/2021	26/05/2021	26/05/2021	26/05/2021	26/05/2021	27/05/2021	27/05/2021
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
C5-C10 Gasoline Range Organics (GRO)	DETSC 3321*	0.1	mg/kg	< 0.1		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
C10-C24 Diesel Range Organics (DRO)	DETSC 3311#	10	mg/kg	< 10		< 10	< 10	< 10	< 10	14
PAHs										
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	0.04		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	0.06		< 0.03	< 0.03	< 0.03	< 0.03	0.04
Pyrene	DETSC 3303#	0.03	mg/kg	0.05		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	0.04		< 0.03	< 0.03	< 0.03	< 0.03	0.04
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03		< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	0.21		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
PCBs										
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg	< 0.01			< 0.01			
PCB 52	DETSC 3401#	0.01	mg/kg	< 0.01			< 0.01			
PCB 101	DETSC 3401#	0.01	mg/kg	< 0.01			< 0.01			
PCB 118	DETSC 3401#	0.01	mg/kg	< 0.01			< 0.01			
PCB 153	DETSC 3401#	0.01	mg/kg	< 0.01			< 0.01			
PCB 138	DETSC 3401#	0.01	mg/kg	< 0.01			< 0.01			
PCB 180	DETSC 3401#	0.01	mg/kg	< 0.01			< 0.01			
PCB 7 Total	DETSC 3401#	0.01	mg/kg	< 0.01			< 0.01			
Phenols										
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3		< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 21-11553
Client Ref PN214233
Contract Title Newport

			Lab No	1855645	1855648
			.Sample ID	WS-BH103	WS-BH106
			Depth	1.00	1.00
			Other ID		
			Sample Type	ES	ES
			Sampling Date	26/05/2021	26/05/2021
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
VOCs					
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 21-11553
Client Ref PN214233
Contract Title Newport

			Lab No	1855645	1855648
			.Sample ID	WS-BH103	WS-BH106
			Depth	1.00	1.00
			Other ID		
			Sample Type	ES	ES
			Sampling Date	26/05/2021	26/05/2021
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
SVOCs					
Phenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Dibenzofuran	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,6-Dinitrotoluene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Diethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 21-11553
Client Ref PN214233
Contract Title Newport

			Lab No	1855645	1855648
			.Sample ID	WS-BH103	WS-BH106
			Depth	1.00	1.00
			Other ID		
			Sample Type	ES	ES
			Sampling Date	26/05/2021	26/05/2021
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Diphenylamine	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Hexachlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Azobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1

Key: * -not accredited. n/s -not supplied.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-11553
Client Ref PN214233
Contract Title Newport
Sample Id WS-BH106 1.00

Sample Numbers 1855648 1855652
Date Analysed 14/06/2021

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	< 0.5	3	5	6
DETSC 2003# Loss On Ignition	%	1.8	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	8.1	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l 10:1	Amount Leached* mg/kg LS10	WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	0.22	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	51	0.51	20	100	300
DETSC 2306 Cadmium as Cd	0.058	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	< 0.25	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	0.46	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.50	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	0.26	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	8.6	0.086	4	50	200
DETSC 2055 Chloride as Cl	750	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	3500	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	29000	290	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	8.0
DETSC 2009 Conductivity uS/cm	41.6
* Temperature*	21.0

Mass of Sample Kg*	0.100
Mass of dry Sample Kg*	0.094

Stage 1

Volume of Leachant L2*	0.935
Volume of Eluate VE1*	0.9

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*

V.2.06 ** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

Summary of Asbestos Analysis

Soil Samples

Our Ref 21-11553
Client Ref PN214233
Contract Title Newport

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1855645	WS-BH103 1.00	SOIL	NAD	none	Emma Stacey
1855647	WS-BH105 1.10	SOIL	NAD	none	Emma Stacey
1855648	WS-BH106 1.00	SOIL	NAD	none	Emma Stacey
1855649	WS-BH107 0.50	SOIL	NAD	none	Emma Stacey
1855650	CP-BH105 0.50	SOIL	NAD	none	Emma Stacey
1855651	WS-BH101 0.80	SOIL	NAD	none	Emma Stacey

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 21-11553
Client Ref PN214233
Contract Newport

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1855645	WS-BH103 1.00 SOIL	26/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia (3 days)	Ammoniacal Nitrogen as NH4
1855646	WS-BH103 2.40 SOIL	26/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia Aqueous Extract (3 days)	
1855647	WS-BH105 1.10 SOIL	26/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia (3 days)	Ammoniacal Nitrogen as NH4
1855648	WS-BH106 1.00 SOIL	26/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia (3 days)	Ammoniacal Nitrogen as NH4
1855649	WS-BH107 0.50 SOIL	26/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia (3 days)	Ammoniacal Nitrogen as NH4
1855650	CP-BH105 0.50 SOIL	27/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia (3 days)	Ammoniacal Nitrogen as NH4
1855651	WS-BH101 0.80 SOIL	27/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia (3 days)	Ammoniacal Nitrogen as NH4
1855652	WS-BH106 1.00 LEACHATE	26/05/21	GJ 250ml, GJ 60ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Certificate of Analysis

Certificate Number	21-11935	*Issued:*	16-Jun-21

Client Geotechnics LTD
The Geotechnical Centre
Unit 1B Borders Ind. Park
River Lane
Saltney
Chester
CH4 8RJ

Our Reference 21-11935

Client Reference PN214233

Order No ON29764

Contract Title Newport

Description 10 Soil samples, 1 Leachate sample.

Date Received 04-Jun-21

Date Started 07-Jun-21

Date Completed 16-Jun-21

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 21-11935
Client Ref PN214233
Contract Title Newport

	Lab No	1858724	1858725	1858726	1858727	1858728	1858729
	.Sample ID	CP-BH101	CP-BH101	WS-BH111	WS-BH108	WS-BH109	WS-BH109
	Depth	4.20	1.00	1.00	0.50	6.00	1.00
	Other ID						
	Sample Type	ES	ES	ES	ES	ES	ES
	Sampling Date	27/05/2021	27/05/2021	27/05/2021	25/05/2021	27/05/2021	27/05/2021
	Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg		3.9	5.2	5.9		2.5
Barium	DETSC 2301#	1.5	mg/kg		130	350	190		720
Beryllium	DETSC 2301#	0.2	mg/kg		0.6	0.6	0.4		1.2
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg		< 0.2	4.5	< 0.2		0.4
Cadmium	DETSC 2301#	0.1	mg/kg		0.2	1.1	0.1		0.2
Chromium	DETSC 2301#	0.15	mg/kg		15	280	13		34
Copper	DETSC 2301#	0.2	mg/kg		8.6	62	9.1		12
Lead	DETSC 2301#	0.3	mg/kg		7.4	57	12		12
Mercury	DETSC 2325#	0.05	mg/kg		< 0.05	< 0.05	< 0.05		< 0.05
Nickel	DETSC 2301#	1	mg/kg		16	38	11		37
Selenium	DETSC 2301#	0.5	mg/kg		< 0.5	2.3	< 0.5		< 0.5
Vanadium	DETSC 2301#	0.8	mg/kg		16	63	18		41
Zinc	DETSC 2301#	1	mg/kg		38	220	39		69
Inorganics									
pH	DETSC 2008#		pH		6.3	11.5	7.9		6.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg		0.2	< 0.1	< 0.1		0.4
Total Organic Carbon	DETSC 2084#	0.5	%		1.8	1.1	0.5		1.2
Ammonia Aqueous Extract as N	DETSC 2119	10	mg/l	< 10				< 10	
Ammoniacal Nitrogen as NH4	DETSC 2119	0.5	mg/kg		24	2.3	3.0		71
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg		< 1.5	4.3	< 1.5		< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg		< 1.2	9.8	< 1.2		< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg		< 1.5	12	< 1.5		< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg		< 3.4	55	< 3.4		< 3.4
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg		< 3.4	27	< 3.4		< 3.4
Aliphatic C10-C44	DETSC 3072*	10	mg/kg		< 10	97	< 10		< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg		< 0.01	< 0.01	< 0.01		< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg		< 0.9	< 0.9	< 0.9		< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg		< 0.5	< 0.5	< 0.5		< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg		< 0.6	< 0.6	< 0.6		< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg		< 1.4	< 1.4	< 1.4		< 1.4
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg		< 1.4	< 1.4	< 1.4		< 1.4
Aromatic C10-C44	DETSC 3072*	10	mg/kg		< 10	< 10	< 10		< 10
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg		< 10	97	< 10		< 10
C5-C10 Gasoline Range Organics (GRO)	DETSC 3321*	0.1	mg/kg		< 0.1	< 0.1	< 0.1		< 0.1
C10-C24 Diesel Range Organics (DRO)	DETSC 3311#	10	mg/kg		< 10	< 10	< 10		< 10

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 21-11935
Client Ref PN214233
Contract Title Newport

			Lab No	1858724	1858725	1858726	1858727	1858728	1858729
			.Sample ID	CP-BH101	CP-BH101	WS-BH111	WS-BH108	WS-BH109	WS-BH109
			Depth	4.20	1.00	1.00	0.50	6.00	1.00
			Other ID						
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	27/05/2021	27/05/2021	27/05/2021	25/05/2021	27/05/2021	27/05/2021
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg		< 0.03	0.03	< 0.03		0.04
Acenaphthylene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03
Fluorene	DETSC 3303	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg		< 0.03	0.08	< 0.03		< 0.03
Anthracene	DETSC 3303	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg		< 0.03	0.09	0.04		< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg		< 0.03	0.07	0.04		< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg		< 0.03	0.04	< 0.03		< 0.03
Chrysene	DETSC 3303	0.03	mg/kg		< 0.03	0.03	< 0.03		< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg		< 0.03	0.04	< 0.03		< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg		< 0.03	< 0.03	< 0.03		< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg		< 0.10	0.32	< 0.10		< 0.10
PCBs									
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg				< 0.01		
PCB 52	DETSC 3401#	0.01	mg/kg				< 0.01		
PCB 101	DETSC 3401#	0.01	mg/kg				< 0.01		
PCB 118	DETSC 3401#	0.01	mg/kg				< 0.01		
PCB 153	DETSC 3401#	0.01	mg/kg				< 0.01		
PCB 138	DETSC 3401#	0.01	mg/kg				< 0.01		
PCB 180	DETSC 3401#	0.01	mg/kg				< 0.01		
PCB 7 Total	DETSC 3401#	0.01	mg/kg				< 0.01		
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg		< 0.3	< 0.3	< 0.3		< 0.3

Summary of Chemical Analysis
Soil Samples

Our Ref 21-11935
Client Ref PN214233
Contract Title Newport

			Lab No	1858730	1858731	1858732	1858733
			.Sample ID	RC-BH103	RC-BH103	RC-BH104	RC-BH104
			Depth	1.00	2.10	1.00	3.00
			Other ID				
			Sample Type	ES	ES	ES	ES
			Sampling Date	28/05/2021	28/05/2021	28/05/2021	01/06/2021
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	6.1	4.9	6.4	
Barium	DETSC 2301#	1.5	mg/kg	270	230	84	
Beryllium	DETSC 2301#	0.2	mg/kg	0.6	0.7	0.5	
Boron, Water Soluble	DETSC 2311#	0.2	mg/kg	3.1	0.2	0.4	
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	< 0.1	< 0.1	
Chromium	DETSC 2301#	0.15	mg/kg	480	31	22	
Copper	DETSC 2301#	0.2	mg/kg	53	12	11	
Lead	DETSC 2301#	0.3	mg/kg	24	12	8.2	
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	
Nickel	DETSC 2301#	1	mg/kg	23	52	22	
Selenium	DETSC 2301#	0.5	mg/kg	2.8	< 0.5	< 0.5	
Vanadium	DETSC 2301#	0.8	mg/kg	120	29	22	
Zinc	DETSC 2301#	1	mg/kg	140	69	51	
Inorganics							
pH	DETSC 2008#		pH	11.4	7.9	8.3	
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	
Total Organic Carbon	DETSC 2084#	0.5	%	2.8	< 0.5	< 0.5	
Ammonia Aqueous Extract as N	DETSC 2119	10	mg/l				< 10
Ammoniacal Nitrogen as NH4	DETSC 2119	0.5	mg/kg	4.2	2.6	2.1	
Petroleum Hydrocarbons							
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	26	
Aliphatic C35-C44	DETSC 3072*	3.4	mg/kg	< 3.4	< 3.4	< 3.4	
Aliphatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	24	
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	
Aromatic C35-C44	DETSC 3072*	1.4	mg/kg	< 1.4	< 1.4	< 1.4	
Aromatic C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	
Ali/Aro C10-C44	DETSC 3072*	10	mg/kg	< 10	< 10	24	
C5-C10 Gasoline Range Organics (GRO)	DETSC 3321*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	
C10-C24 Diesel Range Organics (DRO)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	

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Summary of Chemical Analysis
Soil Samples

Our Ref 21-11935
Client Ref PN214233
Contract Title Newport

	Lab No	1858730	1858731	1858732	1858733
	.Sample ID	RC-BH103	RC-BH103	RC-BH104	RC-BH104
	Depth	1.00	2.10	1.00	3.00
	Other ID				
	Sample Type	ES	ES	ES	ES
	Sampling Date	28/05/2021	28/05/2021	28/05/2021	01/06/2021
	Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**		
PAHs					
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	
PCBs							
PCB 28 + PCB 31	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 52	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 101	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 118	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 153	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 138	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 180	DETSC 3401#	0.01	mg/kg	< 0.01			
PCB 7 Total	DETSC 3401#	0.01	mg/kg	< 0.01			
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 21-11935
Client Ref PN214233
Contract Title Newport

			Lab No	1858727	1858730
			.Sample ID	WS-BH108	RC-BH103
			Depth	0.50	1.00
			Other ID		
			Sample Type	ES	ES
			Sampling Date	25/05/2021	28/05/2021
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
VOCs					
Vinyl Chloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chloroform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Benzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Trichloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Dibromomethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Chlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
m+p-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
o-Xylene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Bromoform	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Bromobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-propylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 21-11935
Client Ref PN214233
Contract Title Newport

			Lab No	1858727	1858730
			.Sample ID	WS-BH108	RC-BH103
			Depth	0.50	1.00
			Other ID		
			Sample Type	ES	ES
			Sampling Date	25/05/2021	28/05/2021
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
sec-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
n-butylbenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431	0.01	mg/kg	< 0.01	< 0.01
MTBE	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
SVOCs					
Phenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Dibenzofuran	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,6-Dinitrotoluene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Diethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Diphenylamine	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Soil VOC/SVOC Samples

Our Ref 21-11935
Client Ref PN214233
Contract Title Newport

			Lab No	1858727	1858730
			.Sample ID	WS-BH108	RC-BH103
			Depth	0.50	1.00
			Other ID		
			Sample Type	ES	ES
			Sampling Date	25/05/2021	28/05/2021
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Hexachlorobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Azobenzene	DETSC 3433	0.1	mg/kg	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1

Key: * -not accredited. n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 21-11935
Client Ref PN214233
Contract Title Newport

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1858725	CP-BH101 1.00	SOIL	NAD	none	Jordan Farley
1858726	WS-BH111 1.00	SOIL	NAD	none	Jordan Farley
1858727	WS-BH108 0.50	SOIL	NAD	none	Jordan Farley
1858729	WS-BH109 1.00	SOIL	NAD	none	Jordan Farley
1858730	RC-BH103 1.00	SOIL	NAD	none	Jordan Farley
1858731	RC-BH103 2.10	SOIL	NAD	none	Jordan Farley
1858732	RC-BH104 1.00	SOIL	NAD	none	Jordan Farley

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

WASTE ACCEPTANCE CRITERIA TESTING ANALYTICAL REPORT

Our Ref 21-11935
Client Ref PN214233
Contract Title Newport
Sample Id CP-BH101 1.00

Sample Numbers 1858725 1858734
Date Analysed 16/06/2021

Test Results On Waste

Determinand and Method Reference	Units	Result	WAC Limit Values: Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	1.8	3	5	6
DETSC 2003# Loss On Ignition	%	4.1	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311# TPH (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	6.3	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0	n/a	TBE	TBE

Test Results On Leachate

Determinand and Method Reference	Conc in Eluate ug/l 10:1	Amount Leached* mg/kg LS10	WAC Limit Values (Limit values for LS10 Leachate): Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	0.76	< 0.01	0.5	2	25
DETSC 2306 Barium as Ba	2.1	< 0.1	20	100	300
DETSC 2306 Cadmium as Cd	< 0.030	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	< 0.25	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	< 0.40	< 0.02	2	50	100
DETSC 2306 Mercury as Hg	< 0.010	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.1	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	< 0.50	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	< 0.090	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.17	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	< 0.25	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	< 1.3	< 0.01	4	50	200
DETSC 2055 Chloride as Cl	760	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	< 100	< 0.1	10	150	500
DETSC 2055 Sulphate as SO4	2500	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	8000	80	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	< 2000	< 50	500	800	1000

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive Hazardous Waste

Additional Information

DETSC 2008 pH	8.2
DETSC 2009 Conductivity uS/cm	11.4
* Temperature*	21.0

Mass of Sample Kg*	0.120
Mass of dry Sample Kg*	0.096

Stage 1

Volume of Leachant L2*	0.936
Volume of Eluate VE1*	0.9

Disclaimer: *The WAC limit values are provided for guidance only. DETS does not accept responsibility for errors or omissions. Values are correct at time of issue.*

V.2.06 ** DETS are accredited for the testing of leachates and not the leachate preparation stage which is unaccredited.*

Information in Support of the Analytical Results

Our Ref 21-11935
Client Ref PN214233
Contract Newport

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1858724	CP-BH101 4.20 SOIL	27/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia Aqueous Extract (3 days)	
1858725	CP-BH101 1.00 SOIL	27/05/21	PT 1L	Ammonia (3 days), pH + Conductivity (7 days)	Aliphatics/Aromatics, BTEX, Naphthalene, Ammoniacal Nitrogen as NH4, PAH FID, PAH MS, PCB, EPH/TPH
1858726	WS-BH111 1.00 SOIL	27/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia (3 days), pH + Conductivity (7 days)	Ammoniacal Nitrogen as NH4
1858727	WS-BH108 0.50 SOIL	25/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia (3 days), pH + Conductivity (7 days), VOC (7 days)	Ammoniacal Nitrogen as NH4
1858728	WS-BH109 6.00 SOIL	27/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia Aqueous Extract (3 days)	
1858729	WS-BH109 1.00 SOIL	27/05/21	GJ 250ml, GJ 60ml, PT 1L	Ammonia (3 days), pH + Conductivity (7 days)	Ammoniacal Nitrogen as NH4
1858730	RC-BH103 1.00 SOIL	28/05/21	PT 1L	Ammonia (3 days)	Aliphatics/Aromatics, BTEX, Naphthalene, Ammoniacal Nitrogen as NH4, PAH MS, PCB, SVOC, EPH/TPH
1858731	RC-BH103 2.10 SOIL	28/05/21	PT 1L	Ammonia (3 days)	Aliphatics/Aromatics, BTEX, Naphthalene, Ammoniacal Nitrogen as NH4, PAH MS, EPH/TPH
1858732	RC-BH104 1.00 SOIL	28/05/21	PT 1L	Ammonia (3 days)	Aliphatics/Aromatics, BTEX, Naphthalene, Ammoniacal Nitrogen as NH4, PAH MS, EPH/TPH
1858733	RC-BH104 3.00 SOIL	01/06/21	PT 1L		
1858734	CP-BH101 1.00 LEACHATE	27/05/21	PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Information in Support of the Analytical Results

Our Ref 21-11935
Client Ref PN214233
Contract Newport

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

APPENDIX 11

Laboratory Test Results – Contamination (Groundwater)

Certificate of Analysis

Certificate Number	21-12390	*Issued:*	21-Jun-21

Client Geotechnics LTD
The Geotechnical Centre
Unit 1B Borders Ind. Park
River Lane
Saltney
Chester
CH4 8RJ

Our Reference	21-12390
Client Reference	PN214233
Order No	ON29853
Contract Title	Newport
Description	10 Water samples.
Date Received	11-Jun-21
Date Started	11-Jun-21
Date Completed	21-Jun-21
Test Procedures	Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Water Samples

Our Ref 21-12390
Client Ref PN214233
Contract Title Newport

			Lab No	1861291	1861292	1861293	1861294	1861295	1861296
			.Sample ID	RC-BH105	RC-BH104	CP-BH103	RC-BH103	CP-BH102	CP-BH101
			Depth	2.20	2.50	1.25	2.20	3.05	1.95
			Other ID						
			Sample Type	WATER	WATER	WATER	WATER	WATER	WATER
			Sampling Date	10/06/2021	10/06/2021	10/06/2021	10/06/2021	10/06/2021	10/06/2021
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.31	0.81	0.61	0.86	1.2	1.3
Barium, Dissolved	DETSC 2306	0.26	ug/l	180	360	97	270	200	580
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	47	30	46	76	150	43
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.22	< 0.03	0.17	< 0.03	0.04	0.07
Calcium, Dissolved	DETSC 2306	0.09	mg/l	77	70	32	76	63	120
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.61	1.1	1.2	0.71	1.3	0.63
Copper, Dissolved	DETSC 2306	0.4	ug/l	3.2	2.5	1.1	0.6	3.0	0.5
Lead, Dissolved	DETSC 2306	0.09	ug/l	5.6	0.11	0.69	< 0.09	0.27	0.14
Manganese, Dissolved	DETSC 2306	0.22	ug/l	1300	66	72	12	1000	1200
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.03	0.04	0.02	0.01	0.06	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	3.6	1.4	1.0	< 0.5	4.1	7.2
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.0	0.65	2.8	1.0	12	1.1
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	< 0.6	2.0	1.2	3.6	2.6	< 0.6
Zinc, Dissolved	DETSC 2306	1.3	ug/l	2.3	3.6	3.5	2.9	12	53
Inorganics									
pH	DETSC 2008		pH	7.0	7.3	7.4	7.5	7.3	6.6
Dissolved Organic Carbon	DETSC 2085	2	mg/l	< 2.0	3.4	< 2.0	< 2.0	12	14
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.030	0.10	0.040	0.060	2.8	2.2
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C10-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	24
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	24
Aliphatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C10-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ali/Aro C10-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	24
PAHs									
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 21-12390
Client Ref PN214233
Contract Title Newport

			Lab No	1861291	1861292	1861293	1861294	1861295	1861296
			.Sample ID	RC-BH105	RC-BH104	CP-BH103	RC-BH103	CP-BH102	CP-BH101
			Depth	2.20	2.50	1.25	2.20	3.05	1.95
			Other ID						
			Sample Type	WATER	WATER	WATER	WATER	WATER	WATER
			Sampling Date	10/06/2021	10/06/2021	10/06/2021	10/06/2021	10/06/2021	10/06/2021
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	0.06	0.01	0.06	< 0.01	0.01	< 0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Phenols									
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100	< 100	< 100	< 100	< 100

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 21-12390
Client Ref PN214233
Contract Title Newport

			Lab No	1861297	1861298	1861299	1861300
			.Sample ID	WS-BH110	WS-BH109	RC-BH102	WS-BH103
			Depth	2.65	2.55	2.60	1.90
			Other ID				
			Sample Type	WATER	WATER	WATER	WATER
			Sampling Date	10/06/2021	10/06/2021	10/06/2021	10/06/2021
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Metals							
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	6.5	8.9	0.96	0.78
Barium, Dissolved	DETSC 2306	0.26	ug/l	84	530	130	180
Beryllium, Dissolved	DETSC 2306*	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Boron, Dissolved	DETSC 2306*	12	ug/l	170	81	270	77
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.04	< 0.03	< 0.03	< 0.03
Calcium, Dissolved	DETSC 2306	0.09	mg/l	50	210	28	62
Chromium, Dissolved	DETSC 2306	0.25	ug/l	1.3	1.1	1.2	3.6
Copper, Dissolved	DETSC 2306	0.4	ug/l	3.2	< 0.4	1.2	1.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.57	0.10	0.33	< 0.09
Manganese, Dissolved	DETSC 2306	0.22	ug/l	26	3000	25	170
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.34	0.02	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	2.8	7.4	1.1	3.3
Selenium, Dissolved	DETSC 2306	0.25	ug/l	15	5.0	0.75	0.45
Vanadium, Dissolved	DETSC 2306	0.6	ug/l	38	2.6	2.0	1.5
Zinc, Dissolved	DETSC 2306	1.3	ug/l	1.4	1.6	3.7	3.2
Inorganics							
pH	DETSC 2008		pH	10.2	7.5	8.0	7.6
Dissolved Organic Carbon	DETSC 2085	2	mg/l	24	72	2.2	4.0
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	6.3	3.6	0.34	0.050
Petroleum Hydrocarbons							
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C10-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C35-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C10-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Ali/Aro C10-C44	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
PAHs							
Naphthalene	DETSC 3304	0.05	ug/l	0.12	< 0.05	< 0.05	< 0.05

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 21-12390
Client Ref PN214233
Contract Title Newport

			Lab No	1861297	1861298	1861299	1861300
			.Sample ID	WS-BH110	WS-BH109	RC-BH102	WS-BH103
			Depth	2.65	2.55	2.60	1.90
			Other ID				
			Sample Type	WATER	WATER	WATER	WATER
			Sampling Date	10/06/2021	10/06/2021	10/06/2021	10/06/2021
			Sampling Time	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**				
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	0.02	< 0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	0.07	< 0.01	< 0.01	0.02
Anthracene	DETSC 3304	0.01	ug/l	0.01	0.02	< 0.01	0.02
Fluoranthene	DETSC 3304	0.01	ug/l	0.06	< 0.01	< 0.01	0.03
Pyrene	DETSC 3304	0.01	ug/l	0.15	0.02	< 0.01	0.06
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	0.04	< 0.01	0.04
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	0.44	< 0.20	< 0.20	0.22
Phenols							
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100	< 100	< 100

Key: * -not accredited. n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 21-12390
Client Ref PN214233
Contract Newport

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1861291	RC-BH105 2.20 WATER	10/06/21	GB 1L, GV, PB 1L		
1861292	RC-BH104 2.50 WATER	10/06/21	GB 1L, GV, PB 1L		
1861293	CP-BH103 1.25 WATER	10/06/21	GB 1L, GV, PB 1L		
1861294	RC-BH103 2.20 WATER	10/06/21	GB 1L, GV, PB 1L		
1861295	CP-BH102 3.05 WATER	10/06/21	GB 1L, GV, PB 1L		
1861296	CP-BH101 1.95 WATER	10/06/21	GB 1L, GV, PB 1L		
1861297	WS-BH110 2.65 WATER	10/06/21	GB 1L, GV, PB 1L		
1861298	WS-BH109 2.55 WATER	10/06/21	GB 1L, GV, PB 1L		
1861299	RC-BH102 2.60 WATER	10/06/21	GB 1L, GV, PB 1L		
1861300	WS-BH103 1.90 WATER	10/06/21	GB 1L, GV, PB 1L		

Key: G-Glass P-Plastic B-Bottle V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

APPENDIX 12

Summary of Analytical Soil Data

Site: NEWPORT QUINN SDD RPF

CHEMICAL STATISTICAL ANALYSIS - based on CLEA v1.06 (Sandy Loam 2.5% SOM)

Job No: PN214233

Analyte	Limit of Detection	Made Ground - Potential Hydrocarbons						Natural - Potential Hydrocarbons				
		WS-BH110	WS-BH110	CP-BH102	WS-BH111	WS-BH109	RC-BH103	WS-BH105	RC-BH103	CP-BH101	CP-BH101	WS-BH109
		25/05/2021	25/05/2021	24/05/2021	27/05/2021	27/05/2021	28/05/2021	26/05/2021	28/05/2021	27/05/2021	27/05/2021	27/05/2021
		2.7	3.8	0.5	1.0	1.0	1.0	1.1	2.1	4.2	1.0	6.0
Asbestos Screen	Positive / Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	-	-
Metals												
Arsenic (total)	<0.2 mg/kg	7.8	2.4	2.8	5.2	2.5	6.1	2.8	4.9	-	3.9	-
Barium	<1.5 mg/kg	540	750	540	350	720	270	210	230	-	130	-
Beryllium	<0.2 mg/kg	0.6	1	0.4	0.6	1.2	0.6	0.7	0.7	-	0.6	-
Boron (water soluble)	<0.2 mg/kg	0.6	0.2	6.4	4.5	0.4	3.1	0.2	0.2	-	0.2	-
Cadmium (total)	<0.1 mg/kg	0.8	0.1	0.6	1.1	0.2	0.3	0.1	0.1	-	0.2	-
Chromium (hexavalent)#	-	0.012709	0.004596	80.189957	35.249912	0.000027	48.000000	0.000365	0.000980	-	0.000012	-
Chromium (total) (III for S4ULs)	<0.15 mg/kg	16	29	1600	280	34	480	23	31	-	15	-
Copper (total)	<0.2 mg/kg	18	11	120	62	12	53	13	12	-	8.6	-
Lead (total)	<0.3 mg/kg	21	12	37	57	12	24	9.5	12	-	7.4	-
Mercury (total inorganic)	<0.05 mg/kg	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-	0.05	-
Nickel (total)	<1 mg/kg	17	30	24	38	37	23	23	52	-	16	-
Selenium (total)	<0.5mg/kg	0.5	0.5	7.3	2.3	0.5	2.8	0.5	0.5	-	0.5	-
Zinc (total)	<1 mg/kg	19	40	270	63	41	120	30	29	-	16	-
Vanadium	<1.0 mg/kg	90	56	210	220	69	140	45	69	-	38	-
Inorganic												
pH Value	pH Units	9.3	8.6	11.1	11.5	6.3	11.4	7.6	7.9	7.4	6.3	11.5
Cyanide (total)	<0.1 mg/kg	0.1	0.2	0.1	0.1	0.4	0.1	0.1	0.1	-	0.2	
Ammonia expressed as NH4	<5 mg/kg	11	65	1	2.3	71	4.2	16	2.6	-	24	
Magnesium water soluble	<10mg/l	-	-	-	-	-	-	-	-	10	-	10
Nitrate (2:1)	<1 mg/l	-	-	-	-	-	-	-	-	1	-	8.7
Chloride (2:1)	<1 mg/l	-	-	-	-	-	-	-	-	4.8	-	42
Sulphur (total)	<0.01 %	-	-	-	-	-	-	-	-	0.02	-	0.12
Sulphate (2:1)	<10 mg/l	-	-	-	-	-	-	-	-	33	-	38
Sulphate (total)	<0.01 %	-	-	-	-	-	-	-	-	0.04	-	0.32
Organic												
TOC	<0.5 %	0.5	0.8	0.6	1.1	1.2	2.8	0.5	0.5	-	1.8	-
Phenol (Total Monohydric)	<0.3 mg/kg	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	-	0.3	-
PAH												
Naphthalene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	-	0.03	-
Acenaphthylene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	0.03	-
Acenaphthene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	0.03	-
Fluorene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	0.03	-
Phenanthrene	<0.03 mg/kg	0.03	0.03	0.05	0.08	0.03	0.03	0.03	0.03	-	0.03	-
Anthracene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	0.03	-
Fluoranthene	<0.03 mg/kg	0.03	0.03	0.09	0.09	0.03	0.03	0.03	0.03	-	0.03	-
Pyrene	<0.03 mg/kg	0.03	0.03	0.08	0.07	0.03	0.03	0.03	0.03	-	0.03	-
Benz(a)anthracene	<0.03 mg/kg	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	-	0.03	-
Chrysene	<0.03 mg/kg	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	-	0.03	-
Benzo(b)fluoranthene	<0.03 mg/kg	0.03	0.03	0.06	0.04	0.03	0.03	0.03	0.03	-	0.03	-
Benzo(k)fluoranthene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	0.03	-
Benzo(a)pyrene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	0.03	-
Indeno(123cd)pyrene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	0.03	-
Dibenzo(ah)anthracene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	0.03	-
Benzo(ghi)perylene	<0.03 mg/kg	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	0.03	-
Petroleum Hydrocarbons												
Aliphatic >C_5 - C_6	<0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	-
Aliphatic >C_6 - C_8	<0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	-
Aliphatic >C_8 - C_{10}	<0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	-
Aliphatic >C_{10} - C_{12}	<1 .5mg/kg	1.5	1.5	1.5	4.3	1.5	1.5	1.5	1.5	-	1.5	-
Aliphatic >C_{12} - C_{16}	<1 .2mg/kg	1.2	1.2	1.2	9.8	1.2	1.2	1.2	1.2	-	1.2	-
Aliphatic >C_{16} - C_{21}	<1 .5mg/kg	1.5	1.5	1.5	12	1.5	1.5	1.5	1.5	-	1.5	-
Aliphatic >C_{21} - C_{35}	<3.4 mg/kg	3.4	3.4	20	55	3.4	3.4	3.4	3.4	-	3.4	-
Aliphatic >C_{35} - C_{44}	<3.4 mg/kg	3.4	3.4	3.4	27	3.4	3.4	3.4	3.4	-	3.4	-
Total Aliphatic >C_5 - C_{35}	<10 mg/kg	10	10	21	97	10	10	10	10	-	10	-
Aromatic C_5 - C_7	<0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	-
Aromatic C_7 - C_8	<0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	-
Aromatic >C_8 - C_{10}	<0.01 mg/kg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	0.01	-
Aromatic >C_{10} - C_{12}	<0.9 mg/kg	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	-	0.9	-
Aromatic >C_{12} - C_{16}	<0.5 mg/kg	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-	0.5	-
Aromatic >C_{16} - C_{21}	<0.6 mg/kg	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	-	0.6	-
Aromatic >C_{21} - C_{35}	<1.4 mg/kg	1.4	1.4	74	1.4	1.4	1.4	1.4	1.4	-	1.4	-
Aromatic >C_{35} - C_{44}	<1.4 mg/kg	1.4	1.4	43	1.4	1.4	1.4	1.4	1.4	-	1.4	-
Total Aromatic >C_5 - C_{35}	<10 mg/kg	10	10	130	10	10	10	10	10	-	10	-
PCBs												
PCB 28 + PCB 31	<0.01 mg/kg	0.01	0.01	0.01	-	-	0.01	-	-	-	-	-
PCB 52	<0.01 mg/kg	0.01	0.01	0.01	-	-	0.01	-	-	-	-	-
PCB 101	<0.01 mg/kg	0.01	0.01	0.01	-	-	0.01	-	-	-	-	-
PCB 118	<0.01 mg/kg	0.01	0.01	0.01	-	-	0.01	-	-	-	-	-
PCB 153	<0.01 mg/kg	0.01	0.01	0.01	-	-	0.01	-	-	-	-	-
PCB 138	<0.01 mg/kg	0.01	0.01	0.01	-	-	0.01	-	-	-	-	-
PCB 180	<0.01 mg/kg	0.01	0.01	0.01	-	-	0.01	-	-	-	-	-
PCB 7 Total	<0.01 mg/kg	0.01	0.01	0.01	-	-	0.01	-	-	-	-	-

Analyte	Made Ground - General Site										Natural - General Site		
	WS-BH102	WS-BH108	WS-BH104	WS-BH103	WS-BH106	WS-BH107	CP-BH105	WS-BH101	WS-BH108	RC-BH104	CP-BH102	RC-BH104	WS-BH103
	24/05/2021	25/05/2021	25/05/2021	26/05/2021	26/05/2021	26/05/2021	27/05/2021	27/05/2021	25/05/2021	28/05/2021	24/05/2021	01/06/2021	26/05/2021
	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.8	0.5	1.0	2.2	3	2.4
Asbestos Screen	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	Negative	-	-	Negative
Metals													
Arsenic (total)	5.4	2.4	3.1	7.3	7.8	6.1	5.5	5.7	5.9	6.4	-	-	-
Barium	50	170	380	160	710	220	2200	2200	190	84	-	-	-
Beryllium	0.7	0.2	0.4	0.4	0.6	0.6	0.2	0.3	0.4	0.5	-	-	-
Boron (water soluble)	0.2	0.4	3.4	0.9	0.2	0.2	0.5	3.6	0.2	0.4	-	-	-
Cadmium (total)	0.1	0.1	0.4	0.6	2.3	0.1	4.3	6.1	0.1	0.1	-	-	-
Chromium (hexavalent)#	0.029929	0.001585	0.008435	0.873761	0.000802	0.000652	0.002706	0.501187	0.000411	0.001748	-	-	-
Chromium (total) (III for S4ULs)	15	10	670	110	16	13	5.4	100	13	22	-	-	-
Copper (total)	13	6.3	130	20	17	12	17	22	9.1	11	-	-	-
Lead (total)	16	5.7	26	18	48	8.8	110	130	12	8.2	-	-	-
Mercury (total inorganic)	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.05	0.05	-	-	-
Nickel (total)	24	3.2	27	24	20	22	4.2	9	11	22	-	-	-
Selenium (total)	0.5	0.5	4	0.5	0.5	0.5	0.5	0.9	0.5	0.5	-	-	-
Zinc (total)	17	9.1	180	27	24	19	5	22	18	22	-	-	-
Vanadium	55	19	190	86	210	54	280	500	39	51	-	-	-
Inorganic													
pH Value	9.7	8.6	7.5	10.3	8.1	8.1	9.1	10.1	7.9	8.3	9.4	10.4	7.7
Cyanide (total)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	-	-	-
Ammonia expressed as NH4	5	2.8	1.3	2.2	3.1	3.2	1.9	3.3	3	2.1	-	-	-
Magnesium water soluble	10	10	-	-	-	-	-	-	-	-	23	10	18
Nitrate (2:1)	1	2.1	-	-	-	-	-	-	-	-	1	1	1
Chloride (2:1)	1	14	-	-	-	-	-	-	-	-	180	1200	5.9
Sulphur (total)	0.03	0.1	-	-	-	-	-	-	-	-	0.02	0.18	0.01
Sulphate (2:1)	300	83	-	-	-	-	-	-	-	-	92	550.0	36
Sulphate (total)	0.07	0.24	-	-	-	-	-	-	-	-	0.06	0.55	0.03
Organic													
TOC	0.5	5.7	2.2	0.5	0.5	0.5	7.1	2.8	0.5	0.5	-	-	-
Phenol (Total Monohydric)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	-	-	-
PAH													
Naphthalene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Acenaphthylene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Acenaphthene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Fluorene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Phenanthrene	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Anthracene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Fluoranthene	0.03	0.03	0.03	0.06	0.03	0.03	0.03	0.04	0.04	0.03	-	-	-
Pyrene	0.03	0.03	0.03	0.05	0.03	0.03	0.03	0.03	0.04	0.03	-	-	-
Benz(a)anthracene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Chrysene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Benzo(b)fluoranthene	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.04	0.03	0.03	-	-	-
Benzo(k)fluoranthene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Benzo(a)pyrene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Indeno(123cd)pyrene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Dibenzo(ah)anthracene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Benzo(ghi)perylene	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	-	-	-
Petroleum Hydrocarbons													
Aliphatic >C_5 - C_6	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
Aliphatic >C_6 - C_8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
Aliphatic >C_8 - C_{10}	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
Aliphatic >C_{10} - C_{12}	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	-	-	-
Aliphatic >C_{12} - C_{16}	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	-	-	-
Aliphatic >C_{16} - C_{21}	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	-	-	-
Aliphatic >C_{21} - C_{35}	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	26	-	-	-
Aliphatic >C_{35} - C_{44}	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	-	-	-
Total Aliphatic >C_5 - C_{35}	10	10	10	10	10	10	10	10	10	24	-	-	-
Aromatic C_5 - C_7	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
Aromatic C_7 - C_8	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
Aromatic >C_8 - C_{10}	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-
Aromatic >C_{10} - C_{12}	0.9	0.9	0.9	42	28	0.9	0.9	0.9	0.9	0.9	-	-	-
Aromatic >C_{12} - C_{16}	0.5	0.5	0.5	30	18	0.5	0.5	0.5	0.5	0.5	-	-	-
Aromatic >C_{16} - C_{21}	0.6	0.6	0.6	15	8.2	0.6	0.6	0.6	0.6	0.6	-	-	-
Aromatic >C_{21} - C_{35}	1.4	1.4	1.4	22	10	1.4	1.4	1.4	1.4	1.4	-	-	-
Aromatic >C_{35} - C_{44}	1.4	1.4	1.4	9.4	4.1	1.4	1.4	1.4	1.4	1.4	-	-	-
Total Aromatic >C_5 - C_{35}	10	10	10	130	61	10	10	10	10	10	-	-	-
PCBs													
PCB 28 + PCB 31	-	-	-	0.01	0.01	-	-	-	0.01	-		-	-
PCB 52	-	-	-	0.01	0.01	-	-	-	0.01	-		-	-
PCB 101	-	-	-	0.01	0.01	-	-	-	0.01	-		-	-
PCB 118	-	-	-	0.01	0.01	-	-	-	0.01	-		-	-
PCB 153	-	-	-	0.01	0.01	-	-	-	0.01	-		-	-
PCB 138	-	-	-	0.01	0.01	-	-	-	0.01	-		-	-
PCB 180	-	-	-	0.01	0.01	-	-	-	0.01	-		-	-
PCB 7 Total	-	-	-	0.01	0.01	-	-	-	0.01	-		-	-

Analyte	Statistical Analysis					SGV / GAC Statistical Results			SGV / GAC Criteria Source		LQM/CIEH S4UL Screening Criteria		LQM/CIEH S4UL Criteria Source	
	n	Standard Deviation	Minimum	Average	Maximum	Maximum	Commercial & Industrial Tier 1 Screening Threshold	Pass/ Fail	Source of Screening Criteria	Source of Toxicological Data	Commercial	Pass / Fail	Source of Screening Criteria	Source of Toxicological Data
Asbestos Screen		-	-	-	-	-	-	-	-	-	-	-	-	-
Metals														
Arsenic (total)	19	1.85	2	5	8	7.80	635	Pass	SC050021*	SC050021	640	Pass	CLEA v1.06	LQM/CIEH 2014
Barium	19	627.04	50	532	2200	2200	22000	Pass	CLEA v1.06	EIC/AGS/CL:AIRE				
Beryllium	19	0.25	0.2	0.6	1	1.20	-	-	-	-				
Boron (water soluble)	19	1.86	0.2	1.4	6	6.40	192000	Pass	CLEA v1.06	LQM 2009	240000	Pass	CLEA v1.06	LQM/CIEH 2014
Cadmium (total)	19	1.62	0.1	0.9	6	6.10	230	Pass	SC050021*	SC050021	190	Pass	CLEA v1.06	LQM/CIEH 2014
Chromium (hexavalent)#	19	21.79	0.00001	8.7	80	80.19	35	Fail	CLEA v1.06	LQM 2009	33	Fail	CLEA v1.06	LQM/CIEH 2014
Chromium (total) (III for S4ULs)	19	387.80	5	183	1600	1600.00	30400	Pass	CLEA v1.06	LQM 2009	8600	Pass	CLEA v1.06	LQM/CIEH 2014
Copper (total)	19	36.54	6	30	130	130.00	71700	Pass	CLEA v1.06	LQM 2009	68000	Pass	CLEA v1.06	LQM/CIEH 2014
Lead (total)	19	34.73	6	30	130	130.00	N/A	-	-	-	-		-	-
Mercury (total inorganic)	19	0.01	0.1	0.1	0.1	0.07	3640	Pass	SC050021*	SC050021	1100	Pass	CLEA v1.06	LQM/CIEH 2014
Nickel (total)	19	11.80	3	22	52	52.00	840	Pass	CLEA v1.071	EFSA	980	Pass	CLEA v1.06	LQM/CIEH 2014
Selenium (total)	19	1.76	0.5	1.3	7.3	7.30	13000	Pass	SC050021*	SC050021	120000	Pass	CLEA v1.06	LQM/CIEH 2014
Zinc (total)	19	67.92	5	51	270	270.00	662000	Pass	CLEA v1.06	LQM 2009	730000	Pass	CLEA v1.06	LQM/CIEH 2014
Vanadium	19	118.85	19	127	500	500.00	3160	Pass	CLEA v1.06	LQM 2009	9000	Pass	CLEA v1.06	LQM/CIEH 2014
Inorganic											-	-		
pH Value	24	1.56	6.3	9	11.5	11.50	-	-	-	-	-	-	-	-
Cyanide (total)	19	0.07	0.1	0.1	0.4	0.40	-	-	-	-	-	-	-	-
Ammonia expressed as NH4	19	20.65	1.0	12	71.0	71.00	-	-	-	-	-	-	-	-
Magnesium water soluble	7	5.32	10.0	13	23.0	23.00	-	-	-	-	-	-	-	-
Nitrate (2:1)	7	2.87	1.0	2	8.7	8.70	-	-	-	-	-	-	-	-
Chloride (2:1)	7	442.53	1.0	207	1200.0	1200.00	-	-	-	-	-	-	-	-
Sulphur (total)	7	0.07	0.0	0	0.2	0.18	-	-	-	-	-	-	-	-
Sulphate (2:1)	7	195.20	33.0	162	550.0	550.00	-	-	-	-	-	-	-	-
Sulphate (total)	7	0.20	0.0	0	0.6	0.55	-	-	-	-	-	-	-	-
Organic											-	-		
TOC	19	1.87	0.5	2	7.10	7.10	-	-	-	-	-	-	-	-
Phenol (Total Monohydric)	19	0.00	0	0	0.3	0.30	24200	Pass	CLEA v1.06	SC050021	1500	Pass	CLEA v1.06	LQM/CIEH 2014
PAH														
Naphthalene	19	0.00	0.03	0.03	0.04	0.04	200	Pass	CLEA v1.06	LQM 2009	460	Pass	CLEA v1.06	LQM/CIEH 2014
Acenaphthylene	19	0.00	0.03	0.03	0.03	0.03	84000	Pass	CLEA v1.06	LQM 2009	97000	Pass	CLEA v1.06	LQM/CIEH 2014
Acenaphthene	19	0.00	0.03	0.03	0.03	0.03	8500	Pass	CLEA v1.06	LQM 2009	97000	Pass	CLEA v1.06	LQM/CIEH 2014
Fluorene	19	0.00	0.03	0.03	0.03	0.03	64000	Pass	CLEA v1.06	LQM 2009	68000	Pass	CLEA v1.06	LQM/CIEH 2014
Phenanthrene	19	0.01	0.03	0.03	0.08	0.08	22000	Pass	CLEA v1.06	LQM 2009	22000	Pass	CLEA v1.06	LQM/CIEH 2014
Anthracene	19	0.00	0.03	0.03	0.03	0.03	530000	Pass	CLEA v1.06	LQM 2009	54000	Pass	CLEA v1.06	LQM/CIEH 2014
Fluoranthene	19	0.02	0.03	0.04	0.09	0.09	23000	Pass	CLEA v1.06	LQM 2009	23000	Pass	CLEA v1.06	LQM/CIEH 2014
Pyrene	19	0.01	0.03	0.04	0.08	0.08	54400	Pass	CLEA v1.06	LQM 2009	54000	Pass	CLEA v1.06	LQM/CIEH 2014
Benz(a)anthracene	19	0.00	0.03	0.03	0.04	0.04	92	Pass	CLEA v1.06	LQM 2009	170	Pass	CLEA v1.06	LQM/CIEH 2014
Chrysene	19	0.00	0.03	0.03	0.04	0.04	138	Pass	CLEA v1.06	LQM 2009	350	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(b)fluoranthene	19	0.01	0.03	0.03	0.06	0.06	100	Pass	CLEA v1.06	LQM 2009	44	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(k)fluoranthene	19	0.00	0.03	0.03	0.03	0.03	140	Pass	CLEA v1.06	LQM 2009	1200	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(a)pyrene	19	0.00	0.03	0.03	0.03	0.03	14	Pass	CLEA v1.06	LQM 2009	35	Pass	CLEA v1.06	LQM/CIEH 2014
Indeno(123cd)pyrene	19	0.00	0.03	0.03	0.03	0.03	60	Pass	CLEA v1.06	LQM 2009	510	Pass	CLEA v1.06	LQM/CIEH 2014
Dibenzo(ah)anthracene	19	0.00	0.03	0.03	0.03	0.03	13	Pass	CLEA v1.06	LQM 2009	3.6	Pass	CLEA v1.06	LQM/CIEH 2014
Benzo(ghi)perylene	19	0.00	0.03	0.03	0.03	0.03	650	Pass	CLEA v1.06	LQM 2009	4000	Pass	CLEA v1.06	LQM/CIEH 2014
Petroleum Hydrocarbons														
Aliphatic >C_5 - C_6	19	0.00	0.01	0.01	0.0	0.01	3400	Pass	CLEA v1.06	LQM 2009	5900	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_6 - C_8	19	0.00	0.01	0.01	0.0	0.01	8300	Pass	CLEA v1.06	LQM 2009	17000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_8 - C_{10}	19	0.00	0.01	0.01	0.0	0.01	2100	Pass	CLEA v1.06	LQM 2009	4800	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{10} - C_{12}	19	0.64	1.50	1.65	4.3	4.30	10000	Pass	CLEA v1.06	LQM 2009	23000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{12} - C_{16}	19	1.97	1.20	1.65	9.8	9.80	61000	Pass	CLEA v1.06	LQM 2009	82000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{16} - C_{21}	19	2.41	1.50	2.05	12.0	12.00	1600000	Pass	CLEA v1.06	LQM 2009	170000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{21} - C_{35}	19	12.94	3.40	8.18	55.0	55.00	1600000	Pass	CLEA v1.06	LQM 2009	170000	Pass	CLEA v1.06	LQM/CIEH 2014
Aliphatic >C_{35} - C_{44}	19	5.41	3.40	4.64	27.0	27.00	1600000	Pass	CLEA v1.06	LQM 2009	170000	Pass	CLEA v1.06	LQM/CIEH 2014
Total Aliphatic >C_5 - C_{35}	19	20.04	10	16	97.0	97.00	-	-	-		-	-	-	
Aromatic C_5 - C_7	19	0.00	0.01	0.01	0.01	0.01	28000	Pass	CLEA v1.06	LQM 2009	46000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic C_7 - C_8	19	0.00	0.01	0.01	0.01	0.01	59000	Pass	CLEA v1.06	LQM 2009	110000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_8 - C_{10}	19	0.00	0.01	0.01	0.0	0.01	3700	Pass	CLEA v1.06	LQM 2009	8100	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{10} - C_{12}	19	11.00	0.90	4.49	42.0	42.00	17000	Pass	CLEA v1.06	LQM 2009	28000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{12} - C_{16}	19	7.67	0.50	2.97	30.0	30.00	36000	Pass	CLEA v1.06	LQM 2009	37000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{16} - C_{21}	19	3.65	0.60	1.76	15.0	15.00	28000	Pass	CLEA v1.06	LQM 2009	28000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{21} - C_{35}	19	17.04	1.40	6.76	74.0	74.00	28000	Pass	CLEA v1.06	LQM 2009	28000	Pass	CLEA v1.06	LQM/CIEH 2014
Aromatic >C_{35} - C_{44}	19	9.60	1.40	4.15	43.0	43.00	28000	Pass	CLEA v1.06	LQM 2009	28000	Pass	CLEA v1.06	LQM/CIEH 2014
Total Aromatic >C_5 - C_{35}														
PCBs														
PCB 28 + PCB 31	7	0.00	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
PCB 52	7	0.00	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
PCB 101	7	0.00	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
PCB 118	7	0.00	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
PCB 153	7	0.00	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
PCB 138	7	0.00	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
PCB 180	7	0.00	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-
PCB 7 Total	7	0.00	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-

Below Detection Limits.
Exceeded GAC/SGV
Exceeded pC4SL / S4ULs
Assessment criteria for pH, Sulphide and Sulphate are not based on human health. Sulphate criteria assumes DS-1 ACEC classification for concrete.

Notes

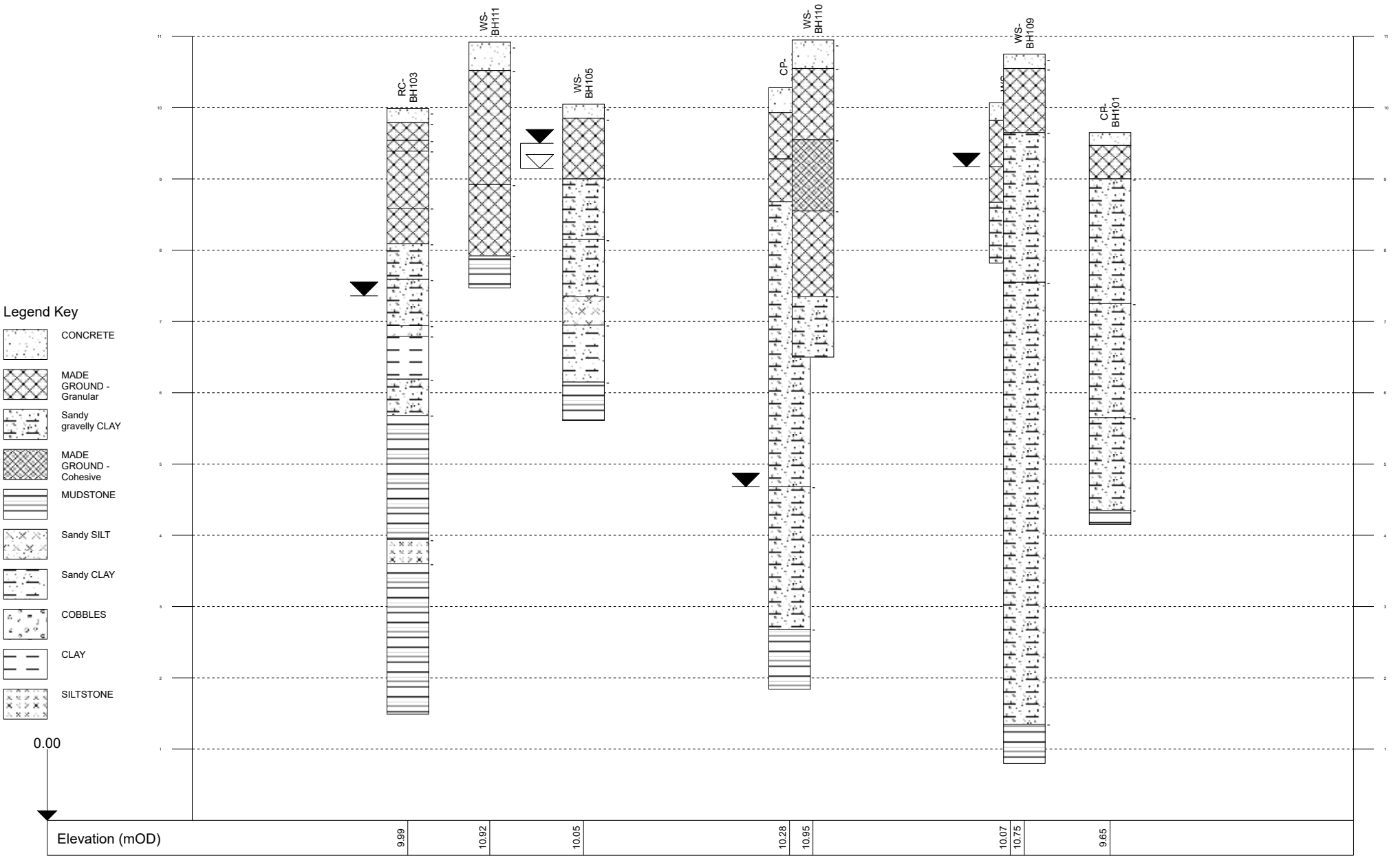
1. Generic Qualitative Assessment Criteria have been used where appropriate based on the current CLEA 1.06 Model (default values, sandy loam 2.5 %SOM). Where no CLEA generic guideline value has been calculated no assessment has been made. The results presented show maximum and mean concentrations. This is to provide a reasonable prediction of the range of data rather than to provide any detailed statistical appraisal.
2. Results lower than detection limit are shaded in grey.
3. When the test result is recorded as being less than the detection limit, the result used for the analysis is the detection limit.
4. Cyanide (total)*, in the absence of a GOAC based on current CLEA 1.06 Model, the Atrisk Soil Value for Cyanide (free) has been used.
5. For metals, where an SGV has been published, this value has been used. Note that the published SGVs do not include the residential without plant uptake scenario. CLEA v1.06 has therefore been used to derive GACs for this scenario. For organics, CLEA v1.06 has been used (as the SGV assumes 6% SOM)
6. pC4SL based on adjusted toxicology and exposure assumptions
7. pC4SL for benzene assumes 6% SOM

\# - Caclulated concentration based on chromate equilibrium

APPENDIX 13

Cross Sections Showing Water Strikes

Project:	**NEWPORT QUINN SDD RFP**	Title:	**Section Line**	Unit 1B Borders Industrial Park River Lane Saltney Chester CH4 8RJ	Phone: 01244 671117 Email: mail@geotechnics.co.uk www.geotechnics.co.uk	GEOTECHNICS geotechnical and geoenvironmental specialists
		Vertical Scale:	**1:73**			
Project No.:	**PN214233**	Horizontal Scale:	**1:1590**			
Client:	**Pinnacle Consulting Engineers Limited**	Engineer:	**Pinnacle Consulting Engineers Limited**			



Project:	**NEWPORT QUINN SDD RFP**	Title:	**Section Line**	Unit 1B Borders Industrial Park River Lane Saltney Chester CH4 8RJ	Phone: 01244 671117 Email: mail@geotechnics.co.uk www.geotechnics.co.uk
		Vertical Scale:	**1:112**		
Project No.:	**PN214233**	Horizontal Scale:	**1:1830**		
Client:	**Pinnacle Consulting Engineers Limited**	Engineer:	**Pinnacle Consulting Engineers Limited**		

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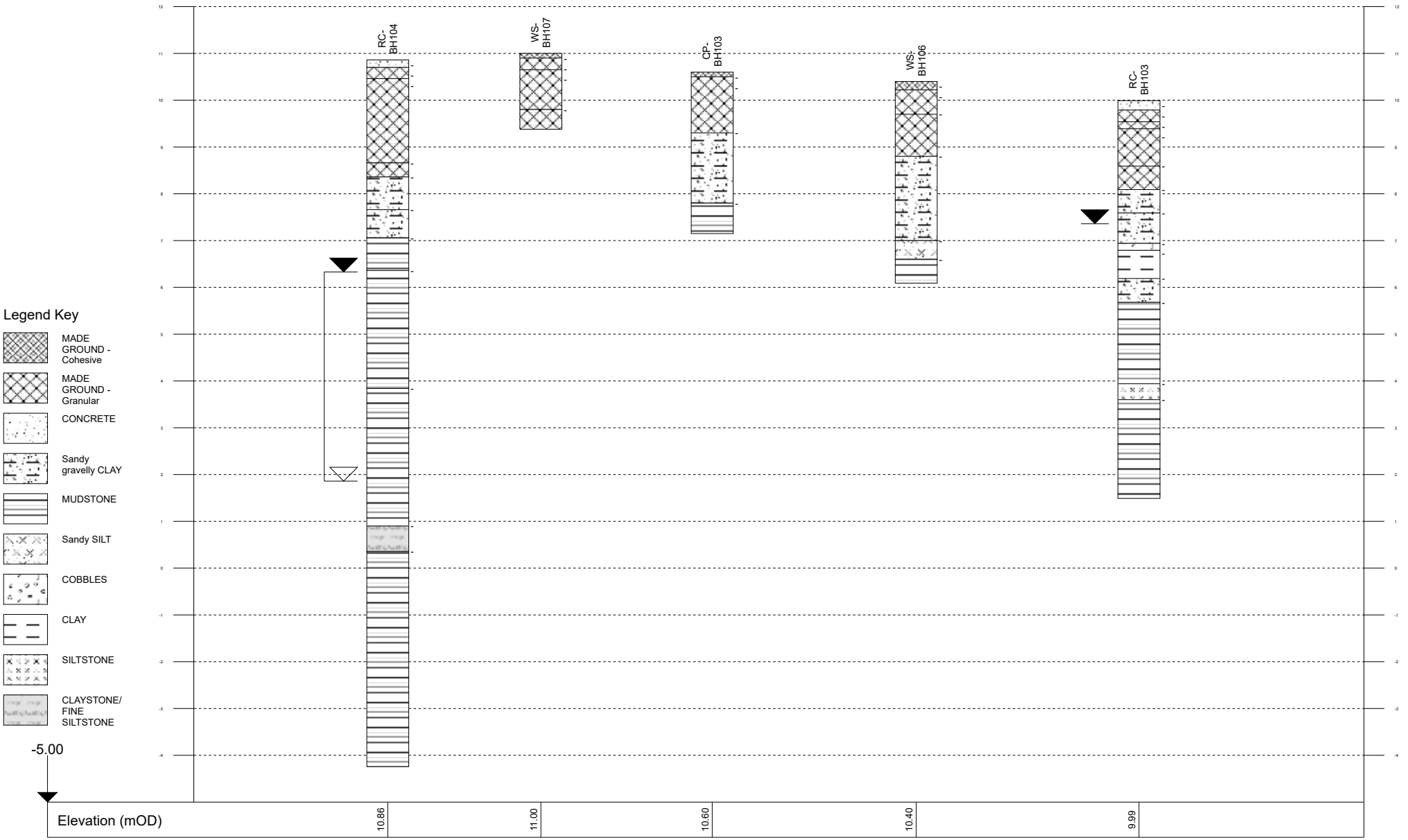

APPENDIX 14

Summary of Analytical Groundwater Data

Job No: PC2114233
Site: Newport Quinn SDD
Summary of Water Analysis - Tier 1 Screening

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Sample Location	Units	Minimum Reporting Value	Drinking Water Standard (or closest value)	EQS Freshwater	Esturies and coastal waters	Preliminary Investigation									
						Made Ground				Natural					
						CP-BH103	WS-BH110	WS-BH109	WS-BH103	RC-BH105	RC-BH104	RC-BH103	CP-BH102	CP-BH101	RC-BH102
Water Quality - Field Testing															
pH	pH Units	-	-	-	-	7.4	10.2	7.5	7.6	7	7.3	7.5	7.3	6.6	8
Metals															
Arsenic	ug/l	-	10	50	25	0.61	6.5	8.9	0.78	0.31	0.81	0.86	1.2	1.3	0.96
Cadmium	ug/l	0.1	50	See notes	0.2	0.17	0.04	0.03	0.03	0.22	0.03	0.03	0.04	0.07	0.03
Chromium (Total)	ug/l	-	50	Sum of III and VI		1.2	1.3	1.1	3.6	0.61	1.1	0.71	1.3	0.63	1.2
Chromium (III)	ug/l	-	50	4.7	-										
Chromium (VI)	ug/l	-		3.4	0.6										
Copper	ug/l	-	2000	1*	3.76 (where DOC 1mg/l)	1.1	3.2	0.4	1.4	3.2	2.5	0.6	3.0	0.5	1.2
					3.76+((DOC/2)-0.5) where DOC >1mg/l										
Iron	ug/l	-	200	1000	1000										
Lead	ug/l	-	10	1.2}	1.3	0.69	0.57	0.1	0.09	5.6	0.11	0.09	0.27	0.14	0.33
Manganese	ug/l	-	50	123*	-	72	26	3000	170	1300	66	12	1000	1200	25
Mercury	ug/l	0.01	1	0.07	0.07	0.02	0.34	0.02	0.01	0.03	0.04	0.01	0.06	0.01	0.01
Nickel	ug/l	-	20	4*	8.6	1	2.8	7.4	3.3	3.6	1.4	0.5	4.1	7.2	1.1
Selenium	ug/l	-	10	-	-	2.8	15	5	0.45	1	0.65	1	12	1.1	0.75
Zinc	ug/l	-	3000¬	10.9*	6.8	3.5	1.4	1.6	3.2	2.3	3.6	2.9	12	53	3.7
Calcium	ug/l	-	250	-	-	32	50	210	62	77	70	76	63	120	28
Inorganic															
Ammoniacal Nitrogen as N	mg/l	-	50	1	1	0.040	6.3	3.6	0.050	0.03	0.1	0.06	2.8	2.2	0.34
Organics															
Phenol	ug/l	0.5	-	7.7	7.7	100	100	100	100	100	100	100	100	100	100
Dissolved Organic Carbnon	mg/l	-	-	-	-	2	24	72	4.0	2	3.4	2	12	14	2.2
PAH															
Naphthalene	ug/l	-	-	2	2	0.05	0.12	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Acenaphthylene	ug/l	-	-	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Acenaphthene	ug/l	-	-	-	-	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Fluorene	ug/l	-	-	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Phenanthrene	ug/l	-	-	-	-	0.01	0.07	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
Anthracene	ug/l	-	-	0.1	0.1	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
Fluoranthene	ug/l	-	-	0.0063	0.0063	0.01	0.06	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01
Pyrene	ug/l	-	-	-	-	0.06	0.15	0.02	0.06	0.06	0.01	0.01	0.01	0.01	0.01
Benzo[a]anthracene	ug/l	-	-	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Chrysene	ug/l	-	-	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Benzo[b]fluoranthene	ug/l	-	0.10	BaP	BaP	0.01	0.01	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.01
Benzo[k]fluoranthene	ug/l	-	0.10	BaP	BaP	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Benzo[a]pyrene	ug/l	-	0.01	0.00017	0.00017	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
indeno[1.2.3-cd]pyrene	ug/l	-	0.10	BaP	BaP	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
dibenzo[a,h]anthracene	ug/l	-	-	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Benzo[ghi]perylene	ug/l	-	-	BaP	BaP	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

TPH																
Aliphatic >C5 - C6	ug/l	-	10	10	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Aliphatic >C6 - C8	ug/l	-	10	10	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Aliphatic >C8 - C10	ug/l	-	10	10	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Aliphatic >C10 - C12	ug/l	-	10	10	10	1	1	1	1	1	1	1	1	1	1
Aliphatic >C12 - C16	ug/l	-	10	10	10	1	1	1	1	1	1	1	1	1	1
Aliphatic >C16 - C21	ug/l	-	10	10	10	1	1	1	1	1	1	1	1	1	1
Aliphatic >C21 - C34	ug/l	-	10	10	10	1	1	1	1	1	1	1	1	24	1
Aliphatic (C5 - C34)	ug/l	-	10	10	10	1	1	1	1	1	1	1	1	1	1
Aromatic >C5 - C7	ug/l	-	10	10	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Aromatic >C7 - C8	ug/l	-	10	10	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Aromatic >C8 - C10	ug/l	-	10	10	10	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Aromatic >C10 - C12	ug/l	-	10	10	10	1	1	1	1	1	1	1	1	1	1
Aromatic >C12 - C16	ug/l	-	10	10	10	1	1	1	1	1	1	1	1	1	1
Aromatic >C16 - C21	ug/l	-	10	10	10	1	1	1	1	1	1	1	1	1	1
Aromatic >C21 - C35	ug/l	-	10	10	10	1	1	1	1	1	1	1	1	1	1
Aromatic >C35 - C40	ug/l	-	10	10	10	1	1	1	1	1	1	1	1	1	1

Note:

Fail: Above UK EQS

Fail: Above UK DWS

Result below Detection Limit

EQS for cadmium is dependent on hardness 40 mg/l 0.08ug/l. 40 to 50mg/l 0.08ug/l. 50 to 100 mg/l 0.09ug/l. 100-200mg/l 0.15ug/l. >500mg/l 0.25ug/l

* EQS for substances based on CaCO3 Hardness and second stage asessment with m-BAT tool required if exceeded

Total of 4 Drinking Water Standard PAHs: Benzo[b]fluoranthene, Benzo[k]fluoranthene, Indeno[1,2,3-cd]pyrene, Benzo[ghi]perylene

¬ The Surface Waters (Abstraction for Drinking Water) (Classification) Regulations 1996

~ Drinking Water Inspectorate(2006) DWI1/10/18 (odour threshold)

+ WHO Guidelines for drinking water quality - 4th ed

} - bioavailable

APPENDIX 15

Output from Metal Bio-Availability Assessment Tool

ID	Location	Waterbody	Date	Measured Cu Concentration (dissolved) (µg l^{-1})	Measured Zn Concentration (dissolved) (µg l^{-1})	Measured Mn Concentration (dissolved) (µg l^{-1})	Measured Ni Concentration (dissolved) (µg l^{-1})	pH	DOC	Ca	Site-specific PNEC Dissolved Copper (µg l^{-1})	BioF	Bioavailable Copper Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Zinc (µg l^{-1})	BioF	Bioavailable Zinc Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Manganese (µg l^{-1})	BioF	Bioavailable Manganese Concentration (µg l^{-1})	Risk Characterisation Ratio	Site-specific PNEC Dissolved Nickel (µg l^{-1})	BioF	Bioavailable Nickel Concentration (µg l^{-1})	Risk Characterisation Ratio
1	CP-BH103	Perched	10/06/2021	1.1	3.5	72	1	7.4	2	32	8.07	0.12	0.14	0.14	16.64	0.66	2.29	0.21	399.21	0.31	22.18	0.18	8.90	0.45	0.45	0.11
2	WS-BH110	Perched	10/06/2021	3.2	1.4	26	2.8	10.2	24	50	2.17	0.47	1.50	1.50	92.26	0.12	0.17	0.02	123.00	1.00	26.00	0.21	4.00	1.00	2.80	0.70
3	WS-BH109	Perched	10/06/2021	0.4	1.6	3000	7.4	7.5	72	210	56.88	0.02	0.01	0.01	68.42	0.16	0.25	0.02	577.6	0.21	638.43	5.18	38.08	0.11	0.78	0.19
4	WS-BH103	Perched	10/06/2021	1.4	3.2	170	3.3	7.6	4.0	62	16.36	0.06	0.09	0.09	24.14	0.45	1.45	0.13	265.90	0.46	78.64	0.64	13.78	0.29	0.96	0.24
5	RC-BH105	Groundwater	10/06/2021	3.2	2.3	1300	3.6	7	2	77	7.45	0.13	0.43	0.43	19.04	0.57	1.32	0.12	1521.55	0.08	105.09	0.85	17.95	0.22	0.80	0.20
6	RC-BH104	Groundwater	10/06/2021	2.5	3.6	66	1.4	7.3	3.4	70	14.58	0.07	0.17	0.17	22.01	0.50	1.78	0.16	851.26	0.14	9.54	0.08	16.50	0.24	0.34	0.08
7	RC-BH103	Groundwater	10/06/2021	0.6	2.9	12	0.5	7.5	2	76	7.81	0.13	0.08	0.08	18.79	0.58	1.68	0.15	577.98	0.21	2.55	0.02	12.99	0.31	0.15	0.04
8	CP-BH102	Groundwater	10/06/2021	3.0	12	1000	4.1	7.3	12	63	53.41	0.02	0.06	0.06	44.66	0.24	2.93	0.27	489.18	0.21	251.43	2.04	25.13	0.16	0.65	0.16
9	CP-BH1-1	Groundwater	10/06/2021	0.5	53	1200	7.2	6.6	14	120	19.55	0.05	0.03	0.03	32.88	0.31	17.56	1.61	3122.98	0.04	47.26	0.38	36.88	0.11	0.78	0.20
10	RC-BH102	Groundwater	10/06/2021	1.2	3.7	25	1.1	8	2.2	28	6.10	0.16	0.20	0.20	17.17	0.63	2.35	0.22	123.00	1.00	25.00	0.20	5.06	0.79	0.87	0.22

APPENDIX 16

Environmental Notes

1.0 LEGISLATION OVERVIEW

This report includes hazard identification and environmental risk assessment in line with the risk-based methods referred to in relevant UK legislation and guidance. Government environmental policy is based upon a "suitable for use approach," which is relevant to both the current use of land and also to any proposed future use. The contaminated land regime is the statutory regime for remediation of contaminated land that causes an unacceptable level of risk and is set out in Part 2A of the Environmental Protection Act 1990 ("EPA 1990"). The main objective of introducing the Part IIA regime is to provide an improved system for the identification and remediation of land where contamination is causing unacceptable risks to human health or the wider environment given the current use and circumstances of the land. Part IIA provides a statutory definition of contaminated land under Section 78A(2) as:

"any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on, or under the land, that:
(a) Significant harm is being caused or there is a significant possibility of such harm being caused; or
(b) Pollution of controlled waters is being, or is likely to be, caused."
In order to assist in establishing if there is a "significant possibility of significant harm" there must be a "contaminant linkage" for potential harm to exist. That means there must be a source(s) of contamination, sensitive receptors present and a connection or pathway between the two. This combination of contaminant-pathway-receptor is termed a "contaminant linkage or CPR linkage."

Part IIA of The Environmental Protection Act 1990 is supported by a substantial quantity of guidance and other Regulations. Key implementing legislation of the Part 2A regime includes the Contaminated Land (Wales) (Amendment) Regulations 2012 (SI 2012/283 (W.47)) as amended by the overarching legislation for the contaminated land regime, which implements the provisions of Part IIA of the Environmental Protection Act 1990 (as inserted by section 57 of the Environment Act 1995), came into force on 14th July 2000 together with Revised Contaminated Land Statutory Guidance was published by the Welsh Government in 2012. Part IIA defines the duties of Local Authorities in dealing with it. Part IIA places contaminated land responsibility as a part of planning and redevelopment process rather than Local Authority direct action except in situations of very high pollution risk. Powers were transferred to the National Assembly of Wales by the National Assembly for Wales (Transfer of Functions) Order 1999.

In the planning process guidance is provided by Planning Policy Wales of February 2021 which requires that a site which has been developed shall not be capable of being determined "contaminated land" under Part IIA. In practice, Planning Authorities require sites being developed to have a lower level of risk post development than the higher level of risk that is required in order to determine a site as being contaminated in accordance with Part IIA. This is to ensure that there is a suitable zone of safety below the level for Part IIA determination and prevent recently developed sites becoming reclassified as contaminated land if there are future legislative or technical changes (e.g. a substance is subsequently found to be more toxic than previously assessed this increases its hazard).

The criteria for assessing concentrations of contaminants and hence determining whether a site represents a hazard are based on a range of techniques, models and guidance. Within this context it is relevant to note that Government objectives are:

(a) to identify and remove unacceptable risks to human health and the environment;
(b) to seek to bring damaged land back into beneficial use;
(c) to seek to ensure that the cost burdens faced by individuals, companies and society as a whole are proportionate, manageable and economically sustainable.

These three objectives underlie the "suitable for use" approach to risk management and remediation of contaminated land. The "suitable for use" approach focuses on the risks caused by land contamination. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Risks therefore should be assessed on a site-by-site basis.

The "suitable for use" approach then consists of three elements:

(a) ensuring that land is suitable for its current use - in other words, identifying any land where contamination is causing unacceptable risks to human health and the environment, assessed on the basis of the current use and circumstances of the land, and returning such land to a condition where such risks no longer arise ("remediating" the land); the contaminated land regime provides the regulatory mechanisms to achieve this;

(b) ensuring that land is made suitable for any new use, as planning permission is given for that new use - in other words, assessing the potential risks from contamination, on the basis of the proposed future use and circumstances, before official permission is given for the development and, where necessary to avoid unacceptable risks to human health and the

environment, remediating the land before the new use commences; this is the role of the town and country planning and building control regimes; and

(c) limiting requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to the current use or future use of the land for which planning permission is being sought - in other words, recognising that the risks from contaminated land can be satisfactory assessed only in the context of specific uses of the land (whether current or proposed), and that any attempt to guess what might be needed at some time in the future for other uses is likely to result either in premature work (thereby running the risk of distorting social, economic and environmental priorities) or in unnecessary work (thereby wasting resources).

The mere presence of contaminants does not therefore necessarily warrant action, and consideration must be given to the scale of risk involved for the use that the site has, and will have in the future .Please note that Geotechnics Limited Reports do not address risk associated with potential contamination by botanical agents such as Japanese Knotweed.

To determine potential risk and uncertainty, reference is made to the currently accepted UK methodology as defined by the source-pathway-receptor model of land contamination and as further detailed in Section 4 below. Please note that reports do not address potential contamination by botanical agents such as Japanese Knotweed.

2.0 LEGAL FRAMEWORK

Land contamination is an increasingly important material consideration within the overall planning regime. The Planning Authority is required to consider the potential implications of contamination both when it is developing structure or local plans and when it is considering individual applications for planning permission. Where contamination is suspected or known to exist at a site, a Planning Authority may require investigations to be undertaken, for example, before granting planning permission. Alternatively it may include conditions on the permission itself requiring appropriate investigation and, if necessary, remediation. Part IIA of the Environmental Protection Act 1990 has created a regime within which the identification and remediation of contaminated land can be undertaken regarding current land use and legacy contamination. This is then further refined through the use of guidance on specific aspects of the process produced by various authorising bodies.

Section 78A(2) of the Act defines contaminated land for the purposes of Part IIA as:

> "any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substance in, on or under the land that:
>
> a) significant harm is being caused or there is a significant possibility of such harm being caused;
> or:
>
> b) significant pollution of controlled waters is being, or is likely to be caused."

Part IIA is intended to complement the Planning Regime and both of these are intended to embody a "suitable for use approach". In the context of Part IIA, action is necessary only where there are unacceptable risks to health or the environment, taking in to account the current use of the land and its environmental setting.

Environmental reports should provide an assessment of the contamination conditions considered likely to be found at the site in the context of the legal framework discussed above. Hence, this assessment is based solely on our current knowledge and understanding of the site as determined by the information made available to us by the Client or acquired on their behalf as well as our understanding of the proposed development, legal and other guidance available at the time of writing.

3.0 OVERALL METHODOLOGY

The work presented in this report has been carried out in general accordance with recognised best practice as detailed in guidance documents such as in the on-line Environment Agency Land Contamination Risk Management (LCRM) (adopted in Wales), and BS10175:2011+A2 2017. Important aspects of the risk assessment process are transparency and justification. The particular rationale behind the risk assessments presented is given in this appendix.

The first stage of a two-staged investigation and assessment of a site is the Preliminary Investigation (BS 10175:2011), often referred to as the Phase 1 Study, comprising desk study and walk-over survey, which culminates in the Preliminary Risk Assessment and development of the Preliminary Conceptual Site Model (CSM). A CSM is developed which identifies potential geotechnical and geo-environmental hazards and the qualitative degree of risk associated with them. From the geo-environmental perspective, the Hazard Identification process uses professional judgement to evaluate all the hazards in terms of potential contaminant linkages (of contaminant source-pathway-receptor). Potential contaminant linkages are potentially unacceptable risks in terms of the current contaminated land regime legal framework and require either remediation or further assessment. These are

normally addressed via intrusive ground investigation and generic risk assessment.

The second stage is the Ground Investigation, Generic Risk Assessment and Geotechnical Interpretation. This represents the further assessment mentioned above. The scope of the Ground Investigation is based on the findings of the Preliminary Risk Assessment and is designed to reduce uncertainty in the geotechnical and geoenvironmental hazard identification. The Ground Investigation comprises fieldwork, laboratory testing and usually also on-site monitoring. The Ground Investigation may include the Exploratory, Main and Supplementary Investigations described in BS 10175:2011+A2 2017. The results of the Ground Investigation reduces uncertainty in the geotechnical and geoenvironmental risks. Depending on the findings more detailed investigations or assessments may be required.

4.0 PRELIMINARY RISK ASSEMMENT

Current practice recommends that the determination of potential liabilities that could arise from land contamination be carried out using the process of risk assessment, whereby "risk" is defined as:

"(a) The probability, or frequency, or occurrence of a defined hazard; and

(b) The magnitude (including the seriousness) of the consequences."

The UK's approach to the assessment of environmental risk is set out in by the Department of the Environment Transport and the Regions (2000) publication "A Guide to Risk Assessment and Risk Management for Environmental Protection" (also called Greenleaves II). This established an iterative, systematic staged process which comprises:

(a) Hazard identification;
(b) Hazard assessment;
(c) Risk estimation;
(d) Risk evaluation;
(e) Risk assessment.

At each stage during the development process, the above steps are repeated as more detailed information becomes available for the site.

For an environmental risk to be present, all three of the following elements must be present:

- Source/Contaminant: hazardous substance that has the potential to cause adverse impacts;
- Receptor: target that may be affected by contamination: examples include human occupants/users of site, water resources (rivers or groundwater), or structures;
- Pathway: a viable route whereby a hazardous substance may come into contact with the receptor.

The absence of one or more of each component (contaminant, pathway, receptor) would prevent a contaminant linkage being established and there would be no significant environmental risk.

The identification of potential contaminant linkages is based on a Conceptual Model of the site, which is subject to continual refinement as additional data becomes available. As part of a Preliminary Risk Assessment (Desk Study and site walk over) a Preliminary Conceptual Site Model (PCSM) is formed. Based on the PCSM, potential contaminant linkages can be assessed. If the PCSM and hazard assessment indicate that a contaminant linkage is not of significance then no further assessment or action is required for this linkage. For each significant and potential linkage a risk assessment is carried out. The linkages which potentially pose significant risks may require a variety of responses ranging from immediate remedial action or risk management or, more commonly, further investigation and risk assessment. This next stage is termed a Phase II Main Site Investigation and should provide additional data to allow refinement of the Conceptual Site Model and assess the level of risk from each contaminant linkage.

5.0 GENERIC RISK ASSESSMENT

In the following sections the current UK guidance on risks to the following receptors are discussed: human health, plant life and controlled waters

5.1 Human Health

The overall methodology for assessing the risk to human health from potential contaminants in soil is set out in the Environment Agency's guidance "Using Soil Guideline Values" SC050021/SGV Introduction, March 2009 and using the CLEA 1.06 model software (and CLEA 1.071 for nickel). The generic assessment criteria are in accordance with the following:

- Science Report SC050021/SR2: Human health toxicological assessment of contaminants in soil;
- Science Report SC050021/SR3: Updated technical background to the CLEA model;
- Science Report SC050021/SR4: CLEA Software (Version 1.071, 2014) & Handbook;
- Toxicological reports and SGV technical notes;
- Toxicological data published by LQM/CIEH (2009) and CL:AIRE/EIC/AGS (2009)
- DEFRA Development of Category 4 Screening Levels for assessment of land affected by contamination - SP1010 (December 2013).

- LQM/CIEH Suitable 4 Use Levels (S4ULs) for Human Health Risk Assessment
- Toxicology review published by the European Food Safety Authority for nickel (2015)

In March 2014 six 'proposed' Category 4 Screening Levels (pC4SL) were issued by Defra. These screening values are considered to be within Category 4 as defined in the Contaminated Land Statutory Guidance and indicate safe levels for new developments passing through the planning system. The SGV for lead has been withdrawn, and the pC4SL for lead has been derived using current best practice. In January 2015 LQM/CIEH published S4ULs for 89 contaminants in accordance with the C4SL methodology.

Note that groundwater contamination may pose a risk to human health and GAC values for volatile contaminants for exposure via inhalation were published by SoBRA.

The CLEA model has been developed to calculate an estimated tolerable daily soil intake (TDSI) for site users given a set 'default' exposure pathways. Ten human exposure pathways are covered in the CLEA model as presented below:

- **Ingestion**
  - ingestion of outdoor soil;
  - ingestion of indoor dust;
  - ingestion of home grown vegetables;
  - ingestion of soil attached to home grown vegetables.
- **Dermal Contact**
  - dermal contact with outdoor soil;
  - dermal contact with indoor dust.
- **Inhalation**
  - inhalation of outdoor dust;
  - inhalation of indoor dust;
  - inhalation of outdoor soil vapour;
  - inhalation of indoor soil vapour.
  -

It should be noted that there are other potential exposure pathways on some sites not included in the CLEA model e.g. certain organic compounds can pass through plastic water pipes into drinking water supply.
The presence and/or significance of each of the above exposure pathways are dependent on the type of land use being considered and the nature of the contaminant under scrutiny. Accordingly, the CLEA model considers for principle 'default' land use types and makes a series of 'default' assumptions with regard to human exposure frequency, duration and critical human target groups for each land use considered:

- residential land use;
- allotments;
- commercial and industrial land use.
-

The land use categories defined in the CLEA are detailed below.

Residential: This land use category assumes that people live in a variety of dwellings including terraced, detached and semi-detached houses up to two storeys high. The structure of buildings varies. Default parameters for building materials and building design are included in CLEA documents to calculate the relevant multi-layer diffusion coefficients for vapour intrusion and to model indoor vapour intrusion. The CLEA model assumes that regardless of the style of housing the residents will have access to either a private garden or community open space nearby, and that soil tracked into the home will form indoor dust. It allows for the ingestion pathways from home grown vegetables.

Allotments: The CLEA model incorporates an assessment of land provided by local authorities specifically for people to grow fruit and vegetables for their own consumption. Consumption of such fruit and vegetables present several exposure pathways; plants absorb contaminants mainly via water uptake through roots, the contaminants move to edible portions of plants via translocation and contaminated soil particles become trapped in the skin and between leaves. At present the model fails to account for exposure through the consumption of animals, and their products (e.g. eggs), which have been reared on contaminated land.

Commercial/Industrial: Although there are a wide variety of workplaces and work-related activities, the CLEA assessment of this land-use assumes that work occurs in a permanent, three-storey structure, where employees spend most time indoors, conducting office-based or light physical work. The model assumes employees sit outside during breaks for most of the year. Limitations in applying this land-use to different industries is detailed in EA publication "Updated technical background to the CLEA model" (2011). The generic model assumes that the site would not be covered by hard standing. Risk of exposure to contaminants would be clearly less where commercial land is essentially all buildings and hard standing.

Based on the assumptions of each land use and the associated applicable exposure pathways, a 'Soil Guideline Value' (SGV) may be calculated for each contaminant under consideration for a particular land use in order to determine whether certain contaminant soil concentrations pose a significant risk to human health. The primary purpose of the CLEA SGVs are as 'trigger values' – indicators to a risk assessor that soil concentrations below this level require no further

assessment as it can be assumed that the soil is suitable for the proposed use. Where soil concentrations occur above the SGV then further assessment of the results is required. The Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, 2012) which came into force in early April 2012 provides new clarity on the assessment of risk where soil concentrations exceed the SGV. The guidance introduces a four stage classification system relating to concentration of contaminants and the assessed risk which indicates appropriate actions. Category 1 and 2 sites are classified as "Contaminated Land" as defined in Part IIA of The Environmental Protection Act (1990). Category 3 and 4 sites are not considered as "Contaminated Land" in accordance with the Act. This can be explained using the figure on the following page.

There are also difficulties in establishing soil concentrations of contaminants beyond which risks from exposure to these contaminants would be 'unacceptable' and that they would lead to "significant possibility of significant harm" as defined in Part IIA of The Environmental Protection Act (1990) and determine that the land is "contaminated." This ultimately requires detailed 'toxicological' information of the health effects of individual contaminants and also a scientific judgement on what constitutes an 'unacceptable' risk. It is for local authorities or the Environment Agency to determine whether a particular site is contaminated land and it is for local Planning Authorities to determine whether land affected by contamination can be redeveloped.

Given the SGVs have been derived only for a limited number of contaminants and there was little prospect of further SGVs being published, two professional groupings have produced Generic Assessment Criteria (GACs) in accordance with the CLEA model for a large number of additional contaminants. These GACs were recognised in the new Contaminated Land Statutory Guidance (DEFRA, 2012) and have been produced as follows:

LQM/CIEH : 2009 Nathaniel CP, McCaffrey C, Ashmore MH, Cheng NPS GROUP, Gillett A, Ogden R & Scott D : 2009 . The LQM/CIEH Generic Assessment Criteria for Human Health Risk Assessment (2nd edition). Land Quality Press, Nottingham.
CL:AIRE/EIC/AGS: 2009 : Soil Generic Assessment Criteria (GAC) for Human Health Risk Assessment. Contaminated Land: Applications in Real Environments, Environment Industries Commission & Association of Geotechnical and Environmental Specialists. December 2009.

Category 4 Screening Levels and LQM/CIEH Suitable 4 Use Levels

For new developments progressing through the planning regime, it is desirable that the soil concentrations are within Category 4 where there is a valid contaminant linkage. The upper boundary between Category 4 and 3 is not defined in the guidance. This boundary can also be better defined by carrying out a Detailed Quantified Risk Assessment (DQRA) and this is discussed later in this appendix.

In December 2013 Defra issued the findings of a research project undertaken by CL:AIRE to set out the framework by which potential Category 4 Screening Levels (pC4SL) may be derived. The report was not designed to produce 'final' C4SL as the steering group producing the report believes that final C4SL should be set by a 'relevant authority' (e.g. Defra), the toxicological framework proposed has not been reviewed by the Committee on Toxicity and the document has yet to be subject to peer review.

In March 2014, appendices to the main Defra report were published detailing the derivation of pC4SL for 6 contaminants and other appendices regarding a review of the CIEH/CL:AIRE statistics guidance and sensitivity analysis. For each contaminant, a range of pC4SL have been produced relating to modifying toxicological parameters only, modifying exposure parameters only or by modifying both. It should be noted that the pC4SL produced for lead (the SGV was withdrawn in 2011) has undertaken a relatively large toxicological review in relation to modelling blood lead concentrations. pC4SL have been produced for:

- Arsenic;
- Benzene;
- Benzo(a)pyrene (as a surrogate marker for PAHs);
- Cadmium;
- Chromium (VI); and
- Lead

As previously discussed the values were initially published as 'potential' C4SL but have become 'final' following DEFRA having issued a policy decision letter indicating that they are to be used in the planning regime (letter of 3rd September 2014). It is considered that the pC4SL provide a simple test for deciding whether land is suitable for use without any remediation. The pC4SL represent a new set of screening levels that are more pragmatic (but strongly precautionary) compared to the existing soil guideline values (SGVs and the other GACs calculate in accordance with the existing CLEA methodology). The pC4SL provide cautious estimates of contaminant concentrations in soil that are still considered to present an acceptable level of risk, within the context of Part 2A, by combining information on toxicology, exposure assessment and normal levels of exposure to these contaminants. pC4SL values should not be seen as 'SPOH values.' Exceeding a pC4SL means that further investigation is required, not that the land is necessarily contaminated. In January 2015, LQM

published Suitable 4 Use Levels (S4ULs) for a further 89 contaminants using the Defra C4SL methodology. In a similar manner to the pC4SLs, no authoritative review has been undertaken although the approach and quality of the work undertaken is widely accepted as being of high quality.

Lead
The SGV for lead was withdrawn in 2011 and is not used in this report. The pC4SL for lead provides a technically robust and conservative assessment tool using significantly updated toxicological modelling in line with current scientific understanding of lead toxicology.

Nickel
The SGV for nickel was withdrawn in 2015 and is not used in this report. In-house GACs for nickel have been produced using the updated toxicological review by the EFSA and the CLEA 1.071 software.

Public Open Space
The Defra report (December 2013) has also introduced exposure scenarios for two other commonly occurring land uses which require assessment (under the planning and Part 2A regimes) on a relatively frequent basis. These exposure scenarios are:

- Public Open Space – Space Near Residential Housing (POS_{resi}); and
- Public Open Space – Public Park (POS_{park}).

Potential use of pC4SL relating to Public Open Space (POS) require care due to the significant variability in exposure characteristics. For example, POS may include:

- Children's play areas, public parks where children practise sport several times a week and teenagers only once a week;
- Grassed areas adjacent to residential properties which are rarely used;
- Dedicated sports grounds where exposure is only to players and groundworkers; and
- Nature reserves or open ground with low level activity (for example, dog walking).

Within the Defra report (December 2013) the following exposure scenarios have been modelled as these are considered the most important for potential exposure for the critical receptor i.e. young children:

- Green open space close to housing, including tracking back of soil (POS_{resi}); and
- Park-type scenario where distance is considered sufficient to discount tracking back of soil (POS_{park}).

5.2 Phytotoxic Risks

Generic assessment of phytotoxicity is by comparison with guideline values presented in the British Standard for Topsoil and the Department for the Environment Sewage Sludge Code of Practice.

5.3 Controlled Waters

Risks to controlled waters (groundwater and surface waters) from contaminants are assessed in accordance with the EA documents "The Environment Agency's Approach to Groundwater Protection" (2017) and Remedial Targets Methodology (RTM, 2006). Pollutant inputs from contaminated land sites are considered as passive inputs under the European Water Framework Directive (2000/60/EC) (WFD) and its daughter Directives, and as such are regulated under the Environment Agency's 'limit' pollution objective. Acceptable water quality targets (WQT) are defined for protection of human health (based on Drinking Water Standards (DWS)) and for protection of aquatic ecosystems (Environmental Quality Standards (EQS)). The risk posed to controlled waters from total soil concentrations cannot be directly assessed. The risk is assessed either by comparison of results of leachate tests carried out on soil samples, or from the direct testing of samples of groundwater to screening criteria. Leachate testing generally forms a conservative assessment and is not appropriate for organic contaminants.

Tools available for Risk Assessment of Controlled Waters

In order for a developer of a potentially contaminated site to fulfil their obligations under the legislation, a site assessment would be required to be undertaken in order to identify any potential risks to controlled waters and to derive suitable clean-up criteria if necessary to ensure the protection of controlled waters. A number of tools are available for this purpose.

Three main stages apply to any risk assessment of controlled waters, these are:

i) Risk Screening (devise Conceptual Site Model, making reference to groundwater vulnerability maps, site setting etc)
ii) Generic Risk Assessment (using the EA Remedial Targets Methodology – Tier 1 - Comparison of groundwater data with relevant standards)
iii) Detailed Quantitative Risk Assessment (Consideration of aquifer properties and site specific parameters, using the EA Remedial Targets Methodology - Tiers 2 & 3)

The process is summarised below (Taken from the Environment Agency GP3 consultation document, 2006):

When assessing groundwater impact the Environment Agency advocate the application of their framework methodology "Remedial Targets Methodology – Hydrogeological Risk Assessment for Land Contamination" Environment Agency (2006). The methodology has four tiers of assessment:

Tier 1 utilises either a soil concentration (calculation of pore water concentrations based on partitioning calculations), leaching test or pore-water concentration of perched water as a source concentration input and these are contrasted directly to water quality standards. No dilution or attenuation is considered at Level 1.

Tier 2 (groundwater) considers dilution of the contaminant within the underlying receiving groundwater or surface water body. To determine a dilution factor the infiltration rate of pore water and the discharge of groundwater beneath the source must be determined. Level 2 Assessment is comprises a comparison between measured groundwater concentrations with to water quality standards.

Tier 3 considers natural attenuation in the form of dispersion, retardation and degradation of the contaminant. As the levels are progressed, the assessment becomes increasingly more detailed and less conservative as the data requirements are increased with each successive tier. The Environment Agency has released Excel Worksheets to carry out basic calculations using a conservative approach up to Tier 3. However, in this case the conceptual model is a simple one and assumes there is a simple migration of contaminants from the source zone into the aquifer receptor. Using these worksheets requires a sensitivity analysis showing how by varying each parameter, what effect it might have on the outcome of the assessment. Groundwater conceptual models are not always this simple.

Tier 4 is for more complex conceptual models where multiple sources, multiple pathways, multiple receptors and complex water balances can be assessed.

The Environment Agency developed a spreadsheet based code to support the Remedial Target Methodology, and the code is capable of undertaking assessments for Tiers 1 to 3. Tier 4 assessment is not supported by the spreadsheet based code.

A more advanced code, ConSim2, developed on behalf of the Environment Agency to support the Remedial Targets Methodology, allows for the introduction of additional geological horizons and is used mainly to determine the concentrations reaching a receptor and the timescales over which this may happen.

The codes assess only the dissolved phase contaminants. There are many further codes commercially available for use in controlled waters risk assessment, particularly for more complex situations, however, these should be used with caution and only once agreement has been obtained from the Environment Agency. All have the overall aim of the estimation of risk from contaminant linkages and the protection of controlled waters.

General notes on each stage of the controlled waters risk assessment process

Risk Screening

The understanding of the Conceptual Site Model (CSM) is the key to assessing any site. Using a robust CSM, potential pathways or receptors may be screened out from any further assessment at an early stage. For example if the pathway through the unsaturated zone is blocked by the presence of a significant thickness of low permeability clay. A greater understanding of the CSM is achieved with each tier of risk assessment

Generic Risk Assessment

When undertaking the Generic Hydrogeological Risk Assessment (EA Remedial Targets Methodology Tier 1), comparison of chemical analytical results is made with screening criteria. Published values of screening criteria with which chemical test results can be compared are published in the following guidance:

There is a hierarchy of screening criteria which is as follows:

- Environmental Quality Standards (EQS) for freshwaters based on The EC Dangerous Substances Directive (76/464/EEC and Daughter Directives);
- Surface Waters (Abstraction for Drinking Water)(Classification) Regulations (1996)
- Surface Waters (Fishlife) (Classification) Regulations (1997)
- UK Drinking Water Standards (DWS) (Water Supply (Water Quality) Regulations 2000);
- Dutch Ministry of Housing, Spatial Planning and Environment (2001) Intervention Values and Target Values – soil quality standards;
- World Health Organisation Guidelines for Drinking Water (2004)

Aquifer Designations

The Environment Agency / Natural Resources Wales have classified different types of aquifer from which groundwater can be extracted. The aquifer designations reflect the importance of aquifers in terms of groundwater as a resource (drinking water supply) but also their role in supporting surface water flows and wetland ecosystems. The aquifer designation data is based on geological mapping provided by the British Geological Survey.

The maps are split into two different types of aquifer

designation:

- Superficial (Drift) – permeable unconsolidated (loose) deposits.
- Bedrock (Solid)– solid permeable formations e.g. sandstone, chalk, limestone.

The aquifer designations displayed on the Environment Agency maps are as follows:

- Principal Aquifers (formerly termed Major Aquifers) – These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as a major aquifer.
- Secondary Aquifers (formerly termed Minor Aquifers) – These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:
    - Secondary A - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers;
    - Secondary B - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.
    - Secondary Undifferentiated - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

- Unproductive Strata (formerly termed Non-Aquifer) – These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.

Hazardous and Non Hazardous Substances

The Groundwater (England and Wales) Regulations 2009 control the disposal to the hydrogeological environment of potentially polluting substances which are divided into Hazardous Substances and Non-hazardous Contaminants (this roughly approximates to the former List 1 and List 2 substances).

Hazardous Substances are the most damaging and toxic and must be prevented from directly or indirectly entering the groundwater environment. Hazardous Substances include mineral oils and hydrocarbons, pesticides, biocides, herbicides, solvents and some metals. Discharge of Hazardous Substances to Controlled Waters must be prevented.

Non-hazardous Pollutants are any contaminants other than Hazardous Substances. Non-hazardous Pollutants are potentially toxic but are less harmful than Hazardous Substances, but their direct discharge to groundwater is generally not permitted and any indirect discharge to groundwater must be limited and be controlled by technical precautions in order to prevent pollution. Non-hazardous Pollutants include ammonia and nitrites, many metals and fluorides.

APPENDIX 17

Investigation Techniques and General Notes

INVESTIGATION TECHNIQUES

INTRODUCTION

The following brief review of Ground Investigation techniques, generally used as part of most Site Investigations in the UK, summarises their methodology, advantages and limitations. Detailed descriptions of the techniques are available and can be provided on request. This review should be read in conjunction with the accompanying General Notes.

TRIAL PITS

The trial pit is amongst the simplest yet most effective means of identifying shallow ground conditions on a site. Its advantages include simplicity, speed, potential accuracy and cost-effectiveness. The trial pit is most commonly formed using a back-acting excavator which can typically determine ground conditions to some 4 metres below ground level. Hand excavation is often used to locate, expose and detail existing foundations, features or services. In general, it is difficult to extend pits significantly below the water table in predominantly granular soils, where flows can cause instability. Unless otherwise stated, the trial pits will not have been provided with temporary side support during their construction. Under such circumstances, entrance into the pit is not permitted and hence observations will have been made from the ground surface and samples taken from the excavator bucket.

Where access for personnel is required to allow close observation of the exposed strata, the taking of samples and the carrying out of in situ tests, the sides of the trial pits (Observation Pits in BS 5930:2015) will be made safe using temporary supports or the sides battered back to a stable angle. Some limited access to such Trial Pits (Observation Pits) at depths less than 1m may be allowed in stable conditions or where the sides are benched or battered back to a safe angle.

Trends in strata type, level and thickness can be determined, shear surfaces identified and the behaviour of plant, excavation sides and excavated materials can be related to the construction process. They are particularly valuable in land slip investigations. Some types of in situ test can be undertaken in such pits and large disturbed or block samples obtained.

CABLE PERCUSSION BORING

The light Cable Percussion technique of soft ground boring, typically at a diameter of 150mm, is a well-established simple and flexible method of boring vertical holes and generally allows data to be obtained in respect of strata conditions other than rock. A tubular cutter (for cohesive soils) or shell with a flap valve (for granular soils) is repeatedly lifted and dropped using a winch and rope operating from an "A" frame. Soil which enters these tools is regularly removed and either sampled for subsequent examination or test, or laid to one side for later removal off site and licensed disposal or, if permitted by the Client, use as backfill. Steel casing will have been used to prevent collapse of the borehole sides where necessary. A degree of disturbance of soil and mixing of layers is inevitable and the presence of very thin layers of different soils within a particular stratum may not be identified. Changes in strata type can only be detected on recognition of a change in soil samples at the surface, after the interface has been passed. For the foregoing reasons, depth measurements should not be considered to be more accurate than 0.10 metre. The technique can determine ground conditions to depths in excess of 30 metres under suitable circumstances and usually causes less surface disturbance than trial pitting.

In cohesive soils cylindrical samples are retrieved by driving or pushing in 100mm nominal diameter tubes. In soft soils, piston sampling or vane testing may be undertaken. In granular soils and often in cohesive materials, in situ Standard Penetration Tests (SPT's) are performed. The SPT records the number of standard blows required to drive a 50mm diameter open or cone ended probe for 300mm after an initial 150mm penetration. A modified method of recording is used in denser strata. Small disturbed samples are obtained throughout.

ROTARY DRILLING

Rotary Drilling to produce cores by rotating an annular diamond-impregnated tube or barrel into the ground is the technique most appropriate to the forming of site investigation boreholes through rock or other hard strata. It has the advantage of being able to be used vertically or at an angle. Core diameters of less than 100mm are most common for site investigation purposes. Core is normally retrieved in plastic lining tubes. A flushing fluid such as air, water or foam is used to cool the bit and carry cuttings to the surface. Depths in excess of 60 metres can be achieved under suitable circumstances using rotary techniques, with minimal surface disturbance.

Examination of cores allows detailed rock description and generally enables angled discontinuity surfaces to be observed. However, vertical holes do not necessarily reveal the presence of vertical or near-vertical fissures or joint discontinuities. The core type and/or techniques used will depend on the ground conditions. Where open hole rotary drilling is employed, descriptions of strata result from examination at the surface of small particles ejected from the borehole in the flushing medium. In consequence, no indication of fissuring, bedding, consistency or degree of weathering can be obtained.

DYNAMIC SAMPLING

This technique involves the driving of an open-ended tube into the ground and retrieval of the soil which enters the tube. It was previously called window or windowless sampling. The term "window sample" arose from the original device which had a "window" or slot cut into the side of the tube through which samples were taken. This was superseded by the use of a thin-walled plastic liner to retrieve the soil sample from within a sampler (windowless sampling) which has a solid wall. Line diameters range from 36 to 86mm. Such samples can be used for qualitative logging, selection of samples for classification and chemical analysis and for obtaining a rudimentary assessment of strength.

Driving devices can be hand-held or machine mounted and the drive tubes are typically in 1m lengths. Depending on the type of rig used, the hole formed can be cased to prevent collapse of the borehole sides. Where the type of rig does not allow the insertion of casing, the success of this technique can be limited when soils and groundwater conditions are such that the sides of the hole collapse on withdrawal of the sampler. Obstructions within the ground, the density of the material or its strength can also limit the depth and rate of penetration of this light-weight investigation technique. Nevertheless, it is a valuable tool where access is constrained such as within buildings or on embankments. Depths of up to 10m can be achieved in suitable circumstances depending on the rig type but depths of 5m to 6m are more common.

EXPLORATORY HOLE RECORDS

The data obtained by these techniques are generally presented on Trial Pit, Borehole, Drillhole or Dynamic Sample Records. The descriptions of strata result from information gathered from a number of sources which may include published geological data, preliminary field observations and descriptions, in situ test results, laboratory test results and specimen descriptions. A key to the symbols and abbreviations used accompanies the records. The descriptions on the exploratory hole records accommodate but may not necessarily be identical to those on any preliminary records or the laboratory summaries.

The records show ground conditions at the exploratory hole locations. The degree to which they can be used to represent conditions between or beyond such holes, however, is a matter for geological interpretation rather than factual reporting and the associated uncertainties must be recognised.

DYNAMIC PROBING

This technique typically measures the number of blows of a standard weight falling over a standard height to advance a cone-ended rod over sequential standard distances (typically 100mm). Some devices measure the penetration of the probe per standard blow. It is essentially a profiling tool and is best used in conjunction with other investigation techniques where site-specific correlation can be used to delineate the distribution of soft or loose soils or the upper horizon of a dense or strong layer such as rock.

Both machine-driven and hand-driven equipment is available, the selection depending upon access restrictions and the depth of penetration required. It is particularly useful where access for larger equipment is not available, disturbance is to be minimised or where there are cost constraints. No samples are recovered and some techniques leave a sacrificial cone head in the ground. As with other lightweight techniques, progress is limited in strong or dense soils. The results are presented both numerically and graphically. Depths of up to 10m are commonly achieved in suitable circumstances.

The hand-driven DCP probing device has been calibrated by the Highways Agency to provide a profile of CBR values over a range of depths.

INSTRUMENTATION

The most common form of instrument used in site investigation is either the standpipe or else the standpipe piezometer which can be installed in investigation holes. They are used to facilitate monitoring of groundwater levels and water sampling over a period of time following site work. Normally a standpipe would be formed using rigid plastic tubing which has been perforated or slotted over much of its length whilst a standpipe piezometer would have a filter tip which would be placed at a selected level and the hole sealed above and sometimes below to isolate the zone of interest. Groundwater levels are determined using an electronic "dip meter" to measure the depth to the water surface from ground level. Piezometers can also be used to measure permeability. They are simple and inexpensive instruments for long term monitoring but response times can limit their use in tidal areas and access to the ground surface at each instrument is necessary. Remote reading requires more sophisticated hydraulic, electronic or pneumatic equipment.

Settlement can be monitored using surface or buried target plates whilst lateral movement over a range of depths is monitored using slip indicator or inclinometer equipment.

GENERAL NOTES

1. The report is prepared for the exclusive use of the Client named in the document and copyright subsists with Geotechnics Limited. Prior written permission must be obtained to reproduce all or part of the report. It is prepared on the understanding that its contents are only disclosed to parties directly involved in the current investigation, preparation and development of the site.

2. Further copies may be obtained with the Client's written permission, from Geotechnics Limited with whom the master copy of the document will be retained.

3. The report and/or opinion is prepared for the specific purpose stated in the document and in relation to the nature and extent of proposals made available to Geotechnics Limited at that time. Re-consideration will be necessary should those details change. The recommendations should not be used for other schemes on or adjacent to the site without further reference to Geotechnics Limited.

4. The assessment of the significance of the factual data, where called for, is provided to assist the Client and their Engineer and/or Advisers in the preparation of their designs.

5. The report is based on the ground conditions encountered in the exploratory holes together with the results of field and laboratory testing in the context of the proposed development. The data from any commissioned desk study and site reconnaissance are also drawn upon. There may be special conditions appertaining to the site, however, which are not revealed by the investigation and which may not be taken into account in the report.

6. Methods of construction and/or design other than those proposed by the designers or referred to in the report may require consideration during the evolution of the proposals and further assessment of the geotechnical and any geoenvironmental data would be required to provide discussion and evaluations appropriate to these methods.

7. The accuracy of results reported depends upon the technique of measurement, investigation and test used and these values should not be regarded necessarily as characteristics of the strata as a whole (see accompanying notes on Investigation Techniques). Where such measurements are critical, the technique of investigation will need to be reviewed and supplementary investigation undertaken in accordance with the advice of the Company where necessary.

8. The samples selected for laboratory test are prepared and tested in accordance with the relevant Clauses and Parts of BS EN ISO 17892 and BS 1377 Parts 1 to 8, where appropriate, in Geotechnics Limited's UKAS accredited Laboratory, where possible. A list of tests is given.

9. Tests requiring the use of another laboratory having UKAS accreditation where possible are identified.

10. Any unavoidable variations from specified procedures are identified in the report.

11. Specimens are cut vertically, where this is relevant and can be identified, unless otherwise stated

12. All the data required by the test procedures are recorded on individual test sheets but the results in the report are presented in summary form to aid understanding and assimilation for design purposes. Where all details are required, these can be made available.

13. Whilst the report may express an opinion on possible configurations of strata between or beyond exploratory holes, or on the possible presence of features based on either visual, verbal, written, cartographical, photographic or published evidence, this is for guidance only and no liability can be accepted for its accuracy.

14. The Code of Practice for Ground Investigations – BS 5930:2015 calls for man-made soils to be described as Anthropogenic Ground with soils placed in an un-controlled manner classified as Made Ground and soils placed in a controlled manner as Fill. In view of the difficulty in always accurately determining the origin of man-made soils in exploratory holes, Geotechnics Limited classify such materials as Made Ground. Where soils can be clearly identified as being placed in a controlled manner then further classification of the soils as Fill has been added to the Exploratory Hole Records.

15. Classification of man-made soils is based on the inspection of retrieved samples or exposed excavations. Where it is obvious that foreign matter such as paper, plastic or metal is present, classification is clear. Frequently, however, for man-made soils that arise from the adjacent ground or from the backfilling of excavations, their visual characteristics can closely resemble those of undisturbed ground. Other evidence such as site history, exploratory hole location or other tests may need to be drawn upon to provide clarification. For these reasons, classification of soils on the exploratory hole records as either Made Ground or naturally occurring strata, the boundary between them and any interpretation that this gives rise to should be regarded as provisional and subject to re-evaluation in the light of further data.

16. The classification of materials as Topsoil is generally based on visual description and should not be interpreted to mean that the material so described complies with the criteria for Topsoil used in BS 3882:2015. Specific testing would be necessary where such a definition is a requirement.

17. Ground conditions should be monitored during the construction of the works and the report should be re-evaluated in the light of these data by the supervising geotechnical engineers.

18. Any comments on groundwater conditions are based on observations made at the time of the investigation, unless specifically stated otherwise. It should be noted, however, that the observations are subject to the method and speed of boring, drilling or excavation and that groundwater levels will vary due to seasonal or other effects.

19. Any bearing capacities for conventional spread foundations which are given in the report and interpreted from the investigation are for bases at a minimum depth of 1m below finished ground level in naturally occurring strata and at broadly similar levels throughout individual structures, unless otherwise stated. Typically they are based on serviceability criteria taking account of an assessment of the shear strength and/or density data obtained by the investigation. The foundations should be designed in accordance with the good practice embodied in BS 8004:2015 - Foundations, supplemented for housing by NHBC Standards. Foundation design is an iterative process and bearing pressures may need adjustment or other measures may need to be taken in the context of final layouts and levels prior to finalisation of proposals.

20. Unless specifically stated, the investigation does not take account of the possible effects of mineral extraction or of gases from fill or natural sources within, below or outside the site.

21. The costs or economic viability of the proposals referred to in the report, or of the solutions put forward to any problems encountered, will depend on very many factors in addition to geotechnical or geoenvironmental considerations and hence their evaluation is outside the scope of the report.