Trinity Fields

Ground Investigation Report

A110489-6-1

Caerphilly County Borough Council
September 2020
Prepared by WYG Environment Planning Transport Limited.

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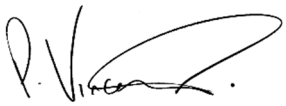
Prepared by:  Paul Vincent Principal Engineering Consultant		
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EXECUTIVE SUMMARY

The Site	The proposed development will involve a large single storey extension to the existing Trinity Fields school building, encompassing the current playground, to form a courtyard. Additional play areas, school allotment and car parking are proposed to the south of the proposed extension. The site area is approximately 3.84ha in area. An approximate postcode of the school site is CF82 7XW.
DTS Summary	Earliest mapping from 1879 indicates that the site remained largely undeveloped until a football ground and sports ground was first recorded on 1960 mapping. Trinity Fields School is shown from historical mapping from 2006 onwards. The surrounding site area generally comprises a mixed commercial residential setting. The BGS does not record significant Made Ground deposits as being present onsite. However, Made Ground is anticipated in the north associated with the current school development. Furthermore, limited reworked material may be present beneath the sports pitch associated with any cut and fill activities associated with the levelling of the pitch. Glaciofluvial deposits are shown to underly the site, comprising Devensian aged sands and gravels. The BGS Geoindex indicates the site is underlain by the Hughes Member, which forms part of the 'Upper Pennant Measures' of the Pennant Sandstone Formation. The Hughes Member (sandstone bedrock) and glaciofluvial sands and gravels are designated as Secondary A Aquifers. No radon protection measures are required for new developments.
Site Investigation	The scope of the site investigation included the following: • Ten window sample boreholes (designated WS01 to WS10) to a maximum depth of 5.00m bgl; • Five cable percussion boreholes through superficial deposits until refusal; • Two machine excavated trial pits (designated SA01 and SA02) in which soil infiltration testing was undertaken; • Seven in situ CBR tests using TRL-DCP method; • Installation of 5 no. ground gas and groundwater monitoring wells; • On-site inspection and logging of recovered samples; • Representative soil samples taken and submitted for geotechnical classification testing; • Representative soil samples taken, submitted and tested for a suite of potential contaminants; and • Three return visits to monitor ground gas and groundwater levels, with one round of groundwater sampling.
Ground Conditions	The sequence of strata encountered beneath the site generally comprised; • Topsoil (GL – 0.15 mbgl) • Made Ground (to a maximum depth of 1.20mbgl) • Glaciofluvial deposits (to a maximum depth of 4.60mbgl); and

	• Hughes Member (inferred to a maximum depth of 4.65mbgl).
Ground Contamination	Only limited Made Ground has been identified on the site and laboratory testing has indicated that the site is suitable a public open space end use in line with the proposed development as part of the extension to the school. Asbestos containing materials have not been identified within the near surface soils and risks to the wider environment are considered to be suitably low. The site is categorised as Characteristic Situation 1 (low risk) under the Wilson and Card classification presented in CIRIA 665 as such, gas protection measures are not required within new developments.
Geotechnical Assessment	The shallow, generally coarse grained Glaciofluvial deposits were identified in all positions immediately below the Topsoil and Made Ground. Shallow spread foundations placed within these soils at a minimum depth of 0.85m bgl may be designed to an allowable net bearing pressure of 200kPa. Floor slabs may be ground bearing, assuming any topsoil and localised Made Ground are stripped and replaced with compacted granular fill. The Design Sulphate Class for the site, as defined in BRE Special Digest 1, be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as AC-1. For pavement design, a conservative CBR value of 5% is recommended. Shallow excavations are likely to remain stable in the short term although some localised collapse may occur. Shallow groundwater (<2m bgl) was not encountered although levels can vary seasonal.
Conclusions and Recommendations	Within the context of ground contamination, no further risk management procedures are recommended with respect to the proposed development of the site. However, it is recommended that a proactive approach is adopted during the future development of the site to identify and assess any previously unidentified contamination which may be encountered during development works.

1.0 INTRODUCTION

1.1 Instruction

WYG Environment Planning Transport Ltd (WYG) was commissioned by Caerphilly County Brough Council (the client) to undertake an Intrusive Ground Investigation for a site known as Trinity Fields School, Ystrad Mynach (known hereafter as "the site").

The location of the site is shown on Figure 1.

This report should be read in conjunction with the following Desk Top Study, previously presented for the site.

- WYG, 2019. Trinity Fields. Phase 1 Geoenvironmental Assessment. Desk Top Study. Reference A110489-6. V1 May 2019.

It should be noted that the DTS report covered a larger area than the current area considered within the ground investigation presented in this report.

1.2 Brief

The brief was to provide an intrusive ground investigation to provide information on the ground conditions and enable a geotechnical assessment and contaminated land risk assessment to support the proposed development of the site.

The work was designed to comprise the following elements:

- Ground investigation comprising of cable percussion drilling, windowless sampling and soil infiltration testing;
- Installation of six ground gas and groundwater monitoring wells;
- On-site inspection and logging of recovered samples;
- Representative soil samples taken and submitted for geotechnical classification testing;
- Representative soil samples submitted and tested for a suite of potential contaminants;
- Three return visits to monitor ground gas and groundwater levels;
- Preparation of a Ground Investigation report.

1.3 Proposed Development

It is understood that the proposed development will involve a large single storey extension to the existing school building, encompassing the current playground, to form a courtyard. Additional play areas, school allotment and car parking are proposed to the south of the proposed extension.

1.4 Report Scope

This report includes the following key elements:

- Full factual records of the site works carried out;
- Summary of the ground conditions encountered;
- In-Situ testing results;
- Environmental laboratory testing results;
- Geotechnical laboratory testing results;
- Interpretation of geotechnical and environmental laboratory data, including a qualitative ground contamination risk assessment (compliant with CIRIA 552 (CIRIA, 2001) methodology);
- An executive summary of the report to allow a rapid, layman's overview.

1.5 Limitations

The recommendations and opinions expressed in this report are based on information obtained as part of the desk study or provided by others. Information provided from other sources is taken in good faith and WYG cannot guarantee its accuracy.

This report is subject to the report conditions presented in Appendix A.

The information contained in this report is intended for the use of Caerphilly County Borough Council (CCBC) and WYG can take no responsibility for the use of this information by any third party or for uses other than that described in this report or detailed within the terms of our engagement.

2.0 SUMMARY OF SITE INFORMATION

2.1 Location

The site is located off Caerphilly Road, to the south of Ystrad Mynach town centre, is approximately 3.84ha in area and is centred on National Grid Reference (NGR) 314440, 193920. The approximate postcode of the site is CF82 7XW.

The site address is:

Trinity Fields School,
Caerphilly Road,
Ystrad Mynach,
Hengoed,
CF82 7XW

A site location plan is presented in Figure 1.

2.2 Site Description

The site consists of the southern part of the Trinity Fields School, including the current car parking facility and external playing area, and extends onto the rugby pitch to the south. These two areas are divided by a hedgerow and fence line which mark the southern extent of the Trinity Fields school site.

The site is largely level with a mixture of ground cover including grass across the rugby pitch and areas of soft landscaping in the school site. The car park and access roads consist of hardstanding (asphalt).

The site is accessed via Caerphilly Road to the east of the site with secure gates marking the entrance to the school. The rugby pitch is surrounded by mental fencing, although the metal gates remain open to provide public access to the site and surrounding public amenity areas.

2.3 Summary of Site History

Earliest mapping from 1879 indicates that the site remained largely undeveloped until a sports ground was first recorded on mapping from the 1960s. Trinity Fields School is shown from historical mapping from 2006 onwards.

The surrounding site area generally comprises a residential setting with Penallta Rugby Football Club located immediately to the east of the site. It is understood that Penallta RFC use the rugby pitch on site as a training and playing facility.

2.4 Geology, Hydrogeology, Hydrology and Radon

2.4.1 Geology

Details of the geology underlying the site have been obtained from the following sources:

- British Geological Survey (BGS) Sheet No. 249 (Newport) Solid and Drift Edition, 1:50 000;
- BGS website (British Geological Survey , 2018);
- BR211 Indicative Radon Mapping (Scivyer, 2015);
- Coal Authority Interactive Mapper (The Coal Authority, 2018); and
- Coal Mining Report (Reference 51002073807004) enclosed as within Appendix C of Trinity Fields Desk Top Study, WYG, May 2019.

Made Ground

The BGS does not record significant Made Ground deposits as being present onsite. However, Made Ground is anticipated in the north associated with the current school development. Furthermore, limited reworked material may be present beneath the sports pitch associated with any cut and fill activities associated with the levelling of the pitch and the installation of a drainage network across the site.

Superficial Geology

Geological mapping indicates that the site is underlain by Glaciofluvial deposits in the north of the site and Alluvial deposits in the south. Glaciofluvial deposits typically comprise sand and gravel and Alluvium is typically comprised of clay, silt, sand and gravel.

Solid Geology

The BGS Geoindex indicates the site is underlain by the Hughes Member, which forms part of the 'Upper Pennant Measures' of the Pennant Sandstone Formation. The member is c.305 million years old, deposited during the Carboniferous period. The lithology of the Hughes Member is described as green-grey lithic arenites interbedded with thin mudstone/siltstone sequences and

seatearths and predominantly thin coals.

A geological fault with unknown displacement is shown to run north west – south west through the southern portion of the site.

2.4.2 Hydrogeology

The Hughes Member (sandstone bedrock) and superficial deposits are designated as Secondary A Aquifers. These are 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. As such, the bedrock is categorised as a Secondary Aquifer with high groundwater vulnerability.

2.4.3 Hydrology

The nearest surface water feature is an unnamed river located 15m to the south within the Rhymney catchment. The Nant Cylla river is located 69m to the north-east which discharges into the River Rhymney located 70m to the east.

2.4.4 Radon

The BRE document 211 (Scivyer, 2015) mapping coverage for the site area was consulted and indicates that the site is located within an area where no radon protection measures are required for new developments.

2.4.5 Coal Mining

Whilst the site is located within a coal mining reporting area, the shallowest recorded worked coal seam is 480m below ground level. Additionally, the site is outside of a development high risk area and not within an area of past or probable shallow coal mine workings. Furthermore, the site is not deemed at risk from historically identified coal mining.

3.0 SITE INVESTIGATION

The site investigation was undertaken from 2nd to 9th June 2020. In total, three return monitoring visits were undertaken between 17th and 30th June 2020 following the completion of the ground investigation.

Details of the fieldwork methods are given in the notes section at the end of this report.

3.1 Scope

The ground investigation was designed to provide an overall assessment of ground conditions. The scope of the site investigation included the following:

- Ground Penetrating Radar (GPR) survey to clear exploratory locations of buried services;
- Ten window sample boreholes (designated WS01 to WS10) to a maximum depth of 5.00m bgl with Standard Penetration Tests (SPTs) conducted at 1m intervals throughout the full depth of the holes. Upon shallow refusal of the windowless sampler, dynamic probing was progressed to scheduled depths;
- Five cable percussion boreholes undertaken to refusal with SPTs through superficial deposits;
- Two machine excavated trial pits (designated SA01 and SA02) in which soil infiltration testing was undertaken between 1.60 to 2.70mbgl within superficial deposits;
- Seven in situ CBR tests using TRL-DCP method;
- Installation of 5 no. ground gas and groundwater monitoring wells;
- On-site inspection and logging of recovered samples;
- Representative soil samples taken and submitted for geotechnical classification testing;
- Representative soil samples taken, submitted and tested for a suite of potential contaminants; and
- Three return visits to monitor ground gas and groundwater levels, with one round of groundwater sampling.

Figure 2 shows the layout of the exploratory holes advanced during the site investigation. Exploratory hole logs including photographic plates are presented in Appendix B.

4.0 GROUND CONDITIONS ENCOUNTERED

4.1 Strata Encountered

The sequence of strata encountered beneath the site generally comprised;

- Grass over Topsoil;
- Made Ground;
- Glaciofluvial deposits; and
- Hughes Member (inferred).

A summary of each stratum depth is provided in the table below, with descriptions of each stratum detailed in the subsequent sections. Exploratory hole logs including photographic plates can also be seen in Appendix B.

Table 1 – Summary of Ground Conditions Encountered

Location	Depth to base of strata (m bgl)			
	Topsoil	Made Ground	Glaciofluvial Deposits	Hughes Member
BH01	GL – 0.15	0.15 – 1.20	1.20 – 3.10	3.10 – 3.30*
BH02	GL – 0.15	0.15 – 1.20	1.20 – 4.00	4.00 – 4.45*
BH03	GL – 0.15	0.15 – 0.80	0.80 – 4.60	4.60 – 4.65*
BH04	GL – 0.15	ne	0.15 - 3.00	3.00 – 3.20*
BH05	GL – 0.15	ne	0.15 – 4.30*	
BH05a	GL – 0.15	ne	0.15 – 4.20	4.20 – 4.40*
WS01	GL – 0.15	0.15 – 1.20	1.20 – 2.0*	
WS02	GL – 0.15	ne	0.15 – 1.10*	
WS03	GL – 0.15	ne	0.15 – 2.90*	
WS04	GL – 0.15	0.15 – 1.60	1.60 – 2.0*	
WS05	GL – 0.15	ne	0.15 – 1.60*	
WS06	GL – 0.15	ne	0.15 – 1.70*	
WS07	GL – 0.15	ne	0.15 – 1.50*	
WS08	GL – 0.15	ne	0.15 – 2.05*	
WS09	GL – 0.15	ne	0.15 – 1.70*	
WS10	GL – 0.15	ne	0.15 – 1.10*	
SA01	GL – 0.15	ne	0.15 – 2.60*	
SA02	GL – 0.15	ne	0.15 – 2.80*	

GL – Ground Level
NE – Not encountered
* - Base of strata not proven

4.1.1 Topsoil

All locations were located within soft cover. As such, topsoil was encountered in all exploratory

locations, with a recorded thickness of 0.15m across the site. The topsoil was comprised of grass over slightly sandy gravelly clay or silt with frequent rootlets.

4.1.2 Made Ground

Made Ground was identified within five exploratory locations, located to the south of the existing school building, but north of the sports pitch. Made Ground was recorded to a maximum depth of 1.60mbgl in WS04.

The Made Ground was largely consistent where present, comprising reworked silty or clayey sandy gravel or gravelly sand with rare fragments fine of brick, plastic, slag or concrete.

Although no fragments of anthropogenic material were observed in BH02, the Made Ground comprised slightly gravelly well sorted fine to medium sand, which was not observed elsewhere onsite.

4.1.3 Glaciofluvial Deposits

Glacifluvial deposits were encountered in all exploratory locations, to a maximum depth of 4.60mbgl in BH03. Deposits were variable across the site, but largely comprised of greyish brown to orange brown slightly silty and/ or clayey sandy gravel, with frequent cobbles and occasional boulders. Gravel, cobbles and boulders comprised of rounded to sub rounded grey medium coarse sandstone.

A number of exploratory locations also recorded a limited thickness of clay and/or silt at varying depths, from a minimum of 0.70mbgl and maximum of 4.0mbgl. These locations were BH04, BH05, WS01, WS03, WS06, WS08 and WS10. Thicknesses of clay with limited sand or gravel were encountered in SA01 and SA02 between 1.20–1.90mbgl and 2.20–2.80mbgl respectively.

4.1.4 Hughes Member

Strata associated with the Hughes Member was identified within BH01–BH04 and BH05A, with arisings returning as grey medium coarse grained angular to tabular coarse-grained gravel or cobble sized fragments. Bedrock was encountered between 3.00mbgl and 4.60mbgl, as indicated by refusal of the CPT tests in the boreholes.

4.2 Obstructions

BH05 was the first borehole advanced on the site and was relocated due to shallow refusal at 4.30m bgl. Further drilling across the site indicated this was likely to represent the presence of shallow bedrock and not an obstruction.

It should be noted that the rugby pitch is crossed by a network of drainage channels placed in a herringbone pattern. These are evident on site due to markings within the grass cover and extend across the entire playing area.

4.3 Groundwater

A groundwater seepage was encountered in BH03 at the base of the borehole (4.60mbgl). The water level rose to 3.7mbgl after 20 minutes. No other groundwater strikes were observed in the other exploratory locations.

4.4 In Situ Testing

4.4.1 Standard Penetration Testing and Dynamic Probes

Standard Penetration Tests (SPTs) were undertaken within all five cable percussion boreholes at approximately 1m intervals (where possible) through the superficial deposits. An SPT was also undertaken at the base of each exploratory following refusal.

SPTS were also undertaken in each of the window sample positions at approximately 1.0m intervals, as well as at the base of each window sample borehole following shallow refusal. Dynamic probes were undertaken at the base of the window sample locations until refusal.

The results are presented in the exploratory hole logs included in Appendix B.

4.4.2 TRL Probe Testing

TRL probes were undertaken at seven locations (TRL01-TRL07). The results are presented in Appendix C and summarised in the table below.

Table 2 – Summary of TRL Probe Results

Location	Depth Range (m bgl)	CBR (%)
TRL01	0.035-0.16-	16.5
	0.16-0.24	40
TRL02	0.03-0.145	14
	0.145-0.19	47
	0.19-0.23	113
TRL03	0.03-0.15	22
	0.15-0.19	73
TRL04 (WS06)	0.04-0.155	20
	0.155-0.275	52
	0.275-0.45	118
TRL05 (WS09)	0.04-0.18	16
	0.18-0.38	84
TRL06	0.03-0.1	25

Location	Depth Range (m bgl)	CBR (%)
	0.1-0.18	45
	0.18-0.205	117
TRL07 (WS10)	0.04-0.125	27
	0.125-0.205	85

4.4.3 Soil Infiltration Testing

Three repeat infiltration tests were undertaken in SA01 and SA02. The tests were undertaken within superficial deposits comprising predominantly sands and gravels. The results of these tests can be found in Appendix D and are summarised in Section 7.0.

All tests were run for a total of 24 hours. However, fills no. 2 and 3 for SA01 did not drain within the specified time period. Extrapolation has not been used to calculate these permeabilities. The results are summarised in the table below.

Table 3 – Summary of Soil Infiltration Testing

Location	Depth (mbgl)	Strata	Hydraulic Conductivity (m/sec)		
			Test 1	Test 2	Test 3
SA01	1.59 – 2.60	Glaciofluvial	$4.08x10^{-6}$	-	-
SA02	2.08 – 2.70	Glaciofluvial	$2.28x10^{-4}$	$1.29x10^{-4}$	$1.12x10^{-4}$

4.5 Visual or Olfactory Evidence of Contamination

During the site investigation no significant visual or olfactory signs of contamination were identified.

5.0 LABORATORY TESTING

5.1 Geotechnical Testing

A programme of laboratory testing was carried out on samples taken from the various strata encountered during the site investigation. Geotechnical testing was scheduled by WYG and carried out by GSTL Ltd, an approved supplier in accordance with the requirements of WYG quality system and UKAS accredited for a range of geotechnical tests. The test procedures used were generally in accordance with the methods described in BS1377:1990. Details of the specific tests used in each case are given in Table 4. Laboratory geotechnical test results are given in Appendix E.

Table 4 - Summary of Geotechnical Testing

Test	No.	Test Method
Moisture Content	13	BS1377:1990 Part 2:3.2
4 Point Liquid & Plastic Limit	13	BS1377:1990 Part 2:4.3&5.3
PSD: Wet Sieve method	17	BS1377:1990 Part 2:9.2
PSD: Sedimentation by Pipette	5	BS1377:1990 Part 2:9.4
Dry Den/MC (2.5kg Rammer Method 1 Litre Mould)	4	BS1377:1990 Part 4 3.3
BRE Suite B Brownfield Site (pyrite present): pH, water and acid soluble sulphate, and total sulphur	12	BRE – BR279
BRE Suite D Brownfield Site (pyrite present): pH, water and acid soluble sulphate, total sulphur magnesium, chloride and nitrate	1	BRE – BR279

5.2 Environmental Testing

Environmental chemistry was investigated by specialist chemical analysis of selected soil samples carried out by ALS Environmental Laboratories, an approved supplier in accordance with the requirements of WYG quality system and UKAS and MCERTS accredited for a range of chemical analyses. The testing was scheduled by WYG and is summarised in Table 5 for soil samples. The test results are included in Appendix F.

Table 5 - Summary of Environmental Testing

Test suite	No.
Soil Samples: **WYG Suite C** • Heavy metals including Chromium (Hexavalent), Boron (water soluble), Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Vanadium and Zinc; • Inorganics – including pH, Water soluble Sulphate as SO_4 (2:1 Extract), Cyanide (Easily liberatable- low level); • Speciated Petroleum Hydrocarbons (TPH CWG); • Speciated Polyaromatic Hydrocarbons (USEPA 16); • BTEX and MTBE; • Asbestos Screen; and, • Phenol. **Asbestos Screening**	**8**
Soil Derived Leachate Samples and Groundwater Suites **WYG Leachate Suite C** • Heavy metals including Antimony, Boron, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium and Zinc; • Inorganics – including pH, Sulphate, Chloride, Nitrite, Nitrate, Total Cyanide, Ammoniacal Nitrogen and NH_3 and NH_4 and Total Alkalinity • Speciated Petroleum Hydrocarbons (TPH CWG); • Speciated Polyaromatic Hydrocarbons (USEPA 16); • BTEX and MTBE; • Phenol.	**4 leachate** **2 groundwater**

6.0 GROUNDWATER AND GAS MONITORING

6.1 Groundwater Monitoring

Groundwater levels were monitored on 3 occasions following the completion of the ground investigation, between 17th June 2020 and 30th June 2020. The monitoring data is presented in Appendix G and summarised in Table 6 below.

Table 6- Summary of groundwater levels

Location	Base of borehole (m bgl)*	Depth to water (m bgl)		
		17/06/20	23/06/20	30/06/20
BH03	4.44	3.60	2.80	2.69
BH04	3.17	2.55	2.11	2.12
WS01	1.96	DRY	1.85	1.86
WS02	0.95	DRY	DRY	DRY
WS10	0.77	DRY	DRY	0.77

* Base of boreholes silted between visits. Depth included as depth measured on final visit

6.2 Ground Gas Monitoring

Ground gas levels were monitored on 3 no. occasions following the completion of the ground investigation, between 17th June 2020 and 30th June 2020. The monitoring data is presented in Appendix G and in Table 7 below.

Table 7 – Summary of phase 1 Ground Gas monitoring

Location	Max. Methane (peak) (% vol)	Max. Carbon Dioxide (peak) (% vol)	Min. Oxygen (steady) (% vol)	Max. Carbon Monoxide (steady) (ppm)	Max. Hydrogen Sulphide (steady) (ppm)	Max. Borehole flow (peak) (l/h)
BH03	0.3	1.1	18.1	1	<1	0.3
BH04	0.2	0.6	18.2	3	<1	0.2
WS01	0.2	0.8	19.0	9	1	0.2
WS02	0.3	3.9	17.7	1	<1	0.2
WS10	0.3	3.8	14.5	5	<1	0.3

The results indicate measurable concentrations of carbon dioxide (maximum of 3.9%/vol) and methane (maximum 0.3%/vol).

The maximum gas flow recorded across the monitoring rounds was a flow of 0.3l/hr within BH03, WS02 and WS10.

In addition, the ground gas monitoring results indicate hydrogen sulphide concentrations of 1 ppm during the second monitoring visit. However, all other locations across all monitoring visits have a hydrogen sulphide concentration of <1ppm.

A maximum concentration of carbon monoxide of 9 ppm was recorded within WS01 during the second visit. Carbon monoxide concentrations were generally between 1 – 3ppm across the site across the monitoring visits.

A review of atmospheric pressure data indicates that monitoring visits were undertaken in atmospheric pressures ranging from 995 mb to 1016 mb. A review of atmospheric pressure graphs on weatheronline.co.uk indicates that all monitoring rounds were undertaken during a period of falling atmospheric pressure.

7.0 SOIL INFILTRATION TESTING

7.1 Background

On 7th January 2019, the Welsh Government introduced Schedule 3 of the Flood and Water Management Act 2010 which requires new developments to consider the feasibility of Sustainable Drainage Systems (SuDS) at the design stage. New developments over 100m^2 or including more than one property must obtain approval of the drainage system from the SuDS Approval Body (SAB) prior to the commencement of construction.

To support the assessment study, preliminary soil infiltration testing has been undertaken as part of the site investigation to provide information on the potential infiltration rates within the sub-strata on the site.

Soil infiltration tests have been undertaken in line with BRE 365 (2016) methodology and any deviations from this approach are documented within the following section. Where possible, locations and depths of test pits were determined based on the proposed drainage design.

7.2 Test Locations

As indicated in the description, the majority of the site comprises of soft scaping. However, in order to minimise any potential damage and disruption to both the school and playing fields, soakaway testing was undertaken along the western edge of the playing fields and not within the school grounds.

The location of infiltration testing is included in Figure 1.

7.3 Soil Infiltration Tests

Three soil infiltration tests were undertaken in each of the two machine excavated trial pits as summarised in the following table.

Table 8 Summary of Soil Infiltration Test Locations

Test Location	Depth to Base (m bgl)	Top of Target Strata (m bgl)	Target strata
SA01	2.60	1.59	Glaciofluvial deposits
SA02	2.70	2.08	Glaciofluvial deposits

Three repeat fills were undertaken within the test location over a period of 3 days, with each individual test run until the water level had passed the 25% of fill level, or for a maximum of 24

hours.

Test locations were securely fenced and covered until the testing period was completed and excavations backfilled on completion.

The results of the soil infiltration tests are presented in the following table. Full test results are included in Appendix D of this report. Note that test 2 and 3 within SA01 were not compliant tests and therefore permeabilities have not been calculated.

Table 9 Summary of Soil Infiltration Test Results

Test Location	Soil Infiltration Rate (m/s)		
	Test 1	Test 2	Test 3
SA01	4.08×10^{-6}	-	-
SA02	2.28×10^{-4}	1.29×10^{-4}	1.12×10^{-4}

7.4 Ground Conditions

7.4.1 Depth to groundwater

Both excavations were terminated within the glaciofluvial deposits. No groundwater was present during the excavation. Based on the groundwater seepage within in BH03 at the base of the borehole (4.60mbgl), groundwater is estimated to be over 1m below the base of the pits.

7.4.2 Strata Type

The targeted strata for the conducted infiltration testing was the sands and gravels of the glaciofluvial deposits.

7.4.3 Ground Contamination

Significant ground contamination has not been identified as part of the ground investigation, a contamination assessment is presented in Sections 10.0 and 11.0.

7.5 Constraints and Limitations

The information presented above is intended to assess the feasibility of soakaway drainage in order to support the development of the drainage strategy. Further testing, groundwater monitoring and ground investigation may be required to support a full SAB application or to inform the development of the final design process.

Ground conditions can vary throughout the year, including the location of the groundwater table. Consideration should be given to the potential effects of seasonal variation when reviewing the data above.

8.0 GEOTECHNICAL ASSESSMENT

8.1 Ground Conditions

The soils beneath the site are characterised by a thin mantle of coarse-grained Made Ground over coarse-grained medium dense to very dense Glaciofluvial Deposits.

8.2 Soil Properties

The ranges of the various soil properties measured are discussed below, to aid in the selection of design values. However, the appropriate choice of characteristic and design values will depend on the particular analysis and design philosophy used and should be selected by the designer.

Where characteristic values are given, these are reasonably conservative estimates of a measured or assessed property that may be used to represent the overall behaviour of the material. Design values are similar but also take into account the ground-structure interaction for a given structure so need to be selected by the designer. It is recommended, however, that design values used do not exceed the characteristic values given in this report.

8.2.1 Glaciofluvial Deposits

Shallow generally coarse-grained deposits were identified within all positions immediately below the Made Ground/topsoil. A summary is presented in the table below.

Table 10 - Summary of test results within the coarse-grained alluvial deposits

	No. of results	Range (min-max)	Average	Lower quartile	Upper quartile	Charact-eristic value+
SPT N Values	33	6 – 50	29	14	47	14
Angle of shearing resistance ϕ*	33	28 – 41	36	31	40	31

Notes:

\+ suggested characteristic values are appropriate for most normal applications but designers should satisfy themselves that they are suitable for the specific application and design method they are using;

* Estimated from a correlation from Peck, Hansen and Thornburn, Foundation Engineering, Wiley, 2nd ed., (1974)[6]

Based on the above, it is recommended that the following values are taken as design/characteristic values for this material:

- SPT N Value 14
- Angle of shearing resistance, φ 31º

9.0 GEOTECHNICAL DESIGN CONSIDERATIONS

9.1 Proposed Development

The proposed development plan is presented at the end of this report and comprises a single storey extension to the existing school building.

9.2 Earthworks

Given the current levels of the site, significant earthworks (cut and fill) is not anticipated at this stage.

The soils are predominantly granular comprising brown silty sandy fine to coarse gravel. Four compaction tests were undertaken on representative samples of these soils. Maximum dry densities ranging between 1.56 and 1.95mg/m^3 were recorded at optimum moisture contents of 7 to 12%. Existing moisture contents were recorded of between 10 to 26%. This would indicate that soils should achieve 95% compaction with minor pre-treatment or processing (Drying).

9.3 Foundations

Within the area of the proposed building topsoil was encountered overlying shallow coarse-grained Made Ground over medium dense to very dense coarse-grained Glaciofluvial deposits.

Based on the above ground conditions it is considered that shallow spread foundations, strip or pads, placed within the shallow coarse-grained deposits, at a minimum depth of 0.85m bgl, would be a suitable foundation option for the proposed extension. Shallow footings may be design to an allowable net bearing pressure of 200kPa, giving a factor of safety greater than 3 against ultimate bearing capacity failure, and should result in settlement less that 25mm for a strip footing of no greater than 0.7m wide or a pad of no more than 2m^2.

Foundation excavations should be inspected by a suitably experienced engineer or inspector to ensure the founding material is suitable natural deposits. Any soft, loose or otherwise unsuitable material should be excavated and replaced by compacted granular backfill or lean concrete.

9.4 Floor Slabs

Floor slabs may be ground bearing to combined dead and live loads of 20kNm^2. Any topsoil should be stripped and localised made ground excavated and replaced with compacted granular

fill. The formation should be proof rolled and inspected by a suitably qualified engineer. Any material such as soft clay, deleterious material containing weak or degradable contaminants, or other unsuitable material, should be excavated and replaced by well-compacted granular fill.

9.5 Chemical Attack on Buried Concrete

Chemical tests undertaken on representative samples show low levels of water-soluble sulphates and generally near neutral conditions. Based on these conditions, it is recommended that for foundations the Design Sulphate Class for the site, as defined in BRE Special Digest 1, be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as AC-1.

9.6 Pavements

CBR values ranged between 16% to >100% and reflect the granular nature of the near surface soils. For pavement design, a conservative value of 5% is recommended. Due to the nature of the deposits, the subgrade should be inspected during construction to identify any loose, soft or other unsuitable material should be removed and replaced with suitable compacted backfill.

9.7 Temporary Works

Excavated pits generally remained open and stable during the investigation and it is considered that most shallow excavation for foundations and service runs should remain stable in the short term. However, where soft or variable materials are encountered some collapse may occur requiring localised support of battering of the excavation. All excavations requiring man entry should be fully supported to prevent unexpected collapse.

Shallow groundwater was not encountered during the investigation. It is therefore unlikely that groundwater will be encountered within shallow excavations, although it should be noted that groundwater levels can vary seasonally.

9.8 Drainage

Soakaway testing within the shallow Glaciofluvial deposits within SA01 has yielded soil infiltration values of the magnitude $<10^{-6}$ m/s with three tests undertaken indicating low permeability and poor drainage conditions. Soakaway testing within SA02 yielded soil infiltration values of the magnitude 10^{-4} m/s with three tests undertaken, indicating medium permeability with good drainage conditions. Therefore, soakaways would be a viable option within the vicinity of SA02.

10.0 GROUND CONTAMINATION ASSESSMENT – HUMAN HEALTH

10.1 Introduction

The UK Contaminated Land Regime (CLR) allows for a tiered approach to the assessment of ground contamination which is designed to allow increasingly site-specific assessment. In order to assess the potential risk posed by contaminants contained within the soils at the study area a generic quantitative risk assessment (gQRA) has been undertaken by comparing recorded concentrations of chemical constituents in soil with Generic Assessment Criteria (GAC) to identify whether, at the concentrations recorded, the presence of the constituent has the potential to adversely affect the health of site users (a Tier 1 assessment). GAC are set at levels where potential exposure is deemed to be within acceptable limits.

If the recorded concentrations of a particular constituent are below the GAC then the risk is generally considered to be acceptable and further assessment / or mitigation measures are not required. Where a substance is recorded at concentrations higher than GAC this does not necessarily indicate that a particular risk is present, however, it does typically signify the requirement to undertake further assessment in line with the UK tiered risk assessment framework.

10.2 Assessment Criteria

10.2.1 Generic Assessment Criteria

The following GAC for soils have been utilised for the screening process, in order of preference:

- CL:AIRE published C4SL (DEFRA, 2014);
- CIEH/LQM published S4UL (LQM/CIEH, 2015);
- WYG internal Tier 1 Screening Criteria (issue 15) derived using the derivation tool CLEA version 1.06, in line with the current UK Contaminated Land Regime.

C4SL are currently available for arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI and lead[1]. The C4SL were originally developed to support the categorisation of sites in accordance with Part 2A are also, based on DEFRA guidance, considered suitable for use during the

[1] Arsenic, benzene, benzo(a)pyrene, cadmium, chromium VI, lead assuming 6% SOM (1% SOM C4SL also published for benzene).

assessment of sites as part of the planning process.

Where C4SLs are not available, 'Suitable for Use Levels' (S4UL) developed by CIEH/LQM have been used. The S4UL provide GAC based on minimal or tolerable risk intended to be protective of human health for individual or mixtures of substances. It is considered conservative and appropriate to use these values for contaminants for which C4SL are unavailable. GAC for volatile and semi-volatile organic compounds (VOC and SVOC) not presented in the S4UL document are sourced from CL:AIRE (CL:AIRE, January 2010).

Where no published screening values are available WYG have derived their own values (easily liberatable cyanide).

The CLEA model states that "For most exposure pathways, the contamination is assumed to be at or within one metre of the surface" (Environment Agency, 2009). It is considered that at depths greater than 1.0m, the probability of human exposure via the direct contact pathways are significantly reduced, leaving inhalation of volatile compounds as the dominant pathway with regard to human health risks. Typically, volatile compounds only significantly affect the indoor inhalation pathway. The same screening concentrations have been used for all depths at this stage, though it is noted that these are highly conservative for depths below 1.00m bgl.

10.2.2 Proposed End Use

Screening criteria have been developed for the following land use scenarios:

- Residential with plant uptake;
- Residential without plant uptake;
- Allotments;
- Public open space (park and residential);
- Commercial / Industrial.

The proposed development on site will consist of a single storey extension to the existing front two canopies, encompassing the current playground, to form a courtyard. Additional play areas, school allotment and car parking are proposed to the south of the proposed extension. As such the following screening assessment has been undertaken against a Public Open Space (POS) assessment criteria to provide a conservative assessment. However, residential without plant uptake end use scenario has also been applied for reference.

10.2.3 Soil Organic Matter

For organic contaminants, the generic soil screening values have been derived for a range of concentrations of soil organic matter (1%, 2.5%, 6%). In order to provide a conservative assessment, the GAC derived for a 1% SOM have been adopted.

10.3 Tier 1 – Soil Screening

A total of 8 no. soil samples collected from across the site were submitted for chemical laboratory analysis. Full copies of laboratory certificates for all soil analysis are included in Appendix F.

Comparison of the chemical analysis results with the generic assessment criteria for Public Open Space (POS) residential RSSV indicates that there are no exceedances against the applied Soil Screening Values (SSV).

10.4 Asbestos

The eight soil samples submitted for laboratory analysis were also submitted for asbestos screening. Asbestos was not identified in any of the samples submitted for testing.

11.0 GROUND CONTAMINATION ASSESSMENT – WIDER ENVIRONMENT

11.1 Introduction

The potential for contaminated groundwater on site to adversely affect controlled water receptors (groundwater and surface water bodies) has been assessed at this stage by direct comparison of analytical data from the WYG ground investigation with relevant Water Quality Standards (WQS).

Similarly, the potential for soil contamination to impact controlled waters has been assessed by comparing analytical data from soil derived leachate tests directly against WQS.

11.2 Assessment Criteria

In light of the environmental setting of the site under consideration. The following water quality standards (WQS) have been adopted, in order of preference.

- Water Framework Directive (WFD),
- Environmental Quality Standards (EQS);[2]
- WHO 2008 - Petroleum Products in Drinking Water (WHO 2008)
- UK Drinking Water Standards[3].

11.2.1 Bioavailability

For certain heavy metals (copper, zinc, manganese, nickel and lead) the bioavailability of the metal within the water can be calculated to generate a bespoke screening criteria based on other groundwater parameters. This assessment is undertaken utilising the Metal Bioavailability Assessment Tool (M-BAT) which was developed using the $EQS_{(bioavailable)}$ developed in line with the Water Framework Directive.

In the case of copper, zinc, manganese and nickel the assessment takes into account the concentration of calcium, Dissolved Organic Carbon (DOC) and pH of the water sample. The assessment for lead only takes the DOC of the sample into account. A spreadsheet has been developed for the assessment by the UK Technical Advisory Group on the Water Framework

[2] Where WFD 2015 are not presented revoked WFD 2010 standards are used
[3] WHO 2005; WHO 2008; UK Water Supply Regulations 2010 and 1989 Regulations. Priority given to UK drinking water standards

Directive.

11.3 Soil Derived Leachate Methodology

Soil derived leachate samples can be used to identify potentially mobile contamination within soil samples collected from the site. It should be noted that the laboratory test methodology indicates a potential mobility of contaminants and is usually considered to reflect a worst-case situation and unlikely to represent on-site conditions.

The laboratory preparation of leachate samples is likely to produce higher concentrations of leachable components than conditions encountered on site and as such the following assessment is considered to be inherently conservative in nature. Furthermore, the resulting data are screened against criteria intended to be protective of water bodies and drinking water supplies and are not intended to assess the potential significance of contaminant mobility.

11.4 Tier 1 Screening Assessment – Soil Derived Leachate

Four soil derived leachate samples were screened against a suite of determinants outlined in Section 11.2.

The following table summarises the determinants which have been identified at concentrations in excess of the adopted screening value.

Table 11 – Summary of Exceedances within Soil Derived Leachate Samples

Determinant	Units	Maximum	Minimum	Screening Value	Exceedances	
					No.	Location (mbgl)
Copper	mg/l	0.00353	0.001	0.001*	3	BH01 0.20 – 0.80 SA01 0.20 – 0.30 WS02 0.45 – 0.70
Lead	mg/l	0.00314	<0.0002	0.0012*	1	SA01 0.20 – 0.30
Zinc	mg/l	0.0344	0.00522	0.012*	1	SA01 0.20 – 0.30
Fluoranthene	mg/l	0.0000277	<0.000005	0.0000063*	1	BH01 0.20 – 0.80 SA01 0.20 – 0.30

* Freshwater waters EQS 2015

A total of 4 no. determinants, comprising of 3no. metals and 1 no. PAHs, were identified within soil derived leachate samples at concentrations in excess of the adopted screening criteria.

Concentrations of copper, zinc and lead can be considered within the context of the

bioavailability of the heavy metal based on other soil parameters. The M-BAT tool has been used to calculate site specific screening criteria for these determinants, with the results presented in the table below.

However, it is worth noting the following assumptions in accordance with M- BAT guidance[4]:

- The calcium content has been estimated as a percentage (40%) of the total alkalinity $CaCO_3$;
- The pH for BH01 (8.02) exceeded the operational range for the M-BAT tool with respect to zinc. Therefore, the pH was set at 8;
- The calcium content for SA01 (calculated as 2.6mg/l) is below the operational range of the M-BAT tool for Copper, which requires a concentration of 3.0 - 93mg/l. As such, the calcium concentration has been set at 3mg/l.
- The DOC for SA01 (51.10mg/l) exceeds the maximum value for the operational range applied within the Lead Screening Tool, which is 20 mg/l. As such, DOC was set at 20mg/l for SA01.

Table 12 – M-BAT adjusted Screening Values for Heavy Metals – Soil Derived Leachate

Determinant	Sample	Concentration (µg/l)	Screening Value (µg/l)	M-BAT Screening Value (µg/l)	Exceedances
Copper	BH01 0.20 - 0.80mbgl	2.94	1	15.65	0
	SA01 0.20 - 0.30mbgl	2.73		22.06	0
	WS02 0.45 - 0.70mbgl	3.53		16.48	0
Zinc	SA01 0.20 - 0.30mbgl	34.4	10.9	24.47	1
Lead	SA01 0.20 - 0.30mbgl	3.14	1.2	24.00	0

As presented in the table above, when bioavailability is taken into consideration the concentrations of copper and lead are below the adjusted screening criteria and consequently are not considered to pose a risk to the wider environment. However, the concentration of zinc is shown to pose a potential risk and is considered further within the risk assessment in Section 14.0.

In addition, he recorded exceedances WQS of some PAHs are considered further within the risk assessment. However, as stated previously, it is worth noting that leachate concentrations are highly conservative and represent a worst case scenario in the natural environment.

[4] Water Framework Directive – United Kingdom Advisory Group (WFD-UKTAG). 2014. *UKTAG River & Lake Assessment Method Specific Pollutants (Metals) Metal Bioavailability Assessment Tool (M-BAT)*. Stirling, Scotland. ISBN: 978-1-906934-57-6.

11.5 Tier 1 Screening Assessment – Groundwater

One groundwater sample was obtained from the on the site and analysed for the suite of determinants outlined in Section 5.2. The results were screened against a suite of determinants outlined in Section 11.2.

The following table summarises the determinants which have been identified at concentrations in excess of the relevant WQS screening criteria.

Table 13 – Summary of Exceedances within Groundwater Samples

Determinant	Units	Concentration	Screening Value	Exceedances	
				No.	Location
Copper	µg/l	4.8	1	1	BH04
Fluoranthene (aq)	µg/l	0.0124	0.0063	2	BH03
		0.0469			BH04
Benzo(b)fluoranthene (aq)	µg/l	0.0354	0.017	1	BH04
Benzo(a)pyrene (aq)	µg/l	0.00485	0.00017	2	BH03
		0.023			BH04

Copper can be considered within the context of the bioavailability of the heavy metal based on other soil parameters using the M-BAT tool as stated above. As such the updated bioavailable concentration for copper has been updated in Table 14.

It should be noted that the Calcium content was set to the maximum operational range as in Section 11.4.

Table 14 - M-BAT adjusted Screening Values for Heavy Metals – Groundwater

Determinant	Sample	Concentration (µg/l)	Screening Value (µg/l)	M-BAT Screening Value (µg/l)	Exceedances
Copper	BH04	4.8	1	7.84	0

As presented in the table above, when bioavailability is taken into consideration the concentration of copper is below the adjusted screening criteria. As such, copper is not considered further.

The groundwater analysis indicates Copper, Fluoranthene, Benzo(b)fluoranthene and Benzo(a)pyrene have been identified at concentrations in excess of the relevant screening criteria. The exceedances of PAHs are considered further within the risk assessment presented in in Section 13.0.

12.0 PRELIMINARY GROUND GAS ASSESSMENT

12.1 Introduction

Three return ground gas monitoring visits were undertaken between the 17th June 2020 and 30th June 2020. Full factual site records of the gas monitoring results are presented in Appendix G and summarised in Section 0.

12.1.1 Ground Gas Monitoring

Ground gases are monitored within boreholes on the site recording the following parameters.

- Concentrations of ground gases;
    - Methane (%v/v);
    - Carbon dioxide (%v/v);
    - Oxygen (%v/v);
    - Carbon monoxide (ppm);
    - Hydrogen sulphide (ppm);
- Borehole flow rate (l/hr);
- Depth to groundwater;
- Atmospheric pressure trends;

Where groundwater levels are noted to be above the screened sections of the boreholes the data is not considered to be representative of the ground gas regime and are therefore not used within the risk assessment process.

Atmospheric pressure trends are recorded on site during the monitoring process, but are also noted in the preceding three days, and one day after each monitoring visit. Falls in atmospheric pressure are generally considered to indicate a higher potential for ground gas migration from the sub surface and as such monitoring during periods of falling pressure are considered to represent worst case scenarios as outlined in the CL:AIRE Technical Bulletin TB17 (CL:AIRE, August 2018).

12.1.2 Land Gas Risk Assessment Methodology

The key reference document which has been used to undertake the semi-quantitative land gas assessment presented in this report is CIRIA C665 (CIRIA, 2007). This provides a framework for assessment of land gas risk to buildings/structures with foundations (i.e. houses and/or

commercial properties).

The risk assessment process is based on a Source-Pathway-Receptor Conceptual Site Model Methodology, with consideration given to the potential sources likely to be present on the site and the ground gas monitoring regime designed to reflect the scale of the source potential.

The collected data has been used for the purposes of undertaking a semi-quantitative assessment in accordance with the CIRIA 665 methodology. The calculation used to calculate the gas screening value (GSV) for the site, together with the relevant definition of units, is as follows:

GSV (litres of gas/hr) = borehole flow rate (l/hr) x gas concentration (volume/100)

The calculated GSV values are used to determine the Characteristic Situation (CS) for the site in terms of methane and carbon dioxide, based on the conditions outlined in Table 15 below.

CS classification is applicable to all buildings, with the exception of low-rise housing with a ventilated underfloor void, in these situations, the NHBC Traffic Light System is adopted, as outlined in Table 16.

Table 15 –GSV Classification (Modified Wilson and Card Methodology)

Characteristic Situation	Risk Classification	Gas Screening Value Threshold (l/hr)	Additional Considerations
1	Very Low Risk	<0.07	Methane concentration <1% Carbon dioxide <5%
2	Low Risk	<0.7	Borehole flow rate <70 l/hr
3	Moderate Risk	<3.5	-
4	Moderate to High Risk	<15	Quantitative risk assessment required to evaluate scope of protective measures
5	High Risk	<70	-
6	Very High Risk	>70	-

Table 16 –NHBC Traffic Light Classification

Traffic Light	Methane		Carbon Dioxide	
	Typical maximum concentration (%v/v)	GSV (litres per hour)	Typical maximum concentration (%v/v)	GSV (litres per hour)
Green	1	0.16	5	0.78
Amber 1	5	0.63	10	1.56
Amber 2	20	1.56	30	3.13
Red				

It should be noted that the suggested threshold values lie between each traffic light boundary and therefore the wider conceptual model should be considered to provide a comprehensive assessment of the ground gas regime on the site before a classification can be attributed.

12.2 Preliminary Ground Gas Risk Assessment

12.2.1 Conceptual Site Model

The following sections outline the anticipated Source-Pathway- Receptor model associated with the proposed development on site.

Sources

The following potential sources have been identified on and off site.

- Made Ground deposits noted to underlay the site; and

Pathways

The following potential pathways have been identified which may act as preferential pathways for ground gas migration:

- The underlying strata have been classified as sands and gravels with varying components of clays and silts. Therefore, there is potential for some horizontal and vertical migration of ground gas;
- Buried service runs and foundations, including sub-floor voids of current school building

and proposed extension.

Receptors

Within the context of ground gases, the following enclosed structures are considered to represent potential receptors.

- The existing structure on the site
- Structures and enclosed areas within proposed development.

12.2.2 Risk Assessment – Methane and Carbon Dioxide

In order to assess the significance of ground gases at the site, measured concentrations and flow rates have been used to derive Gas Screening Values (GSVs). GSVs are the product of gas concentration and gas flow measured in a borehole and provide an indication of the flow of the particular gas in question out of the ground.

As part of the conservative assessment, the worst-case values have been applied.

Based on a maximum flow recorded of 0.3l/hr and the maximum recorded concentration of carbon dioxide (CO_2) and methane (CH_4) during the three monitoring visits, the GSVs have been calculated as presented in Table 17.

Table 17 – Initial GSV Calculations

	Maximum Concentration (%vol)	Maximum Flow Rate (l/hr)	GSV (l/hr)	Characteristic Situation (Wilson and Card)	NHBC Traffic Light
Carbon Dioxide	3.9	0.3	0.0117	1	Green
Methane	0.1	0.3	0.0003	1	Green

These values have been compared with the Revised Wilson and Card Classification presented in Table 15.

The risk assessment process indicates the site is representative of Characteristic Situation 1 (Very Low Risk) and Green within the NHBC Traffic Light System based on the recorded concentrations of carbon dioxide and methane and maximum flow rates within the sub surface.

12.2.3 Carbon Monoxide and Hydrogen Sulphide

Maximum concentrations of carbon monoxide and hydrogen sulphide were recorded at 9ppm and 1ppm respectively throughout the monitoring period. The recorded concentrations are

considered to be suitably low to negate the requirement for additional risk assessment.

12.2.4 Atmospheric Pressure Trends

A review of atmospheric pressure data and pressure trends indicates that monitoring visits were undertaken in atmospheric pressures ranging from 997mb – 1016 mb, and falling pressure. As such the recorded concentrations are deemed representative of ground conditions, including a worst-case scenario (falling, low pressure).

12.3 Summary and Discussion

The site has been classified as Characteristic Situation 1 (Very Low Risk) / Green based on the worst-case recorded concentrations of carbon dioxide and methane and maximum flow rates. Site classification of a Characteristic Situation 1 / Green indicates gas protection measures are not required within new developments.

13.0 CONCEPTUAL SITE MODEL AND GROUND CONTAMINATION RISK ASSESSMENT

13.1 Overview

The information presented in the previous sections of this report have been collated and evaluated to establish an initial qualitative risk assessment for the site. A conceptual model of the site has been generated based on information derived from the Phase 1 Geo-environmental Assessment and subsequent intrusive ground investigation and laboratory testing.

The site has been considered with regard to current UK legislation and guidance, namely Part 2A of the Environmental Protection Act 1990 and the Contaminated Land (England) Regulations 2006, as amended, and in accordance with current UK good practice guidelines (for example BS10175:2011).

In general, ground contamination can occur through several causes, particularly from historical operations and activities. Contamination can result from either on-site sources or from on-site migration from off-site sources, leading to long term liabilities under recent legislation for any site owner.

For a risk of pollution or environmental harm to occur as a result of ground contamination, all of the following elements must be present:

- Source, i.e. a substance that is capable of causing pollution or harm;
- Pathway, i.e. a route by which the contaminant can reach a target; and
- Receptor (target), i.e. something which could be adversely affected by the contaminant.

If one of these elements is absent there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

13.2 Current Site Usage and Proposed Development

The proposed development involves a proposed single-story extension to the existing school building. The end users will therefore remain unchanged from the current site users.

13.3 Conceptual Site Model

The key source, pathways and receptor model is outlined below within the context of potential development of the site.

Despite the predominance of hardstanding across the site in the proposed development, the following risk conservative assessment is undertaken in the context of POS Residential.

13.3.1 Potential Sources of Contamination

The main potential sources of contamination on the site are associated with existing features as well as historical land uses on the site as summarised below.

On site Sources

- Made Ground associated with former development on the site; and

Off site Sources

- Ground gas associated with infilled ground within 250m of the site (closest recorded area c.25m to the south).

13.3.2 Potential Contaminant Pathways

The following contaminant pathways are considered to potentially be active based on the current site use and proposed development:

Human Exposure Pathways

- Direct dermal contact or ingestion of soils, or inhalation of dust and/or vapours (i.e. human interaction with surface and sub-surface materials).

Environmental Pathways

- Leaching and horizontal or vertical migration through the unsaturated ground, either through permeable sub-surface materials and/or preferential pathways;
- Lateral and vertical migration of groundwater through permeable sub-surface materials and/ or preferential pathways;
- Leaching to surface water run-off/drainage;
- The migration and accumulation of gases or vapours through permeable sub-surface materials and/ or preferential pathways.

13.3.3 Potential Receptors at Risk

The following potential receptors have been identified:

Human Health

- Current site users (school children and staff);
- Future site users (school children and staff);
- Site workers during the redevelopment of the site;
- Adjacent site users (residential/ rugby club)

Wider Environment

- Secondary A Aquifer of glaciofluvial deposits and Hughes Member bedrock;
- Surface waters (stream c.15m to the south);
- Plant uptake;
- Building Infrastructure and supply pipes; and
- Adjacent properties.

13.4 Ground Conditions Risk Assessment

The source, pathway, receptor linkages identified in the previous section are outlined and a qualitative risk assessment shown in the following tables.

The risk assessment considers the site within an area context and assesses potential risks to identified receptors in relation to the existing site setting and the proposed development. CIRIA C552 has been used to define the risk rating presented in the Qualitative Risk Assessment matrix, the methodology for which is presented in Appendix H.

Table 18- CIRIA C552 Qualitative Risk Assessment

This matrix is based on CIRIA C552 risk evaluation methodology, definitions for risk ratings is presented in Appendix D						
Source	**Pathway**	**Receptor**	**Consequence of risk being realised**	**Probability of risk being realised**	**Risk Classification**	**Potential risk management requirements**
General contamination associated with Made Ground on site (PAHs and Zinc)	Direct dermal contact or ingestion	Current site users	Medium	Unlikely	**Low Risk**	The soil laboratory results of onsite soil samples has not indicated the presence of contaminants of concern in excess of their GAC (POS Residential). Therefore, the risk to human health is considered to be low.
		Future site users		Unlikely	**Low Risk**	
		Construction workers		Unlikely	**Low Risk**	
	Leaching and horizontal or vertical migration	Groundwater (Secondary A Aquifer)	Medium	Unlikely	**Low Risk**	The laboratory results of the soil derived leachate and the groundwater testing indicated slightly elevated concentrations of some heavy metals and some PAH compounds against the EQS screening criteria. However, when considering the bioavailability of heavy metals, only Zinc exceeded EQS screening criteria in the leachate derived samples. Given ,the conservative nature of the leachate testing methodology, the recorded concentrations are not considered to pose a significant risk to controlled waters. In the context of groundwater, water sampling parameters indicate predominantly aerobic, optimal conditions. As such, minor exceedances in PAHs are deemed to present a low risk to groundwater. The nearest surface water body is c. 50m from the site, which
		Surface waters		Unlikely	**Low Risk**	

						negates the risk for any further assessment.
Asbestos within Made Ground	Inhalation	Current and future site users	Medium	Unlikely	**Low Risk**	No ACMs were identified during the site investigation. However, the presence of ACMs within the Made Ground cannot be discounted. In the event that ACMs are encountered during the development process, further assessment will be required to provide an updated risk assessment process.
		Construction Workers	Medium	Low likelihood	**Moderate to Low Risk**	
Ground gas generation associated with Made Ground	Inhalation of gases	Current and future site users	Medium	Likely	**Low Risk**	The results of the ground gas monitoring undertaken across the site indicates that the site is categorised as Characteristic Situation 1 (low risk) under the Wilson and Card classification presented in CIRIA 665, and Green within the NHBC Traffic Light System. As such, gas protection measures are not required within new developments.
		Site construction workers	Medium	Likely	**Low Risk**	

14.0 CONCLUSIONS AND RECOMMENDATIONS

14.1 Ground Contamination

14.1.1 Summary

A thin thickness (<0.60m) of Made Ground was identified in some exploratory locations on site. The laboratory testing found tested contaminant concentrations did not exceed the screening criteria for a Public Open Space (POS) end use.

Asbestos containing materials have not been identified within the shallow soils on the site. However, the potential presence of asbestos containing materials within the Made Ground cannot be discounted. In the event that previously unidentified asbestos contamination is encountered during the development phase, works should stop to allow additional investigation and risk assessment to be undertaken and additional risk management procedures put in place, if required.

With respect to the risk to the wider environment, the results of the soils derived leachate testing indicated an exceedance of zinc and fluoranthene against their respective EQS values. In addition, the groundwater results show exceedances of a number of PAH compounds against their relevant EQS values. However, given the marginal nature of the exceedances noted and the conservative methodology of the leachate testing, the concentrations noted are considered to pose a low risk to the local environmental receptors.

The site is categorised as Characteristic Situation 1 (low risk) under the Wilson and Card classification presented in CIRIA 665, and Green within the NHBC Traffic Light System following the completion of Ground gas monitoring undertaken during variable pressure conditions. As such, gas protection measures are not required within new developments.

14.2 Geotechnical

Based on ground conditions it is considered that shallow spread foundations, strip or pads, placed within the shallow coarse-grained deposits Glaciofluvial Deposits, at a minimum depth of 0.85m bgl, would be a suitable foundation option. . Shallow footings may be design to an allowable net bearing pressure of 200kPa, giving a factor of safety greater than 3 against ultimate bearing capacity failure, and should result in settlement less that 25mm for a strip footing of no greater than 0.7m wide or a pad of no more than $2m^2$. Floor slabs may be ground bearing to combined dead and live loads of $20kNm^2$, providing that topsoil should be stripped and localised made ground excavated and replaced with compacted granular fill.

Soakaway testing within the shallow coarse-grained Glaciofluvial deposits indicated low to medium permeability with good drainage conditions. Therefore, soakaways would be a viable option. However, further testing will need to be undertaken once the position and invert level of the proposed soakaway is known.

The Design Sulphate Class for the site can be taken as DS-1, and the Aggressive Chemical Environment for Concrete (ACEC) site classification be taken as AC-1.

14.3 Recommendations

Within the context of ground contamination, no further risk management procedures are recommended with respect to the proposed development of the site. However, it is recommended that a proactive approach is adopted during the future development of the site to identify and assess any previously unidentified contamination which may be encountered during development works.

15.0 NOTES

1. Standards

All boring operations, sampling of soils, *in situ* testing and geotechnical laboratory testing have been carried out in accordance with the recommendations of the British Standards BS 5930(2015)[1], BS 1377 (1990)[2] and BS10175 (2001)[3].
Soil and rock descriptions follow the recommendations of BS 593. Where descriptions or classifications are based on other documents (e.g. BS 8004 (1986) or CIRIA Project Report 11 (1993)), this is stated in the report text.

2. Site methods

Unless specifically stated otherwise, the following methods are used for exploratory holes.

- Holes described as cable percussive are bored using a light cable percussive rig. Standard penetration tests are carried out where appropriate, as shown in the logs. Disturbed and undisturbed samples are taken from the exploratory holes at the depths on the records.
- Window sampling generally uses the windowless sampling method, using a tracked Geotool.
- Dynamic probes are usually heavy dynamic probes, using the same tracked Geotool used for window sampling.

3. Definitions and abbreviations

The following terms are used in the exploratory hole logs

Samples

U	Undisturbed 102mm dia. sample
TW	Thin Walled undisturbed 102mm dia. sample
B	Bulk sample
D	Small disturbed sample
W	Water sample
CBR	California Bearing Ratio test or CBR value obtained from Mexiprobe test

In situ tests

S	Standard penetration test (SPT)
N	SPT N value (blows/300mm)
HP	Hand penetrometer – shear strength
SV	Hand shear vane – shear strength
VOC	Volatile organic compounds (ppm)
PID	Photo-ionisation detector – used to detect the presence of VOCs.

Core recovery and rock quality

TCR	Total core recovery (%)
SCR	Solid core recovery (%)
RQD	Rock quality designation (%)
FI	Fracture index
NR	No recovery
NI	Not intact

Rotary drilling sizes

	Nominal diameter (mm)	
Index letter	**Borehole**	**Core**
N	75	54
H	99	76
P	120	92
S	146	113

Water strikes

▽	Level of water strike
▼	Water level rose to this level (see Remarks at foot of log for details)

Depth means depth below existing ground level unless otherwise specified. Values specified in soil descriptions given in the exploratory hole logs are depths unless otherwise specified.

16.0 GLOSSARY

AOD	above Ordnance Datum
bgl	below ground level
BGS	British Geological Survey
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
C4SL	Category 4 Screening Levels
CIEH	Chartered Institute of Environmental Health
CLEA	Contaminated Land Exposure Assessment
CoC	Constituent of Concern
CSM	Conceptual Site Model
DEFRA	Department of Environment, food and Rural Affairs
DQRA	Detailed Quantitative Risk Assessment
DTS	Desktop Study
DRO	Diesel Range Organics
DWS	Drinking Water Standard
EA	Environment Agency (England)
EPH	Extractable Petroleum Hydrocarbons
EQS	Environmental Quality Standards
FOC	Fraction Organic Carbon
GPR	Ground Penetrating Radar
LOD	Limit of detection
LQM	Land Quality Management
NRW	Natural Resources Wales
OS	Ordnance Survey
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PPE	Personal Protection Equipment
ppm	parts per million
PRO	Petroleum Range Organics
SGV	Soil Guideline Values
SOM	Soil Organic Matter
SVOC	Semi-volatile organic compounds
TPH	Total Petroleum Hydrocarbon
TSV	Tier 1 Screening Values
VOC	Volatile Organic Carbon
VPH	Volatile Petroleum Hydrocarbons

17.0 REFERENCES

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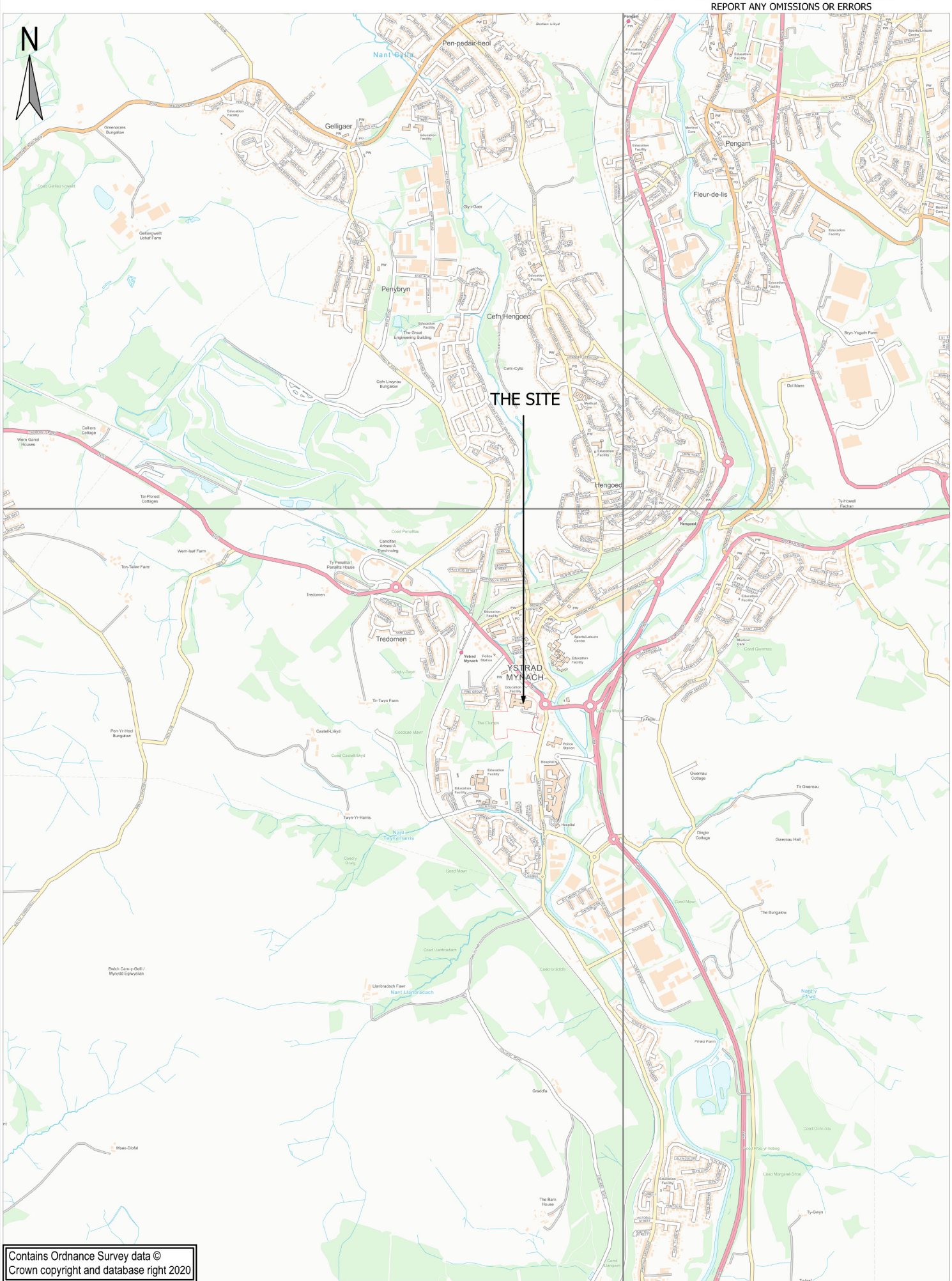
FIGURES

Figure 1 – Site Location Plan

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS



REV	DESCRIPTION	BY	CHK	APP	DATE

5th FLOOR
LONGCROSS COURT
47 NEWPORT ROAD
CARDIFF
CF24 0AD
TEL: +44 (0)29 2082 9200
FAX: +44 (0)29 2045 5321
e-mail: cardiff@wyg.com

Client: CAERPHILLY COUNTY BOROUGH COUNCIL

Project: TRINITY FIELDS, CAERPHILLY

Drawing Title: SITE LOCATION PLAN

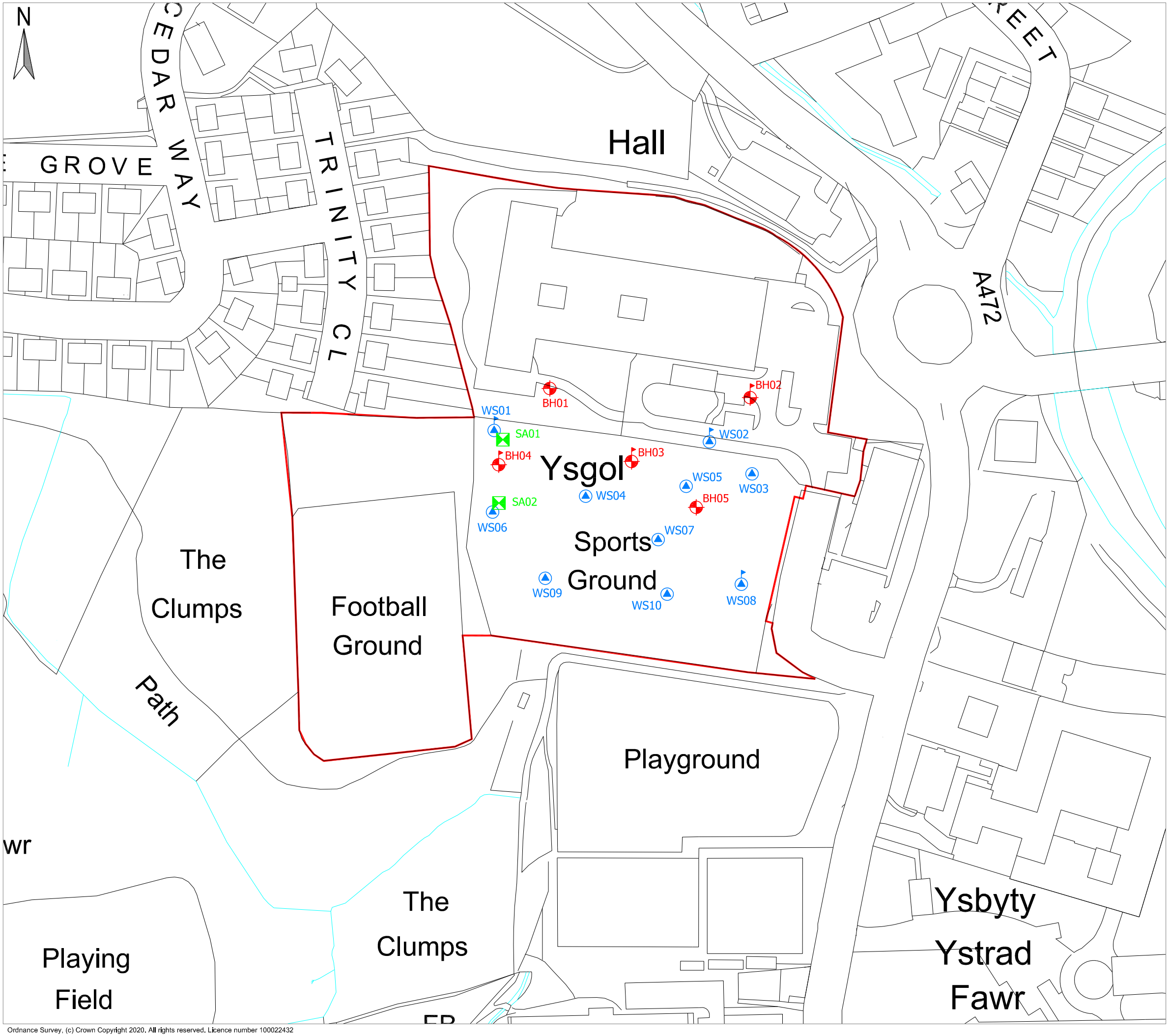
Scale @ A4	Drawn	Date	Checked	Date	Approved	Date
	PP	02.06.20	KW	02.06.20	SR	02.06.20

Project No.	Office	Type	Drawing No.	Revision
A110489-6-1	CDF	N	1	00

WYG Group Ltd.

Figure 2 – Site Investigation Layout Plan

DO NOT SCALE: CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY OMISSIONS OR ERRORS



LEGEND:
WYG SITE INVESTIGATION LOCATIONS MAY 2020:

- CABLE PERCUSSIVE BOREHOLE
- WINDOWLESS SAMPLE BOREHOLE
- SOAKAWAY TEST LOCATIONS
- INSTALLATIONS

REV	DESCRIPTION	BY	CHK	APP	DATE

Client:
CAERPHILLY COUNTY BOROUGH COUNCIL

5th FLOOR
LONGCROSS COURT
47 NEWPORT ROAD
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TEL: +44 (0)29 2082 9200
FAX: +44 (0)29 2045 5321
e-mail: cardiff@wyg.com

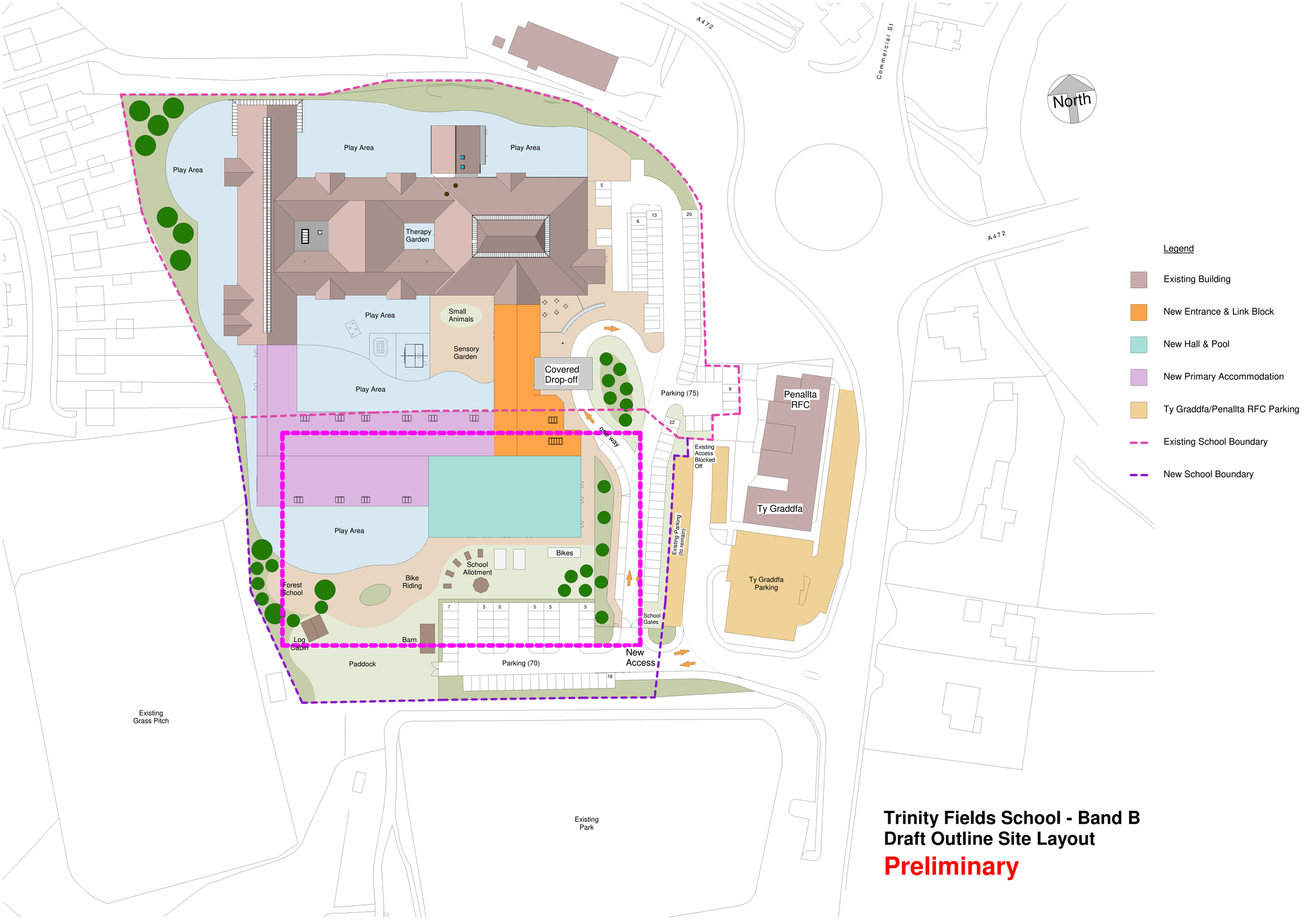
Project:
TRINITY FIELDS, CAERPHILLY

Drawing Title:
SITE INVESTIGATION LAYOUT PLAN

Scale @ A3	Drawn Date	Checked Date	Approved Date
NTS	PP 03.06.20	SB 03.06.20	SR 03.06.20

Project No.	Office	Type	Drawing No.	Revision
A110489-6-1	CDF	N	2	00

PROPOSED DEVELOPMENT PLAN



Trinity Fields School - Band B
Draft Outline Site Layout
Preliminary

APPENDICES

APPENDIX A – REPORT CONDITIONS

APPENDIX A - REPORT CONDITIONS
GROUND INVESTIGATION

This report is produced solely for the benefit of Caerphilly County Borough Council and no liability is accepted for any reliance placed on it by any other party unless specifically agreed in writing otherwise.

This report refers, within the limitations stated, to the condition of the site at the time of the inspections. No warranty is given as to the possibility of future changes in the condition of the site.
This report is based on a visual site inspection, reference to accessible referenced historical records, information supplied by those parties referenced in the text and preliminary discussions with local and Statutory Authorities. Some of the opinions are based on unconfirmed data and information and are presented as the best that can be obtained without further extensive research. Where ground contamination is suspected but no physical site test results are available to confirm this, the report must be regarded as initial advice only, and further assessment should be undertaken prior to activities related to the site. Where test results undertaken by others have been made available these can only be regarded as a limited sample. The possibility of the presence of contaminants, perhaps in higher concentrations, elsewhere on the site cannot be discounted.

Whilst confident in the findings detailed within this report because there are no exact UK definitions of these matters, being subject to risk analysis, we are unable to give categoric assurances that they will be accepted by Authorities or Funds etc. without question as such bodies often have unpublished, more stringent objectives. This report is prepared for the proposed uses stated in the report and should not be used in a different context without reference to WYGE. In time improved practices or amended legislation may necessitate a re-assessment.

The assessment of ground conditions within this report is based upon the findings of the study undertaken. We have interpreted the ground conditions in between locations on the assumption that conditions do not vary significantly. However, no investigation can inspect each and every part of the site and therefore changes or variances in the physical and chemical site conditions as described in this report cannot be discounted.

The report is limited to those aspects of land contamination specifically reported on and is necessarily restricted and no liability is accepted for any other aspect especially concerning gradual or sudden pollution incidents. The opinions expressed cannot be absolute due to the limitations of time and resources imposed by the agreed brief and the possibility of unrecorded previous use and abuse of the site and adjacent sites. The report concentrates on the site as defined in the report and provides an opinion on surrounding sites. If migrating pollution or contamination (past or present) exists further extensive research will be required before the effects can be better determined.

APPENDIX B – EXPLORATORY HOLE LOGS

Project: **Trinity Fields**

Location: **Caerphilly**

Client: **Caerphilly County Borough Council**

Location Details			
Easting:	314438.54	Northing:	193961.57
Level:	99.74mAOD	Depth:	3.30m
Logger:	SB	Type:	CP
		Inclination:	90°

Status: FINAL

Borehole Number: **BH01**

Sheet 1 of 1

Method, Plant and Crew					Diameter		Casing	
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)
0.00	1.20	Cable Percussion	Hand Excavated	M. Mcauley & D. Davis				
1.20	3.30		Dando 2000	M. Mcauley & D. Davis				

Drilling Progress by Time				
Date	Time	Depth (m)	Casing (m)	Water (m)

Scale:	1:50
Checked By:	PV
Approved By:	CBP
Start Date:	05/06/2020
Finish Date:	08/06/2020

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	99.60			0.20 - 0.80 0.20 - 0.80	B1 ES1	
Light brown silty or clayey sandy fine to coarse GRAVEL of angular to subrounded grey sandstone. Sand is fine to coarse. (MADE GROUND)								
Brown silty or clayey sandy fine to coarse angular to tabular GRAVEL of grey sandstone and rare fine concrete fragments. Sand is fine to coarse. Gravel of concrete weathered to white or pink clay in places. Pockets of very sandy clay or silt throughout. (MADE GROUND)		0.80	98.94			0.80 - 1.20 0.80 - 1.20	B2 ES2	
Medium dense greyish brown sandy silty clayey fine to coarse GRAVEL of sub rounded, occasionally tabular, rarely angular grey sandstone, with medium cobble content. Sand is fine to coarse. Cobbles are fine to medium rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.20	98.54			1.20 - 2.20	B3	SPT(C) 1.20m, N=24 (4,6/8,7,6,3)
Medium dense orange brown, occasionally mottled grey, sandy silty or clayey rounded to subrounded, occasionally angular , fine to coarse GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. Cobbles are rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		2.20	97.54			2.20 - 3.00	B4	SPT(C) 2.20m, N=11 (1,2/2,2,3,4)
								SPT(C) 3.00m, 50 (5,13/50 for 195mm)
Very dense probable bedrock returned as coarse tabular GRAVEL of coarse grained grey sandstone. (HUGHES MEMBER SANDSTONE)		3.10	96.64					
		3.30	96.44					SPT(C) 3.30m, 50 (25 for 21mm/50 for 0mm)
EOH at 3.30m - Target Depth Reached								

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 3.30 mbgl.
3. Upon completion exploratory hole backfilled with bentonite and arisings.

Chiselling			Water Added		Hammer Information	
From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %

Groundwater					
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks

Project Number: **A110489-6-1**

Project: **Trinity Fields**

Location: **Caerphilly**

Client: **Caerphilly County Borough Council**

Location Details			
Easting:	314521.15	Northing:	193957.78
Level:	99.84mAOD	Depth:	4.45m
Logger:	SB	Type:	CP
		Inclination:	90°

Status: FINAL

Borehole Number: **BH02**

Sheet 1 of 1

Method, Plant and Crew				
From (m)	To (m)	Type	Plant Used	Crew
0.00	1.20	Cable Percussion	Hand Excavated Dando 2001	M. Mcauley & D. Davis
1.20	4.45			M. Mcauley & D. Davis

Diameter		Casing	
Depth (m)	Diam (mm)	Depth(m)	Diam (mm)

Drilling Progress by Time				
Date	Time	Depth (m)	Casing (m)	Water (m)

Scale: 1:50
Checked By: PV
Approved By: CBP
Start Date: 10/06/2020
Finish Date: 11/06/2020

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	99.69			0.30 - 1.20	B1	
Yellow orange slightly gravelly fine to medium SAND with low cobble content. Gravel coarse rounded to subrounded grey sandstone. Cobbles fine rounded to sub rounded grey sandstone. (MADE GROUND)								
Dense greyish brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular, rarely angular GRAVEL of grey sandstone. Sand is fine to coarse. Cobbles are fine to medium rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.20	98.64			1.20 - 2.00	B2	SPT(C) 1.20m, 47 (10,12/47 for 242mm)
						2.00 - 3.00	B3	SPT(C) 2.00m, N=36 (11,13/9,8,9,10)
Dense greyish brown sandy very clayey or silty fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		3.00	96.84			3.00 - 4.00	B4	SPT(C) 3.00m, N=37 (4,6/6,9,12,10)
Dense to very dense bedrock returned as coarse tabular GRAVEL of coarse grained grey sandstone. (HUGHES MEMBER SANDSTONE)		4.00	95.84					SPT(C) 4.00m, N=46 (25 for 85mm/10,10,13,13)
EOH at 4.45m - Target Depth Reached		4.45	95.39					SPT(C) 4.60m, 50 (15,10/50 for 0mm)

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 4.45 mbgl.
3. Upon completion exploratory hole backfilled with bentonite and arisings.

Chiselling		
From (m)	To (m)	Time (mins)

Water Added	
From (m)	To (m)

Hammer Information	
Serial No.	Energy Ratio %

Groundwater					
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks

Project Number: **A110489-6-1**

Project: **Trinity Fields**

Location: **Caerphilly**

Client: **Caerphilly County Borough Council**

Location Details			
Easting:	314472.27	Northing:	193931.48
Level:	98.76mAOD	Depth:	4.65m
Logger:	SB	Type:	CP
		Inclination:	90°

Status: FINAL

Borehole Number: **BH03**

Sheet 1 of 1

Method, Plant and Crew				
From (m)	To (m)	Type	Plant Used	Crew
0.00	1.20	Cable Percussion	Hand Excavated Dando 2002	M. Mcauley & D. Davis
1.20	4.65			M. Mcauley & D. Davis

Diameter	
Depth (m)	Diam (mm)

Casing	
Depth(m)	Diam (mm)

Drilling Progress by Time				
Date	Time	Depth (m)	Casing (m)	Water (m)

Scale: 1:50
Checked By: PV
Approved By: CBP
Start Date: 08/06/2020
Finish Date: 09/06/2020

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	98.61			0.00	EW1	
						0.20 - 0.80	B1	
Light brown sandy slightly clayey or silty fine to coarse rounded to sub angular GRAVEL of grey sandstone with occasional fine brick and plastic fragments. and low cobble content. Cobbles rounded to sub rounded grey sandstone. (MADE GROUND)		0.80	97.96					
Medium dense greyish brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. with low cobble content. Cobbles rounded to sub rounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)						1.20 - 1.65	B2	SPT(C) 1.20m, N=31 (3,5/8,10,6,7)
Medium dense orange brown, occasionally mottled grey, sandy silty or clayey rounded to subrounded, occasionally angular , fine to coarse GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. Cobbles are rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.50	97.26					
						2.20 - 3.20	B3	SPT(C) 2.20m, N=19 (3,3/3,2,6,8)
Dense orange brown sandy clayey silty fine rounded, occasionally tabular GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		3.20	95.56			3.20 - 3.65	B4	SPT(C) 3.20m, N=37 (7,8/8,9,9,11)
						4.20 - 4.60	B6	SPT(C) 4.20m, 50 (7,6/50 for 175mm)
						4.20 - 4.65	B5	
Very dense probable bedrock returned as coarse tabular GRAVEL of coarse grained grey sandstone. (HUGHES MEMBER SANDSTONE)		4.60	94.16					SPT(C) 4.60m, 50 (25 for 23mm/50 for 0mm)
EOH at 4.65m - Target Depth Reached		4.65	94.11					

Observations / Remarks

1. Groundwater seepage at 4.60mbgl. Water level at 3.7mbgl after 20 mins.
2. Borehole terminated at 4.65 mbgl.
3. Upon completion exploratory hole installed with 50mm piezometer with response zone between 3.2 - 4.65mbgl.
4. Borehole backfilled with bentonite following completion of monitoring.

Chiselling		
From (m)	To (m)	Time (mins)

Water Added	
From (m)	To (m)

Hammer Information	
Serial No.	Energy Ratio %

Groundwater					
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks
4.60	5	-	20	3.70	

Project Number: **A110489-6-1**

Project: **Trinity Fields**

Location: **Caerphilly**

Client: **Caerphilly County Borough Council**

Location Details			
Easting:	314417.48	Northing:	193930.13
Level:	98.29mAOD	Depth:	3.20m
Logger:	SB	Type:	CP
		Inclination:	90°

Status: FINAL

Borehole Number: **BH04**

Sheet 1 of 1

Method, Plant and Crew					Diameter		Casing	
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)
0.00	1.20		Hand Excavated	M. Mcauley & D. Davis				
1.20	3.20	Cable Percussion	Dando 2003	M. Mcauley & D. Davis				

Drilling Progress by Time				
Date	Time	Depth (m)	Casing (m)	Water (m)

Scale: 1:50
Checked By: PV
Approved By: CBP
Start Date: 09/06/2020
Finish Date: 10/06/2020

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	98.14			0.00	EW2	
						0.20 - 0.80	B1	
Light brown slightly sandy silty clayey fine to coarse angular to subrounded GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. Cobbles are rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		0.80	97.49			0.80 - 1.20	B2	
Brown silty or clayey slightly sandy fine to medium angular to tabular GRAVEL of grey sandstone. Sand is fine to coarse. Pockets of very sandy clay or silt throughout. (GLACIOFLUVIAL DEPOSITS)		1.20	97.09			1.20 - 1.70	B3	SPT(C) 1.20m, N=23 (4,9/9,6,4,4)
Stiff greyish brown, occasionally mottled orange, sandy very gravelly CLAY or SILT with medium cobble content. Gravel is fine to coarse rounded to sub rounded, occasionally tabular, rarely angular grey sandstone. Cobbles are fine to medium rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.70	96.59			1.70 - 2.70	B4	SPT(S) 1.70m, N=8 (1,1/1,2,2,3)
Loose orange brown, occasionally mottled grey, sandy silty or clayey rounded to subrounded, occasionally angular , fine to coarse GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. Cobbles are rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)								
Becoming very dense from 2.70m bgl								SPT(C) 2.70m, 50 (9,8/50 for 96mm)
Very dense probable bedrock returned as coarse tabular GRAVEL of coarse grained grey sandstone. (HUGHES MEMBER SANDSTONE)		3.00	95.29			3.00 - 3.20	B5	
		3.20	95.09					SPT(C) 3.20m, 50 (25 for 19mm/50 for 27mm)
EOH at 3.20m - Target Depth Reached								

1 2 3 4 5 6 7 8 9 10

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 3.20 mbgl.
3. Upon completion exploratory hole installed with 50mm piezometer with response zone between 1.70 - 3.20mbgl.

Chiselling			Water Added		Hammer Information	
From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %

Groundwater					
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks

Project Number: **A110489-6-1**

Project: **Trinity Fields**

Location: **Caerphilly**

Client: **Caerphilly County Borough Council**

Location Details			
Easting:	314498.92	Northing:	193912.55
Level:	98.64mAOD	Depth:	4.30m
Logger:	SB	Type:	CP
		Inclination:	90°

Status: FINAL

Borehole Number: **BH05**

Sheet 1 of 1

Method, Plant and Crew					Diameter		Casing	
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)
0.00	1.20	Cable Percussion	Hand Excavated Dando 2004	M. Mcauley & D. Davis				
1.20	4.30			M. Mcauley & D. Davis				

Drilling Progress by Time				
Date	Time	Depth (m)	Casing (m)	Water (m)

Scale: 1:50
Checked By: PV
Approved By: CBP
Start Date: 03/06/2020
Finish Date: 04/06/2020

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	98.49			0.30 - 0.80	B1	
Light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. with medium cobble content Sand is fine to coarse. Cobbles are fine subrounded to rounded, occasionally tabular, grey sandstone. (GLACIOFLUVIAL DEPOSITS)		0.80	97.84			0.80 - 1.20	B2	
Light brown slightly sandy silty clayey fine to coarse angular to subrounded GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. Cobbles are rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.20	97.44			1.20 - 2.20	B3	SPT(C) 1.20m, N=8 (2,2/2,1,3,2)
Soft light brown with pockets of grey, slightly sandy very gravelly CLAY or SILT with low cobble content and pockets of stiff clay throughout. Gravel is fine to coarse subrounded grey sandstone. Cobbles are fine to medium rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		2.20	96.44			2.20 - 3.20	B4	SPT(C) 2.20m, N=11 (1,3/2,2,3,4)
Medium dense light brown to grey sandy silty or clayey fine to coarse angular to subrounded GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. Cobbles are rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		3.20	95.44			3.20 - 4.00	B5	SPT(C) 3.20m, N=20 (5,6/7,5,4,4)
Stiff greyish brown slightly sandy very gravelly CLAY or SILT with low cobble content. Sand is fine to coarse. Gravel is fine to coarse sub angular to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		4.00	94.64					SPT(C) 4.00m, N=36 (4,5/6,8,6,16)
Dense to very dense brownish grey slightly silty or clayey sandy rounded to sub rounded to rounded fine to coarse GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. Cobbles are fine to medium rounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		4.30	94.34					SPT(C) 4.30m, 50 (10,12/50 for 256mm)
EOH at 4.30m - Target Depth Reached								

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 4.30 mbgl.
3. Upon completion exploratory hole backfilled with bentonite and arisings.

Chiselling			Water Added		Hammer Information	
From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %

Groundwater					
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks

Project Number: **A110489-6-1**

Project: **Trinity Fields**

Location: **Caerphilly**

Client: **Caerphilly County Borough Council**

Location Details			
Easting:	314506.00	Northing:	193912.00
Level:	98.00mAOD	Depth:	4.40m
Logger:	SB	Type:	CP
		Inclination:	90°

Status: FINAL

Borehole Number: **BH05A**

Sheet 1 of 1

Method, Plant and Crew					Diameter		Casing		Drilling Progress by Time				
From (m)	To (m)	Type	Plant Used	Crew	Depth (m)	Diam (mm)	Depth(m)	Diam (mm)	Date	Time	Depth (m)	Casing (m)	Water (m)
0.00	1.20	Cable Percussion	Hand Excavated Dando 2005	M. Mcauley & D. Davis									
1.20	4.40			M. Mcauley & D. Davis									

Scale: 1:50
Checked By: PV
Approved By: CBP
Start Date: 04/06/2020
Finish Date: 05/06/2020

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Inst / Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	97.85			0.20 - 1.20	B1	
Brown sandy silty or clayey fine to medium angular to tabular GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		1.20	96.80			1.20 - 2.20	B2	SPT(C) 1.20m, N=6 (4,3/2,2,1,1)
Loose orange brown sandy silty or clayey fine to coarse rounded to subrounded occasionally tabular GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. Cobbles are fine to coarse rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)						2.20 - 3.00	B3	SPT(C) 2.20m, N=12 (1,1/2,2,3,5)
Very dense light brown to grey sandy silty or clayey fine to coarse angular to subrounded GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. Cobbles are rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		3.00	95.00			3.00 - 3.70	B4	SPT(C) 3.00m, 50 (11,13/50 for 173mm)
						3.70 - 4.20	B5	
Very dense probable bedrock returned as coarse tabular GRAVEL of coarse grained grey sandstone. (HUGHES MEMBER SANDSTONE)		4.20	93.80			4.20 - 4.40	B6	SPT(C) 4.20m, 50 (25 for 25mm/50 for 21mm)
EOH at 4.40m - Target Depth Reached		4.40	93.60					SPT(C) 4.40m, 50 (25 for 15mm/50 for 0mm)

1 2 3 4 5 6 7 8 9 10

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 4.40 mbgl.
3. Upon completion exploratory hole backfilled with bentonite and arisings.

Chiselling			Water Added		Hammer Information	
From (m)	To (m)	Time (mins)	From (m)	To (m)	Serial No.	Energy Ratio %

Groundwater					
Strike (m)	Casing (m)	Sealed (m)	Time (min)	Rose To (m)	Remarks

Project Number: **A110489-6-1**

Project: **Trinity Fields** Location: **Caerphilly** Client: **Caerphilly County Borough Council**	Location Details Easting: 314419.19 Northing: 193940.45 Level: 98.55mAOD Depth: 2.60m Logger: SB Type: TP	Status FINAL	Pit Number **SA01** Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:25
Pit Dimensions 0.60m 2.10m	Orientation: 0° Shoring: None Stability: Stable Plant: JCB 3CX	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: PV Approved By: CBP Start Date: 02/06/2020 Finish Date: 04/06/2020

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	98.40			0.20 - 0.30 0.20 - 0.30	B1 ES1	
Light brown silty or clayey sandy fine to coarse GRAVEL of angular to subrounded grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)						0.60 - 0.80	B2	
Soft grey, occasionally mottled orange, slightly sandy slightly gravelly silty CLAY. Sand fine to coarse. Gravel rounded to subrounded fine grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.20	97.35			1.20 - 1.40	B3	
Orange brown, occasionally mottled grey, silty or clayey slightly gravelly fine to coarse SAND with low cobble content. Gravel is rounded to subrounded, occasionally angular , fine to coarse grey sandstone. Cobbles are fine to medium rounded grey sandstone. Frequent pockets of orange gravel. (GLACIOFLUVIAL DEPOSITS)		1.90	96.65			2.10 - 2.40	B4	
EOH at 2.60m - Target Depth Reached		2.60	95.95					

Observations / Remarks

1. Groundwater not observed.
2. Trial pit terminated at 2.60 mbgl.
3. Upon completion exploratory hole backfilled with arisings.

Longcross Court,
Cardiff,
CF24 0AD

029 2082 9200

Project Number

A110489-6-1

Project: **Trinity Fields** Location: **Caerphilly** Client: **Caerphilly County Borough Council**	Location Details Easting: 314417.57 Northing: 193914.34 Level: 97.96mAOD Depth: 2.80m Logger: SB Type: TP	Status FINAL	Pit Number **SA02** Sheet 1 of 1

Hole Information		Groundwater				Scale: 1:25
Pit Dimensions 0.60m 2.20m	Orientation: 45° Shoring: None Stability: Stable Plant: JCB 3CX	Strike (m)	Rose To (m)	After (mins)	Remarks	Checked By: PV Approved By: CBP Start Date: 02/06/2020 Finish Date: 03/06/2020

Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Water Level (m)	Backfill	Samples and Testing: Depth (m)	Ref	Tests / Results
Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	97.81			0.20 - 0.30	B1	
Light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone with medium cobble content. Sand is fine to coarse. Cobbles are fine subrounded to rounded, occasionally tabular, grey sandstone. (MADE GROUND)		0.30	97.66			0.30 - 0.60	B2	
Light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone with medium cobble content. Sand is fine to coarse. Cobbles are fine subrounded to rounded, occasionally tabular, grey sandstone. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded, occasionally angular, grey sandstone. Cobbles are fine to coarse sub angular to rounded grey sandstone and rare fragments of brick and wood. (MADE GROUND)		0.60	97.36			0.60 - 1.00	B3	
Brownish grey, occasionally mottled orange, sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. with low cobble content. Cobbles rounded to sub rounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.20	96.76			1.20 - 1.40	B4	
Light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. with low cobble content. Sand is fine to coarse. Cobbles are fine subrounded to rounded, occasionally tabular, grey sandstone. (GLACIOFLUVIAL DEPOSITS)								
Stiff to very stiff grey or orange gravelly CLAY or SILT. Gravel is fine to coarse rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		2.20	95.76					
EOH at 2.80m - Target Depth Reached		2.80	95.16					

1
2
3
4
5

Observations / Remarks

1. Groundwater not observed.
2. Trial pit terminated at 2.80 mbgl.
3. Upon completion exploratory hole backfilled with arisings.

Longcross Court,
Cardiff,
CF24 0AD
029 2082 9200

Project Number
A110489-6-1

Project: **Trinity Fields**	Location Details	Status	Hole Number
Location: **Caerphilly**	Easting: 314415.57 Northing: 193944.25	FINAL	**WS01**
Client: **Caerphilly County Borough Council**	Level: 98.56mAOD Depth: 2.00m		Sheet 1 of 1
	Logger: SB Type: WS+DP		
	Inclination: 90°		

AGS

Hole Information

From (m)	To (m)	Type	Termination
0.00	1.00	Inspection Pit	Target Depth Reached
1.00	1.20	Window Sampler	

Groundwater

Strike (m)	Rises to (m)	Time (min)	Remarks

Scale:	1:50
Checked By:	PV
Approved By:	CBP
Start Date:	08/06/2020
Finish Date:	08/06/2020

Blows / 100mm	Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Casing Ø (mm) Depth (m)	Water Level (m)	Installation / Backfill	Samples & Testing: Depth (m)	Ref	Test Results
	Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	98.41				0.40 - 0.60	1 B	
	Light brown slightly sandy very gravelly CLAY or SILT. Sand is fine to coarse. Gravel is fine to coarse angular to subrounded grey sandstone. (MADE GROUND)		0.90	97.66				1.00 - 2.00	2 B	N=8 (3,2/3,2,2,1)
								1.00	SPT(C)	
	Soft to firm light brown to orange occasionally mottled grey very sandy CLAY or SILT with occasional small (<1cm) black organic material. Sand is fine to coarse. Gravel is sub rounded to tabular grey sandstone with rare fine black - grey glassy slag. (MADE GROUND)		1.20	97.36				1.05	HV	
								1.20	HV	
								1.35	HV	
								1.50	HV	
								1.55	HV	
								1.65	HV	
16 17 17 19 25	Firm to stiff light brown to orange, occasionally mottled grey, slightly sandy gravelly CLAY or SILT with with occasional small (<1cm) black organic material . Gravel is coarse rounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		2.00	96.56				2.00	SPT(C)	50 (5,9/50 for 245mm)
	EOH at 2.00m - Target Depth Reached									

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated ar 2.0 mbgl.
3. Upon completion exploratory hole installed with 50mm piezometer with response zone between 1.0 - 2.0 mbgl.

Sampling Runs

From (m)	To (m)	Diam (mm)	Recovery (%)	Remarks
1.00	2.00		100	

Hammer Information

Hammer Serial No.	Energy Ratio %

Project Number

A110489-6-1

Project: **Trinity Fields**	Location Details		Status	Hole Number
Location: **Caerphilly**	Easting: 314504.33	Northing: 193939.69	FINAL	**WS02**
Client: **Caerphilly County Borough Council**	Level: 99.53mAOD	Depth: 1.10m		Sheet 1 of 1
	Logger: SB	Type: WS+DP		
		Inclination: 90°		

AGS

Hole Information

From (m)	To (m)	Type	Termination
0.00	1.00	Inspection Pit	Target Depth Reached
1.00	1.45	Window Sampler	

Groundwater

Strike (m)	Rises to (m)	Time (min)	Remarks

Scale:	1:50
Checked By:	PV
Approved By:	CBP
Start Date:	04/06/2020
Finish Date:	04/06/2020

Blows / 100mm	Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Casing Ø (mm) Depth (m)	Water Level (m)	Installation / Backfill	Samples & Testing: Depth (m)	Ref	Test Results
	Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	99.38						
	Light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		0.35	99.18						
			0.43	99.10				0.45 - 0.70	1 B	
			0.70	98.83				0.45 - 0.70	1 ES	
9 25	Orange brown sandy clayey or silty medium coarse angular GRAVEL of grey sandstone. Gravel is medium to coarse angular grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		1.10	98.43				1.00	SPT(C)	50 (8,13/50 for 180mm)
	Light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)									
	Greyish brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)									
	EOH at 1.10m - Target Depth Reached									

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 1.10 mbgl.
3. Upon completion exploratory hole installed with 50mm piezometer with response zone from 0.60 - 1.0 mbgl.

Sampling Runs

From (m)	To (m)	Diam (mm)	Recovery (%)	Remarks

Hammer Information

Hammer Serial No.	Energy Ratio %
	69

Project Number

A110489-6-1

Project: **Trinity Fields**	Location Details	Status	Hole Number
Location: **Caerphilly**	Easting: 314521.87 Northing: 193926.39	FINAL	**WS03**
Client: **Caerphilly County Borough Council**	Level: 99.08mAOD Depth: 2.90m		Sheet 1 of 1
	Logger: SB Type: WS+DP		
	Inclination: 90°		

AGS

Hole Information

From (m)	To (m)	Type	Termination
0.00	0.90	Inspection Pit	Target Depth Reached
0.90	3.35	Window Sampler	

Groundwater

Strike (m)	Rises to (m)	Time (min)	Remarks

Scale:	1:50
Checked By:	PV
Approved By:	CBP
Start Date:	04/06/2020
Finish Date:	04/06/2020

Blows / 100mm (5 10 15 20 25 30 35 40 45)	Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Casing Ø (mm) Depth (m)	Water Level (m)	Installation / Backfill	Samples & Testing: Depth (m)	Ref	Test Results
	Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	98.93				0.15 - 0.35	2 B	
	Light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. Sand is fine to coarse. Cobbles are fine subrounded to rounded, occasionally tabular, grey sandstone. (GLACIOFLUVIAL DEPOSITS)		0.90	98.18				0.90	SPT(C)	N=38 (2,5/8,11,11,8)
	Orange brown silty or clayey fine to coarse SAND. (GLACIOFLUVIAL DEPOSITS)		1.20	97.88						
	Dense light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS) *Becomes orangey brown in colour.*		1.90	97.18				2.00	SPT(C)	N=9 (2,1/2,2,2,3)
	Soft to firm light brown to orange occasionally mottled grey very sandy CLAY or SILT with occasional small (<1cm) black organic material. (GLACIOFLUVIAL DEPOSITS)		2.30	96.78				2.30 - 2.90 2.30	1 B HV	
16 25	Very dense brownish grey slightly silty or clayey sandy rounded to sub rounded and tabular fine to medium GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		2.90	96.18				2.90 2.90	SPT(C) HV	50 (10,11/50 for 160mm)
	EOH at 2.90m - Target Depth Reached									

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 2.90 mbgl.
3. Upon completion exploratory hole backfilled with bentonite and arisings.

Sampling Runs

From (m)	To (m)	Diam (mm)	Recovery (%)	Remarks
0.90	1.90			
1.90	2.90		100	

Hammer Information

Hammer Serial No.	Energy Ratio %
	69

Project Number

A110489-6-1

Project: **Trinity Fields**	Location Details	Status	Hole Number
Location: **Caerphilly**	Easting: 314453.33 Northing: 193917.16	FINAL	**WS04**
Client: **Caerphilly County Borough Council**	Level: 98.38mAOD Depth: 2.00m		Sheet 1 of 1
	Logger: Type: WS+DP		
	Inclination: 90°		

AGS

Hole Information

From (m)	To (m)	Type	Termination
0.00	1.00	Inspection Pit	Target Depth Reached
1.00	2.45	Window Sampler	

Groundwater

Strike (m)	Rises to (m)	Time (min)	Remarks

Scale: 1:50
Checked By: PV
Approved By: CBP
Start Date: 08/04/2020
Finish Date: 08/04/2020

Blows / 100mm	Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Casing Ø (mm) Depth (m)	Water Level (m)	Installation / Backfill	Samples & Testing: Depth (m)	Ref	Test Results
	Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	98.23				0.20 - 0.40	1 B	
	Light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. with low cobble content Sand is fine to coarse.. Cobbles are fine to medium rounded to subrounded, occasionally tabular, grey sandstone. (MADE GROUND)		0.50	97.88				0.60 - 0.90 0.60 - 0.90	1 ES 2 B	
								1.00	SPT(C)	N=4 (1,0/1,1,1,1)
	Soft orange brown very sandy gravelly CLAY or SILT with low cobble content. Sand is fine to coarse. Gravel is fine to coarse rounded to sub rounded grey sandstone, rare fine brick and slag fragments. Cobbles are fine to medium rounded to subrounded grey sandstone. (MADE GROUND)		1.60	96.78						
14 22 25			2.00	96.38				2.00	SPT(C)	50 (25 for 135mm/50 for 200mm)
	Very dense orange brown sandy silty or clayey rounded to subrounded, occasionally angular, fine to coarse GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)									
	EOH at 2.00m - Target Depth Reached									

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 2.0 mbgl.
3. Upon completion exploratory hole backfilled with bentonite and arisings.

Sampling Runs

From (m)	To (m)	Diam (mm)	Recovery (%)	Remarks
1.00	2.00		100	

Hammer Information

Hammer Serial No.	Energy Ratio %

Project Number
A110489-6-1

Project: **Trinity Fields**	Location Details	Status	Hole Number
Location: **Caerphilly**	Easting: 314494.72 Northing: 193921.24	FINAL	**WS05**
Client: **Caerphilly County Borough Council**	Level: 98.78mAOD Depth: 1.60m		Sheet 1 of 1
	Logger: Type: WS+DP		
	Inclination: 90°		

AGS

Hole Information

From (m)	To (m)	Type	Termination
0.00	1.00	Inspection Pit	Target Depth Reached
1.00	2.50	Window Sampler	

Groundwater

Strike (m)	Rises to (m)	Time (min)	Remarks

Scale:	1:50
Checked By:	PV
Approved By:	CBP
Start Date:	08/04/2020
Finish Date:	08/04/2020

Blows / 100mm	Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Casing Ø (mm) Depth (m)	Water Level (m)	Installation / Backfill	Samples & Testing: Depth (m)	Ref	Test Results
	Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	98.63				0.30 - 0.70	1 B	
	Light brown slightly sandy GRAVEL and COBBLES. Gravel is fine to coarse rounded, occasionally tabular, grey sandstone. Cobbles are fine to medium rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.20	97.58				1.00	SPT(C)	N=29 (5,8/9,6,6,8)
11 13 8 10 8 9 25	Medium dense to dense brownish clayey or silty gravelly fine to coarse SAND. Gravel is rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.60	97.18						
	EOH at 1.60m - Target Depth Reached									

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 1.60 mbgl.
3. Upon completion exploratory hole backfilled with bentonite and arisings.

Sampling Runs

From (m)	To (m)	Diam (mm)	Recovery (%)	Remarks
1.00	1.60		100	

Hammer Information

Hammer Serial No.	Energy Ratio %

Project Number

A110489-6-1

Project: **Trinity Fields**	Location Details	Status	Hole Number
Location: **Caerphilly**	Easting: 314414.97 Northing: 193910.64	FINAL	**WS06**
Client: **Caerphilly County Borough Council**	Level: 97.98mAOD Depth: 1.70m		Sheet 1 of 1
	Logger: Type: WS+DP		
	Inclination: 90°		

AGS

Hole Information

From (m)	To (m)	Type	Termination
0.00	1.00	Inspection Pit	Target Depth Reached
1.00	2.15	Window Sampler	

Groundwater

Strike (m)	Rises to (m)	Time (min)	Remarks

Scale:	1:50
Checked By:	PV
Approved By:	CBP
Start Date:	08/04/2020
Finish Date:	08/04/2020

Blows / 100mm	Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Casing Ø (mm) Depth (m)	Water Level (m)	Installation / Backfill	Samples & Testing: Depth (m)	Ref	Test Results
	Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	97.83				0.50 - 0.70	1 B	
	Light brown sandy silty or clayey rounded to subrounded, occasionally angular , fine to coarse GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. Cobbles are rounded to subrounded, occasionally tabular, grey sandstone. (GLACIOFLUVIAL DEPOSITS)		0.70	97.28				1.00 - 1.30 1.00	2 B SPT(C)	N=14 (5,3/4,2,4,4)
15 18 19 25	Firm greyish brown, occasionally mottled orange, very sandy gravelly CLAY or SILT. Sand is fine to coarse. Gravel is coarse angular to sub angular grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.30	96.68						
	Orange brown and grey, occasionally speckled black, clayey or silty gravelly fine to coarse SAND. Gravel is fine to medium rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.70	96.28						
	EOH at 1.70m - Target Depth Reached									

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 1.70 mbgl.
3. Upon completion exploratory hole backfilled with bentonite and arisings.

Sampling Runs

From (m)	To (m)	Diam (mm)	Recovery (%)	Remarks
1.00	1.70		100	

Hammer Information

Hammer Serial No.	Energy Ratio %

Project Number

A110489-6-1

Project: **Trinity Fields**	Location Details		Status	Hole Number
Location: **Caerphilly**	Easting: 314483.21	Northing: 193899.30	FINAL	**WS07**
Client: **Caerphilly County Borough Council**	Level: 98.19mAOD	Depth: 1.50m		Sheet 1 of 1
	Logger:	Type: WS+DP		
		Inclination: 90°		

AGS

Hole Information

From (m)	To (m)	Type	Termination
0.00	0.90	Inspection Pit	Target Depth Reached
0.90	1.95	Window Sampler	

Groundwater

Strike (m)	Rises to (m)	Time (min)	Remarks

Scale:	1:50
Checked By:	PV
Approved By:	CBP
Start Date:	04/06/2020
Finish Date:	04/06/2020

Blows / 100mm	Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Casing Ø (mm) Depth (m)	Water Level (m)	Installation / Backfill	Samples & Testing: Depth (m)	Ref	Test Results
	Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	98.04				0.20 - 0.40 0.20 - 0.40	1 B 1 ES	
	Light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		0.60	97.59				0.60 - 1.00	2 B	
2 2 4 25	Medium dense orange brown slightly clayey or silty gravelly SAND. Gravel is fine to coarse roudned to subangular grey sanstone. (GLACIOFLUVIAL DEPOSITS)		1.00	97.19				0.80 - 1.00 0.90	2 ES SPT(C)	N=21 (3,3/4,4,6,7)
	Very dense brownish grey slightly silty or clayey sandy rounded to sub rounded and tabular fine to medium GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		1.50	96.69				1.50	SPT(C)	50 (9,9/50 for 255mm)
	EOH at 1.50m - Target Depth Reached									

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 1.50 mbgl.
3. Upon completion exploratory hole backfilled with bentonite and arisings.

Sampling Runs

From (m)	To (m)	Diam (mm)	Recovery (%)	Remarks
0.90	1.50		100	

Hammer Information

Hammer Serial No.	Energy Ratio %
	69

Project Number

A110489-6-1

Project: **Trinity Fields**	Location Details	Status	Hole Number
Location: **Caerphilly**	Easting: 314517.48 Northing: 193880.86	FINAL	**WS08**
Client: **Caerphilly County Borough Council**	Level: 98.04mAOD Depth: 2.05m		Sheet 1 of 1
	Logger: Type: WS+DP		
	Inclination: 90°		

AGS

Hole Information

From (m)	To (m)	Type	Termination
0.00	1.00	Inspection Pit	Target Depth Reached
1.00	2.05	Window Sampler	

Groundwater

Strike (m)	Rises to (m)	Time (min)	Remarks

Scale: 1:50
Checked By: PV
Approved By: CBP
Start Date: 04/06/2020
Finish Date: 04/06/2020

Blows / 100mm	Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Casing Ø (mm) Depth (m)	Water Level (m)	Installation / Backfill	Samples & Testing: Depth (m)	Ref	Test Results
	Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	97.89				0.20 - 0.60	1 B	
	Light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		0.70	97.34				0.70 - 1.50 0.70	2 B HV	
								1.00	SPT(C)	N=16 (2,2/1,3,5,7)
	Firm to stiff light brown to orange, occasionally mottled grey, very sandy gravelly CLAY or SILT with with occasional small (<1cm) black organic material . Gravel is coarse angular to sub angular grey sandstone. (GLACIOFLUVIAL DEPOSITS)		1.50	96.54				1.60	SPT(C)	22 (25 for 113mm/22 for 20mm)
25	Very dense brownish grey slightly silty or clayey sandy rounded to sub rounded and tabular fine to medium GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		2.05	95.99						
	EOH at 2.05m - Target Depth Reached									

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 2.05 mbgl.
3. Upon completion exploratory hole backfilled with bentonite and arisings.

Sampling Runs

From (m)	To (m)	Diam (mm)	Recovery (%)	Remarks
1.00	1.60		100	

Hammer Information

Hammer Serial No.	Energy Ratio %
	69

Project Number
A110489-6-1

Project: **Trinity Fields**	Location Details	Status	Hole Number
Location: **Caerphilly**	Easting: 314436.68 Northing: 193883.35	FINAL	**WS09**
Client: **Caerphilly County Borough Council**	Level: 97.54mAOD Depth: 1.70m		Sheet 1 of 1
	Logger: Type: WS+DP		
	Inclination: 90°		

AGS

Hole Information

From (m)	To (m)	Type	Termination
0.00	1.00	Inspection Pit	Target Depth Reached
1.00	2.15	Window Sampler	

Groundwater

Strike (m)	Rises to (m)	Time (min)	Remarks

Scale:	1:50
Checked By:	PV
Approved By:	CBP
Start Date:	08/06/2020
Finish Date:	08/06/2020

Blows / 100mm	Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Casing Ø (mm) Depth (m)	Water Level (m)	Installation / Backfill	Samples & Testing: Depth (m)	Ref	Test Results
	Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	97.39				0.40 - 0.60 0.40 - 0.60	1 B 1 ES	
	Light brown slightly silty or clayey gravelly fine to coarse SAND with medium cobble content. Gravel is fine to coarse angular to subrounded grey sandstone, with occasional slate and rare plastic fragments. Cobbles are fine subrounded to rounded, occasioanlly tabular, grey sandstone. (MADE GROUND)		0.75 1.20	96.79 96.34				1.00	SPT(C)	N=25 (4,4/4,5,6,10)
8 16 14 11 12 16 12 14 14 25	Medium dense light brown very sandy fine to coarse rounded to sub angular GRAVEL of grey sandstone with low cobble content. Sand is fine to coarse. Cobbles are fine to coarse rounded to subrounded grey sandstone. (GLACIOFLUVIAL DEPOSITS) Very dense brownish grey slightly silty or clayey sandy rounded to sub rounded and tabular fine to medium GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		1.70	95.84				1.70	SPT(C)	50 (25 for 105mm/50 for 115mm)
	EOH at 1.70m - Target Depth Reached									

Observations / Remarks

1. Groundwater not observed.
2. Borehole terminated at 1.70 mbgl.
3. Upon completion exploratory hole backfilled with bentonite and arisings.

Sampling Runs

From (m)	To (m)	Diam (mm)	Recovery (%)	Remarks
1.00	1.70		100	

Hammer Information

Hammer Serial No.	Energy Ratio %

Project Number

A110489-6-1

Project: **Trinity Fields**

Location: **Caerphilly**

Client: **Caerphilly County Borough Council**

Location Details			
Easting:	314486.89	Northing:	193876.79
Level:	97.72mAOD	Depth:	1.10m
Logger:		Type:	WS+DP
		Inclination:	90°

Status: FINAL

Hole Number: **WS10**

Sheet 1 of 1

AGS

Hole Information			
From (m)	To (m)	Type	Termination
0.00	1.00	Inspection Pit	Target Depth Reached
1.00	1.45	Window Sampler	

Groundwater			
Strike (m)	Rises to (m)	Time (min)	Remarks

Scale: 1:50
Checked By: PV
Approved By: CBP
Start Date: 04/06/2020
Finish Date: 04/06/2020

Blows / 100mm	Strata Description	Legend	Depth (m)	Reduced Level (mAOD)	Casing Ø (mm) Depth (m)	Water Level (m)	Installation / Backfill	Samples & Testing		
								Depth (m)	Ref	Test Results
	Grass over soft brown slightly sandy gravelly CLAY or SILT with frequent rootlets. Sand is fine to coarse. Gravel is fine to medium rounded to sub rounded grey sandstone. (TOPSOIL)		0.15	97.57				0.20 - 0.50	1 B	
								0.60 - 1.00	2 B	
25	Light brown sandy silty or clayey fine to coarse rounded to sub rounded, occasionally tabular GRAVEL of grey sandstone. Sand is fine to coarse. (GLACIOFLUVIAL DEPOSITS)		1.00	96.72				1.00	SPT(C)	50 (6,11/50 for 230mm)
	Stiff to hard light brown to orange occasionally mottled grey very sandy CLAY or SILT with occasional small (<1cm) black organic material. (GLACIOFLUVIAL DEPOSITS)		1.10	96.62						
	EOH at 1.10m - Target Depth Reached									

Observations / Remarks

1. Groundwater not observed.
2. terminated at mbgl.
3. Upon completion exploratory hole installed with 50mm piezometer with response zone between 0.20 - 0.60 mbgl.
4. Borehole backfilled with bentonite following completion of monitoring.

Sampling Runs

From (m)	To (m)	Diam (mm)	Recovery (%)	Remarks
1.00	1.10		100	

Hammer Information

Hammer Serial No.	Energy Ratio %
	69

Project Number: **A110489-6-1**

APPENDIX C – TRL PROBE TEST RESULTS

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Environmental Consultancy
Ground Engineering Services

PROJECT No.:	A110489-6-1
PROJECT NAME:	Trinity Fields School
CLIENT:	CCBC
FIGURE No.:	TRL01

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

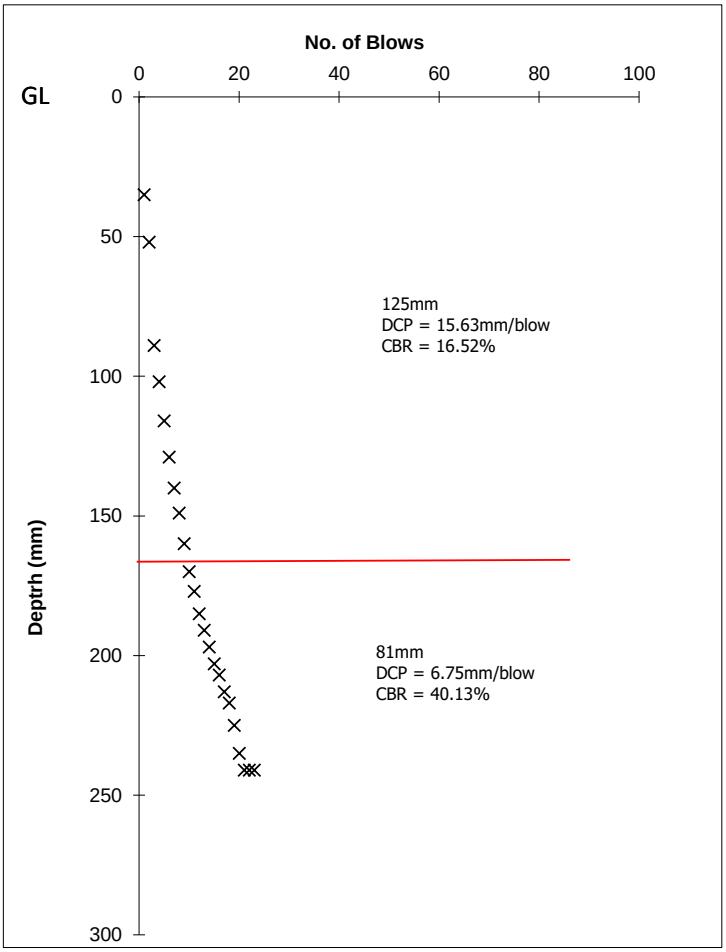
Reference: 1 Position: TRL01 Date: 01 June 2020

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
35	1	76	35		46		-45
17	2	190	52		47		-45
37	3	252	89		48		-45
13	4	304	102		49		-45
14	5	350	116		50		-45
13	6	395	129		51		-45
11	7	185	140		52		-45
9	8	194	149		53		-45
11	9	205	160		54		-45
10	10	215	170		55		-45
7	11	222	177		56		-45
8	12	230	185		57		-45
6	13	236	191		58		-45
6	14	242	197		59		-45
6	15	248	203		60		-45
4	16	252	207		61		-45
6	17	258	213		62		-45
4	18	262	217		63		-45
8	19	270	225		64		-45
10	20	280	235		65		-45
6	21	286	241		66		-45
	22	286	241		67		-45
	23	286	241		68		-45
-286	24		-45		69		-45
	25		-45		70		-45
	26		-45		71		-45
	27		-45		72		-45
	28		-45		73		-45
	29		-45		74		-45
	30		-45		75		-45
	31		-45		76		-45
	32		-45		77		-45
	33		-45		78		-45
	34		-45		79		-45
	35		-45		80		-45
	36		-45		81		-45
	37		-45		82		-45
	38		-45		83		-45
	39		-45		84		-45
	40		-45		85		-45
	41		-45		86		-45
	42		-45		87		-45
	43		-45		88		-45
	44		-45		89		-45
	45		-45		90		-45

Test started at: 0 m below ground level

Zero Reading: 45 mm

Zero reading = start depth below ground surface



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Data compiled by: SB
Data checked by: CP

WYG Environment

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Environmental Consultancy
Ground Engineering Services

PROJECT No.:	A110489-6-1
PROJECT NAME:	Trinity Fields School
CLIENT:	CCBC
FIGURE No.:	TRL02

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

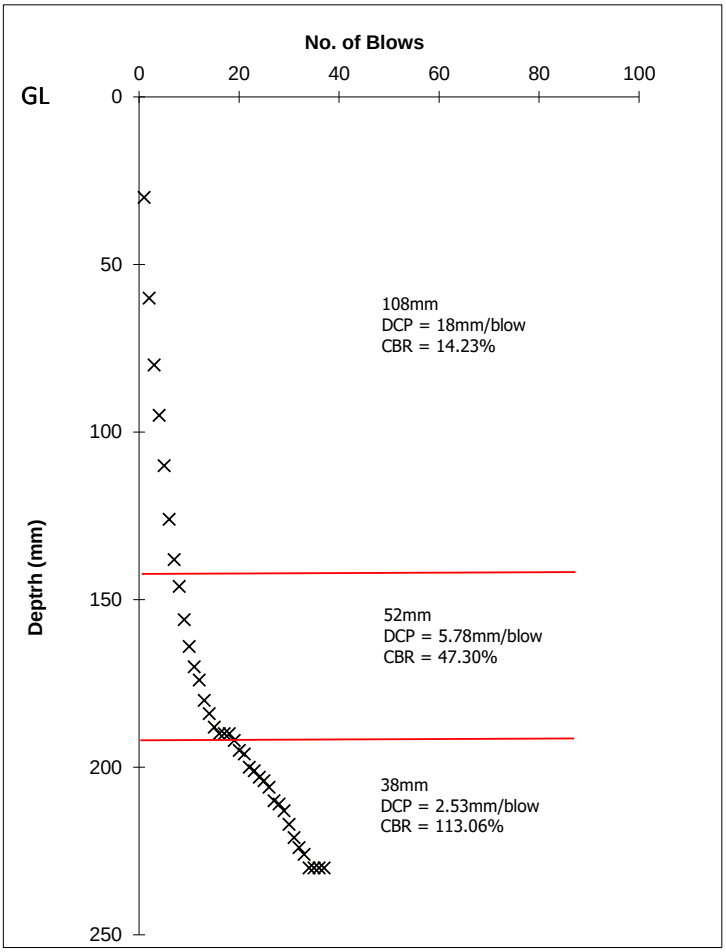
Reference: 1 Position: TRL02 Date: 01 June 2020

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
30	1	76	30		46		-60
30	2	190	60		47		-60
20	3	252	80		48		-60
15	4	304	95		49		-60
15	5	350	110		50		-60
16	6	395	126		51		-60
12	7	198	138		52		-60
8	8	206	146		53		-60
10	9	216	156		54		-60
8	10	224	164		55		-60
6	11	230	170		56		-60
4	12	234	174		57		-60
6	13	240	180		58		-60
4	14	244	184		59		-60
4	15	248	188		60		-60
2	16	250	190		61		-60
	17	250	190		62		-60
	18	250	190		63		-60
2	19	252	192		64		-60
3	20	255	195		65		-60
1	21	256	196		66		-60
4	22	260	200		67		-60
1	23	261	201		68		-60
2	24	263	203		69		-60
1	25	264	204		70		-60
2	26	266	206		71		-60
4	27	270	210		72		-60
1	28	271	211		73		-60
2	29	273	213		74		-60
4	30	277	217		75		-60
4	31	281	221		76		-60
3	32	284	224		77		-60
2	33	286	226		78		-60
4	34	290	230		79		-60
	35	290	230		80		-60
	36	290	230		81		-60
	37	290	230		82		-60
-290	38		-60		83		-60
	39		-60		84		-60
	40		-60		85		-60
	41		-60		86		-60
	42		-60		87		-60
	43		-60		88		-60
	44		-60		89		-60
	45		-60		90		-60

Test started at: 0 m below ground level

Zero Reading: 60 mm

Zero reading = start depth below ground surface



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Data compiled by: SB
Data checked by: CP

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Ground Engineering Services

PROJECT No.:	A110489-6-1
PROJECT NAME:	Trinity Fields School
CLIENT:	CCBC
FIGURE No.:	TRL03

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

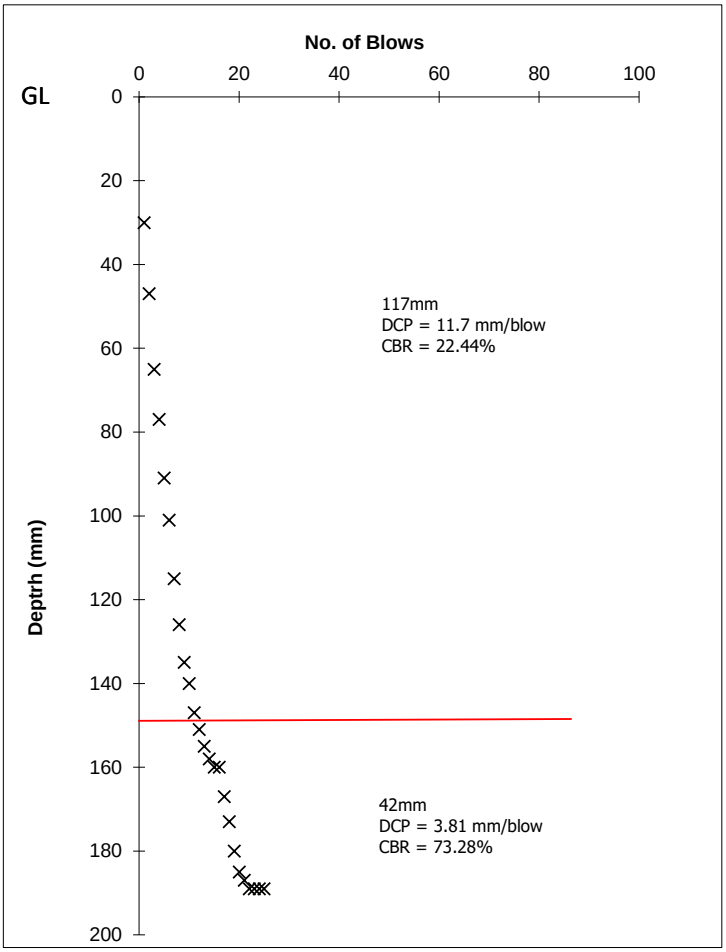
Reference: 1 Position: TRL03 Date: 01 June 2020

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
30	1	76	30				
17	2	190	47				
18	3	252	65				
12	4	304	77				
14	5	350	91				
10	6	395	101				
14	7	190	115				
11	8	201	126				
9	9	210	135				
5	10	215	140				
7	11	222	147				
4	12	226	151				
4	13	230	155				
3	14	233	158				
2	15	235	160				
	16	235	160				
7	17	242	167				
6	18	248	173				
7	19	255	180				
5	20	260	185				
2	21	262	187				
2	22	264	189				
	23	264	189				
	24	264	189				
	25	264	189				
-264	26						
	27						
	28						
	29						
	30						
	31						
	32						
	33						
	34						
	35						
	36						
	37						
	38						
	39						
	40						
	41						
	42						
	43						
	44						
	45						

Test started at: 0 m below ground level

Zero Reading: 75 mm

Zero reading = start depth below ground surface



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Data compiled by: SB
Data checked by: CP

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Ground Engineering Services

PROJECT No.:	A110489-6-1
PROJECT NAME:	Trinity Fields School
CLIENT:	CCBC
FIGURE No.:	TRL04

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

Reference: 1 Position: WS06 Date: 10 June 2020

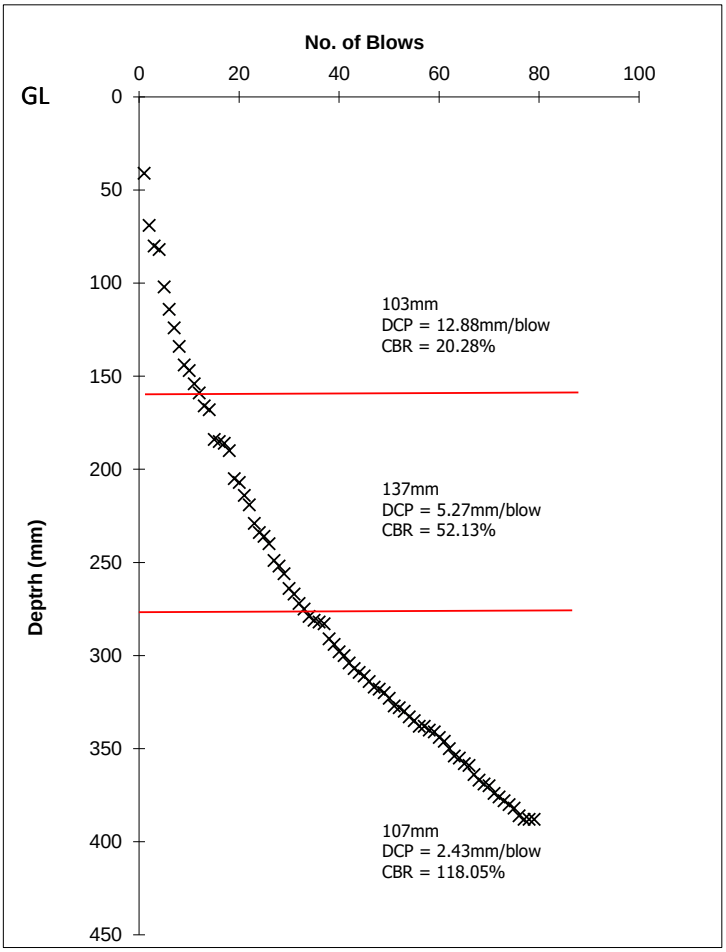
mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
41	1	76	41	3	46	380	314
28	2	190	69	3	47	383	317
11	3	252	80	1	48	384	318
2	4	304	82	2	49	386	320
20	5	350	102	3	50	389	323
12	6	395	114	4	51	393	327
10	7	190	124	1	52	394	328
10	8	200	134	2	53	396	330
10	9	210	144	3	54	399	333
3	10	213	147	2	55	401	335
7	11	220	154	3	56	404	338
5	12	225	159		57	404	338
7	13	232	166	2	58	406	340
2	14	234	168	1	59	407	341
16	15	250	184	3	60	410	344
1	16	251	185	2	61	412	346
1	17	252	186	4	62	416	350
4	18	256	190	4	63	420	354
15	19	271	205	1	64	421	355
2	20	273	207	3	65	424	358
7	21	280	214	1	66	425	359
5	22	285	219	5	67	430	364
10	23	295	229	3	68	433	367
5	24	300	234	2	69	435	369
2	25	302	236	1	70	436	370
4	26	306	240	4	71	440	374
9	27	315	249	2	72	442	376
3	28	318	252	2	73	444	378
4	29	322	256	2	74	446	380
8	30	330	264	2	75	448	382
3	31	333	267	4	76	452	386
5	32	338	272	2	77	454	388
3	33	341	275				
4	34	345	279				
2	35	347	281				
1	36	348	282				
1	37	349	283				
8	38	357	291				
3	39	360	294				
4	40	364	298				
2	41	366	300				
4	42	370	304				
3	43	373	307				
2	44	375	309				
2	45	377	311				

380
383

Test started at: 0 m below ground level

Zero Reading: 66 mm

Zero reading = start depth below ground surface



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Data compiled by: SB
Data checked by: CP

WYG Environment

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Environmental Consultancy
Ground Engineering Services

PROJECT No.:	A110489-6-1
PROJECT NAME:	Trinity Fields School
CLIENT:	CCBC
FIGURE No.:	TRL05

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

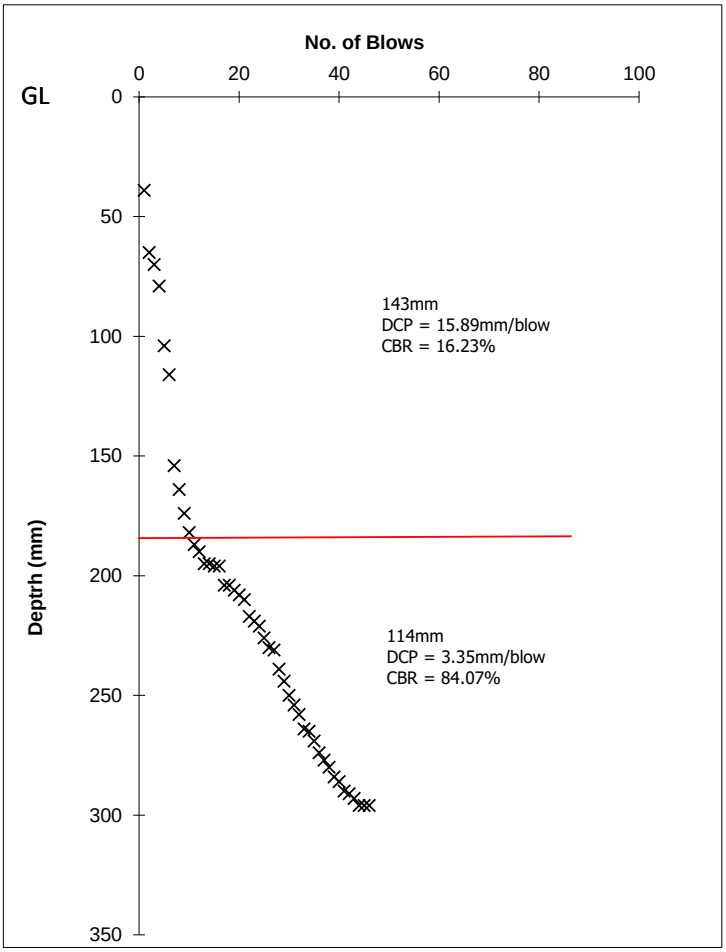
Reference: 1 Position: WS09 Date: 10 June 2020

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
39	1	76	39		46	382	296
26	2	190	65				
5	3	252	70				
9	4	304	79				
25	5	350	104				
12	6	395	116				
38	7	240	154				
10	8	250	164				
10	9	260	174				
8	10	268	182				
5	11	273	187				
3	12	276	190				
5	13	281	195				
	14	281	195				
1	15	282	196				
	16	282	196				
8	17	290	204				
	18	290	204				
2	19	292	206				
2	20	294	208				
2	21	296	210				
7	22	303	217				
2	23	305	219				
2	24	307	221				
5	25	312	226				
4	26	316	230				
1	27	317	231				
8	28	325	239				
5	29	330	244				
6	30	336	250				
4	31	340	254				
4	32	344	258				
6	33	350	264				
1	34	351	265				
4	35	355	269				
5	36	360	274				
3	37	363	277				
3	38	366	280				
4	39	370	284				
2	40	372	286				
4	41	376	290				
1	42	377	291				
2	43	379	293				
3	44	382	296				
	45	382	296				
		382					

Test started at: 0 m below ground level

Zero Reading: 86 mm

Zero reading = start depth below ground surface



After Design manual for Roads and Bridges, Volume 7 Pavement Design and maintenance, Section 3 Pavement Maintenace Assessment, Part 2 HD29/08

Data compiled by: SB
Data checked by: CP

WYG Environment

5th Floor, Longcross Court, 47 Newport Road, Cardiff
Tel: 02920 829200
Fax: 02920 455321
Environmental Consultancy
Ground Engineering Services

PROJECT No.:	A110489-6-1
PROJECT NAME:	Trinity Fields School
CLIENT:	CCBC
FIGURE No.:	TRL06

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

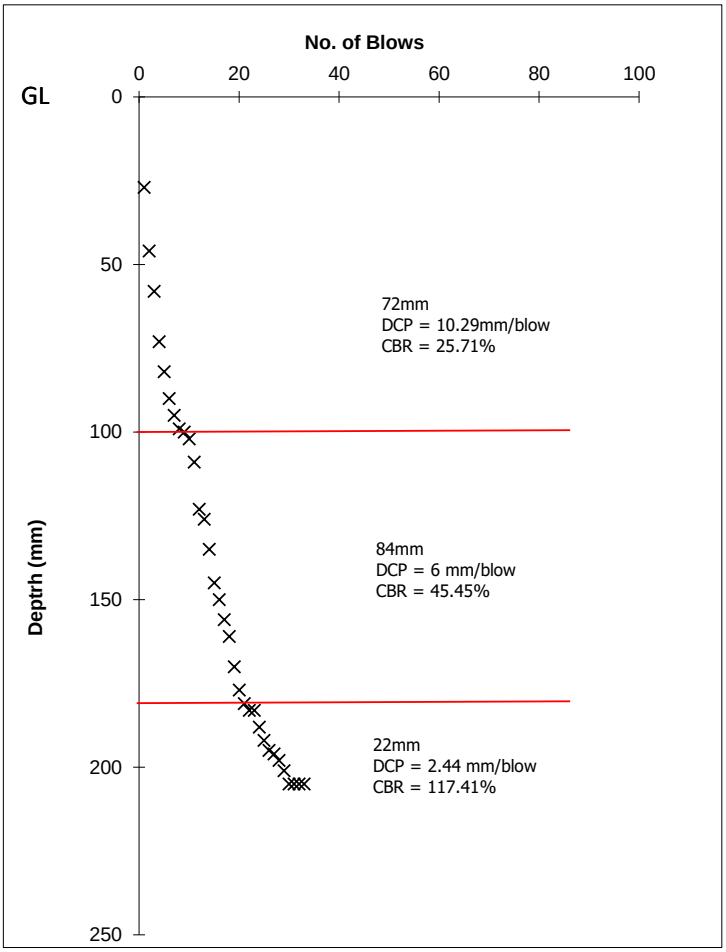
Reference: 1 Position: TRL06 Date: 01 June 2020

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
27	1	76	27				
19	2	190	46				
12	3	252	58				
15	4	304	73				
9	5	350	82				
8	6	395	90				
5	7	180	95				
4	8	184	99				
1	9	185	100				
2	10	187	102				
7	11	194	109				
14	12	208	123				
3	13	211	126				
9	14	220	135				
10	15	230	145				
5	16	235	150				
6	17	241	156				
5	18	246	161				
9	19	255	170				
7	20	262	177				
4	21	266	181				
2	22	268	183				
	23	268	183				
5	24	273	188				
4	25	277	192				
3	26	280	195				
1	27	281	196				
2	28	283	198				
3	29	286	201				
4	30	290	205				
	31	290	205				
	32	290	205				
	33	290	205				

Test started at: 0 m below ground level

Zero Reading: 85 mm

Zero reading = start depth below ground surface



After Design manual for Roads and Bridges, Volume 7 Pavement Design and maintenance, Section 3 Pavement Maintenace Assessment, Part 2 HD29/08

Data compiled by: SB
Data checked by: CP

WYG Environment

5th Floor, Longcross Court, 47 Newport Road, Cardiff
Tel: 02920 829200
Fax: 02920 455321
Environmental Consultancy
Ground Engineering Services

PROJECT No.:	A110489-6-1
PROJECT NAME:	Trinity Fields School
CLIENT:	CCBC
FIGURE No.:	TRL07

DCP-CBR Corellation

$Log_{10}(CBR) = 2.48-1.057 \times Log_{10}$ (mm/blow)

DCP -Modulus E Corellation

$E = 17.6\ (CBR)^{0.64}$ MPa

In situ CBR by TRL Probe

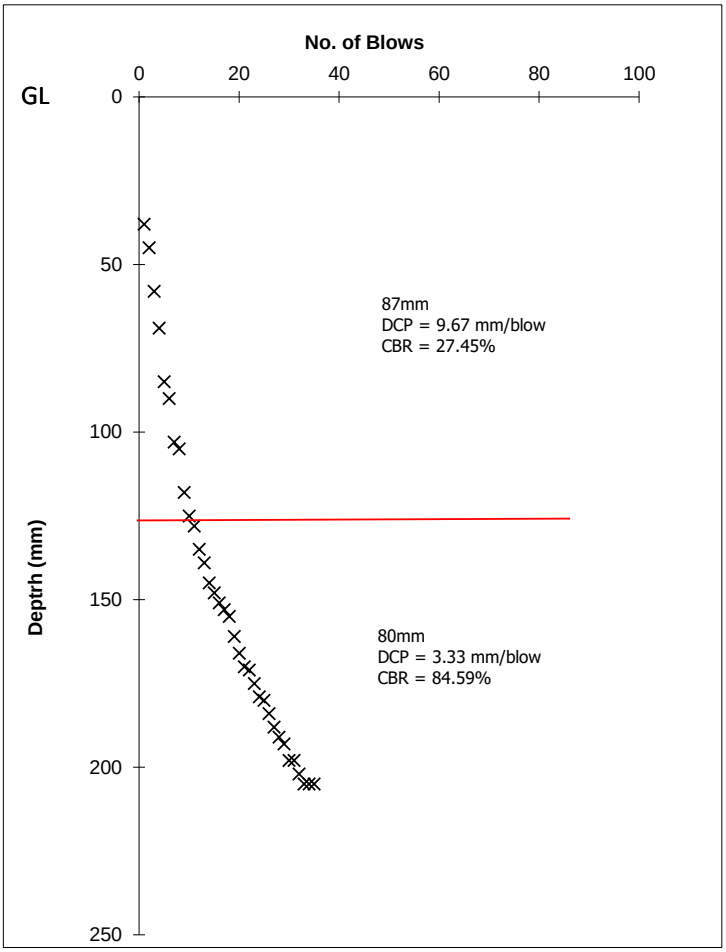
Reference: 1 Position: WS10 Date: 10 June 2020

mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)	mm per blow	Σ Blows	Reading on Scale (mm)	Depth from Ground Level (mm)
38	1	76	38				
7	2	190	45				
13	3	252	58				
11	4	304	69				
16	5	350	85				
5	6	395	90				
13	7	188	103				
2	8	190	105				
13	9	203	118				
7	10	210	125				
3	11	213	128				
7	12	220	135				
4	13	224	139				
6	14	230	145				
3	15	233	148				
3	16	236	151				
2	17	238	153				
2	18	240	155				
6	19	246	161				
5	20	251	166				
4	21	255	170				
1	22	256	171				
4	23	260	175				
4	24	264	179				
1	25	265	180				
4	26	269	184				
4	27	273	188				
3	28	276	191				
2	29	278	193				
5	30	283	198				
	31	283	198				
4	32	287	202				
3	33	290	205				
	34	290	205				
	35	290	205				
		0					

Test started at: 0 m below ground level

Zero Reading: 85 mm

Zero reading = start depth below ground surface



After Design manual for Roads and Bridges, Volume 7 Pavement Design and maintenance, Section 3 Pavement Maintenace Assessment, Part 2 HD29/08

Data compiled by: SB
Data checked by: CP

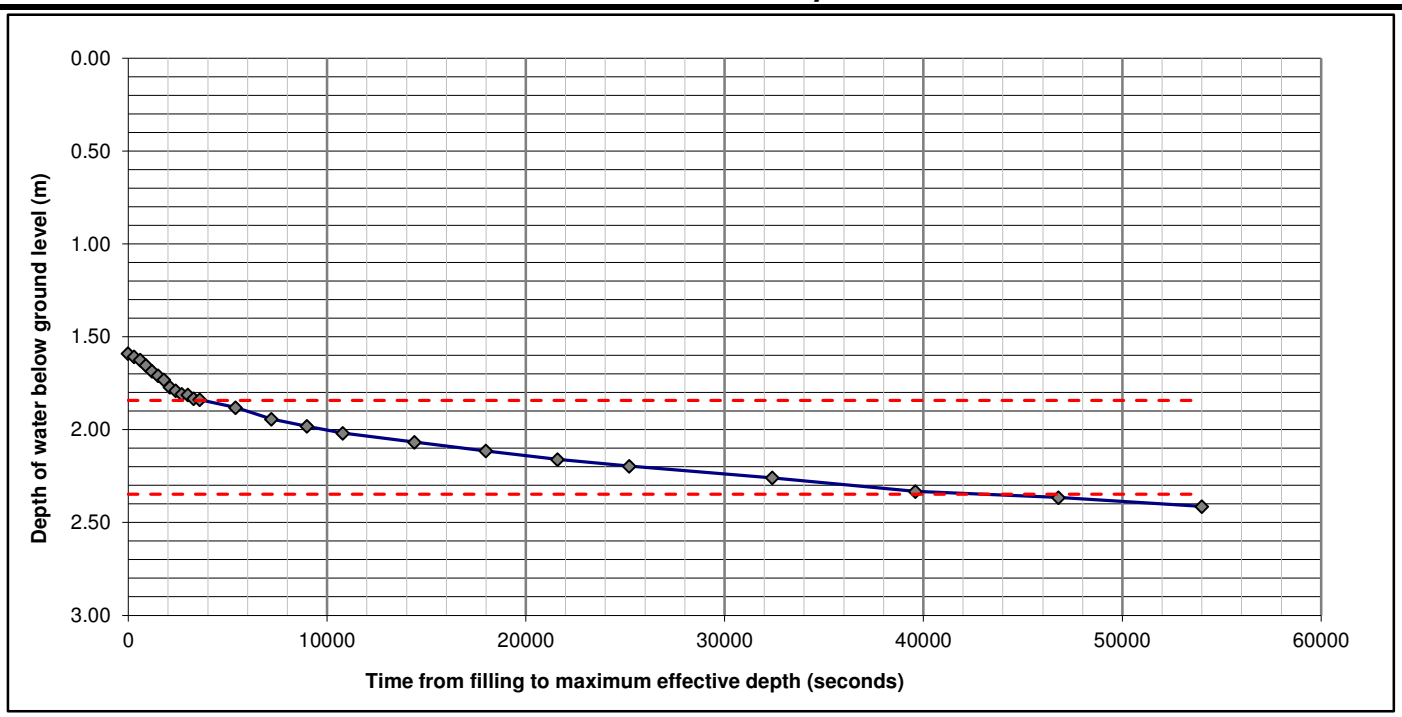
APPENDIX D – SOIL INFILTRATION TEST RESULTS

WYG Environment

Environmental Consultancy
Ground Engineering Services

DATE:	02/06/2020
PROJECT No:	A110489-6-1
PROJECT NAME:	Trinity Fields
CLIENT:	CCBC
TRIAL PIT ID:	SA01
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.00	1.590
300	5.00	1.608
600	10.00	1.624
900	15.00	1.654
1200	20.00	1.685
1500	25.00	1.708
1800	30.00	1.732
2100	35.00	1.772
2400	40.00	1.790
2700	45.00	1.809
3000	50.00	1.813
3300	55.00	1.834
3600	60.00	1.839
5400	90.00	1.881
7200	120.00	1.943
9000	150.00	1.982
10800	180.00	2.019
14400	240.00	2.067
18000	300.00	2.115
21600	360.00	2.160
25200	420.00	2.197
32400	540.00	2.260
39600	660.00	2.333
46800	780.00	2.365
54000	900.00	2.413

PIT LENGTH (m):	2.10	**Pit construction**
PIT WIDTH (m):	0.60	
PIT DEPTH (m):	2.60	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	1.27
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.64
Effective depth of Pit	(m)	1.01
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	1.27
Level of water in pit at 75% effective depth (p_{75})	(m)	0.25
Level of water in pit at 25% effective depth (p_{25})	(m)	0.76
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.64
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	3.99
Time at 75% effective depth (p_{75})	(s)	3751
Time at 25% effective depth (p_{25})	(s)	42896
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	39145

OUTPUT:			
SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**4.08E-06**

WATER INPUT:	1000	in	L

GEOLOGY OF TEST SECTION:

Glaciofouvial Deposits comprising gravelly clayey SAND or sandy gravelly CLAY.

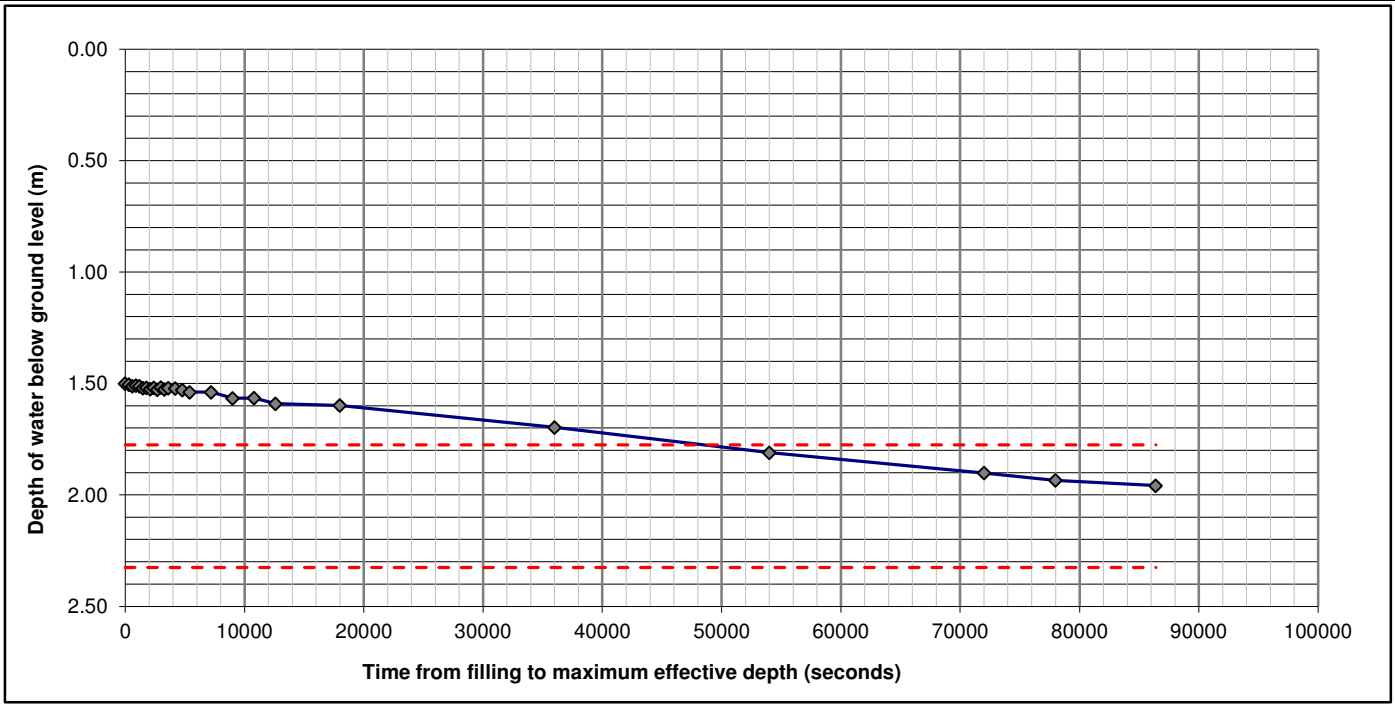
Compiled by:	SB
Checked by:	KW

WYG Environment

Environmental Consultancy
Ground Engineering Services

DATE:	03/06/2020
PROJECT No:	A110489-6-1
PROJECT NAME:	Trinity Fields
CLIENT:	CCBC
TRIAL PIT ID:	SA01
TEST NUMBER:	2

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.00	1.500
300	5.00	1.505
600	10.00	1.512
900	15.00	1.509
1200	20.00	1.512
1500	25.00	1.520
1800	30.00	1.519
2100	35.00	1.525
2400	40.00	1.519
2700	45.00	1.527
3000	50.00	1.517
3300	55.00	1.526
3600	60.00	1.521
4200	70.00	1.522
4800	80.00	1.529
5400	90.00	1.539
7200	120.00	1.539
9000	150.00	1.566
10800	180.00	1.565
12600	210.00	1.590
18000	300.00	1.598
36000	600.00	1.696
54000	900.00	1.810
72000	1200.00	1.901
78000	1300.00	1.934
86400	1440.00	1.958

PIT LENGTH (m):	2.10	**Pit construction**
PIT WIDTH (m):	0.60	
PIT DEPTH (m):	2.60	

INPUT PARAMETERS:

Total volume of pit	(m^3)	1.39
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.69
Effective depth of Pit	(m)	1.10
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	1.39
Level of water in pit at 75% effective depth (p_{75})	(m)	0.28
Level of water in pit at 25% effective depth (p_{25})	(m)	0.83
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.69
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	4.23
Time at 75% effective depth (p_{75})	(s)	48455
Time at 25% effective depth (p_{25})	(s)	#N/A
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	#N/A

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**#N/A**

WATER INPUT:	1000	in	L

GEOLOGY OF TEST SECTION:

Glaciofouvial Deposits comprising gravelly clayey SAND or sandy gravelly CLAY.

Compiled by: SB
Checked by: KW

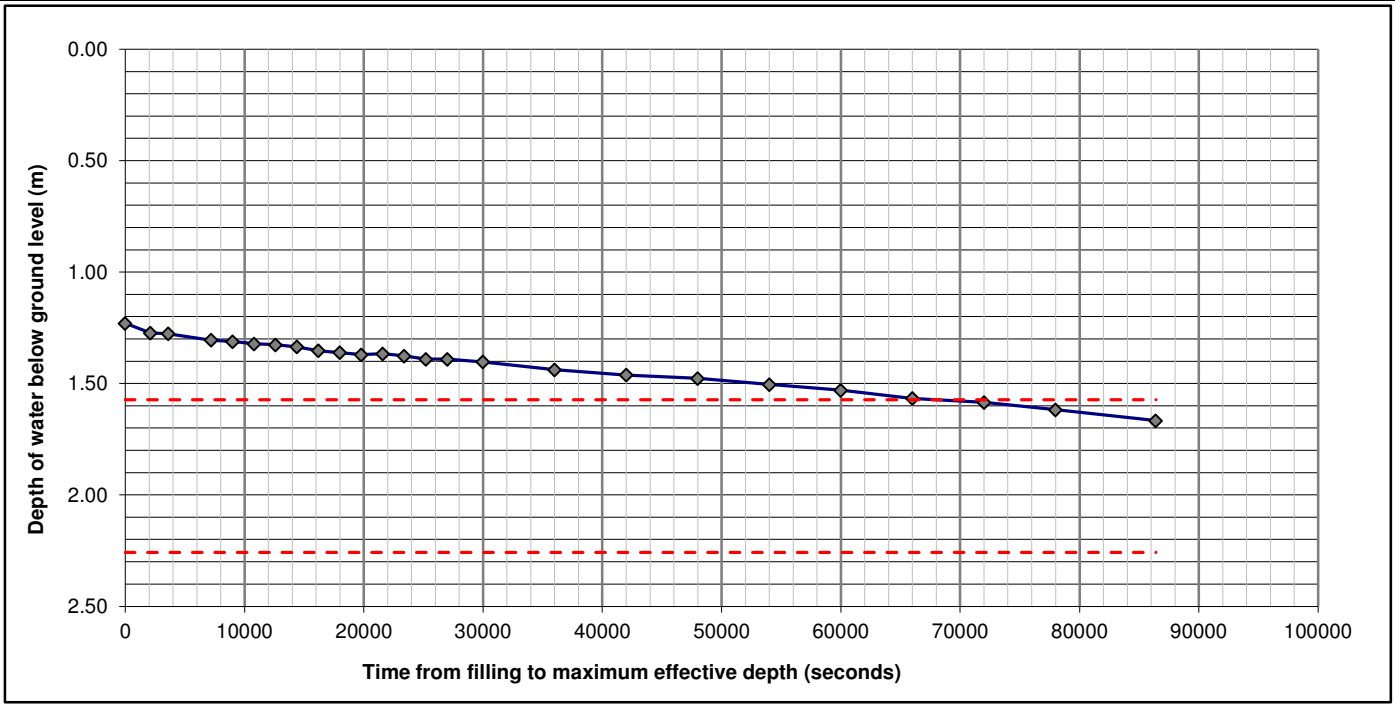
After BRE Digest 365, Soakaway Design, 2016

WYG Environment

Environmental Consultancy
Ground Engineering Services

DATE:	04/06/2020
PROJECT No:	A110489-6-1
PROJECT NAME:	Trinity Fields
CLIENT:	CCBC
TRIAL PIT ID:	SA01
TEST NUMBER:	3

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.00	1.230
2100	35.00	1.273
3600	60.00	1.276
7200	120.00	1.305
9000	150.00	1.312
10800	180.00	1.322
12600	210.00	1.326
14400	240.00	1.336
16200	270.00	1.353
18000	300.00	1.361
19800	330.00	1.371
21600	360.00	1.367
23400	390.00	1.376
25200	420.00	1.391
27000	450.00	1.391
30000	500.00	1.403
36000	600.00	1.438
42000	700.00	1.462
48000	800.00	1.477
54000	900.00	1.505
60000	1000.00	1.530
66000	1100.00	1.567
72000	1200.00	1.584
78000	1300.00	1.617
86400	1440.00	1.666

PIT LENGTH (m):	2.10	**Pit construction**
PIT WIDTH (m):	0.60	
PIT DEPTH (m):	2.60	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	1.73
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.86
Effective depth of Pit	(m)	1.37
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	1.73
Level of water in pit at 75% effective depth (p_{75})	(m)	0.34
Level of water in pit at 25% effective depth (p_{25})	(m)	1.03
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.86
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	4.96
Time at 75% effective depth (p_{75})	(s)	67961
Time at 25% effective depth (p_{25})	(s)	#N/A
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	#N/A

OUTPUT:

SOIL INFILTRATION RATE (f) $\frac{V_{p75\text{-}25}}{A_{p50} \times T_{p75\text{-}25}}$ (m/s) **#N/A**

WATER INPUT: 1000 in L

GEOLOGY OF TEST SECTION:

Glaciofouvial Deposits comprising gravelly clayey SAND or sandy gravelly CLAY.

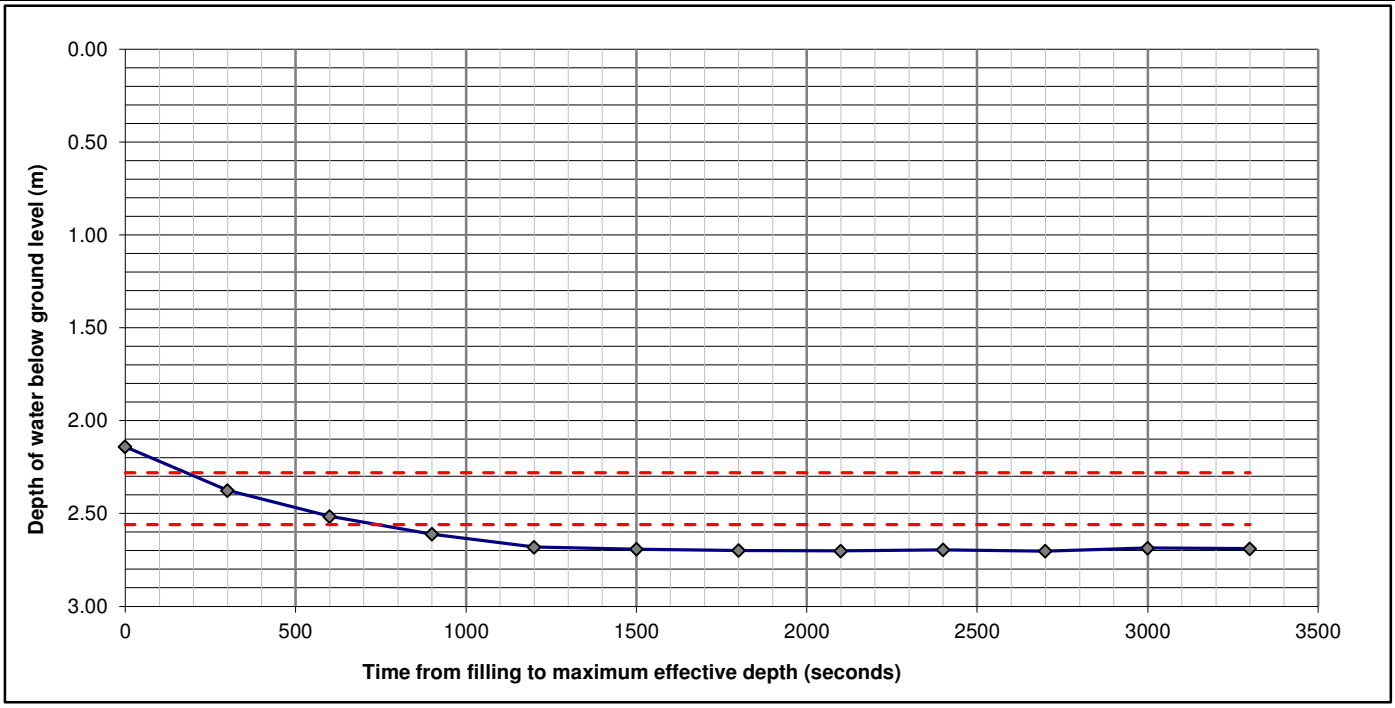
Compiled by: SB
Checked by:

WYG Environment

Environmental Consultancy
Ground Engineering Services

DATE:	03/06/2020
PROJECT No:	A110489-6-1
PROJECT NAME:	Trinity Fields
CLIENT:	CCBC
TRIAL PIT ID:	SA02
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.00	2.140
300	5.00	2.376
600	10.00	2.515
900	15.00	2.611
1200	20.00	2.681
1500	25.00	2.692
1800	30.00	2.699
2100	35.00	2.702
2400	40.00	2.696
2700	45.00	2.702
3000	50.00	2.686
3300	55.00	2.690

PIT LENGTH (m):	2.20	**Pit construction**
PIT WIDTH (m):	0.60	
PIT DEPTH (m):	2.70	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.74
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.37
Effective depth of Pit	(m)	0.56
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.74
Level of water in pit at 75% effective depth (p_{75})	(m)	0.14
Level of water in pit at 25% effective depth (p_{25})	(m)	0.42
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.37
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	2.89
Time at 75% effective depth (p_{75})	(s)	178
Time at 25% effective depth (p_{25})	(s)	740
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	562

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**2.28E-04**

WATER INPUT: 900 in L

GEOLOGY OF TEST SECTION:

Glaciofouvial Deposits comprising gravelly clayey GRAVEL or gravelly CLAY.

Compiled by: SB
Checked by: KW

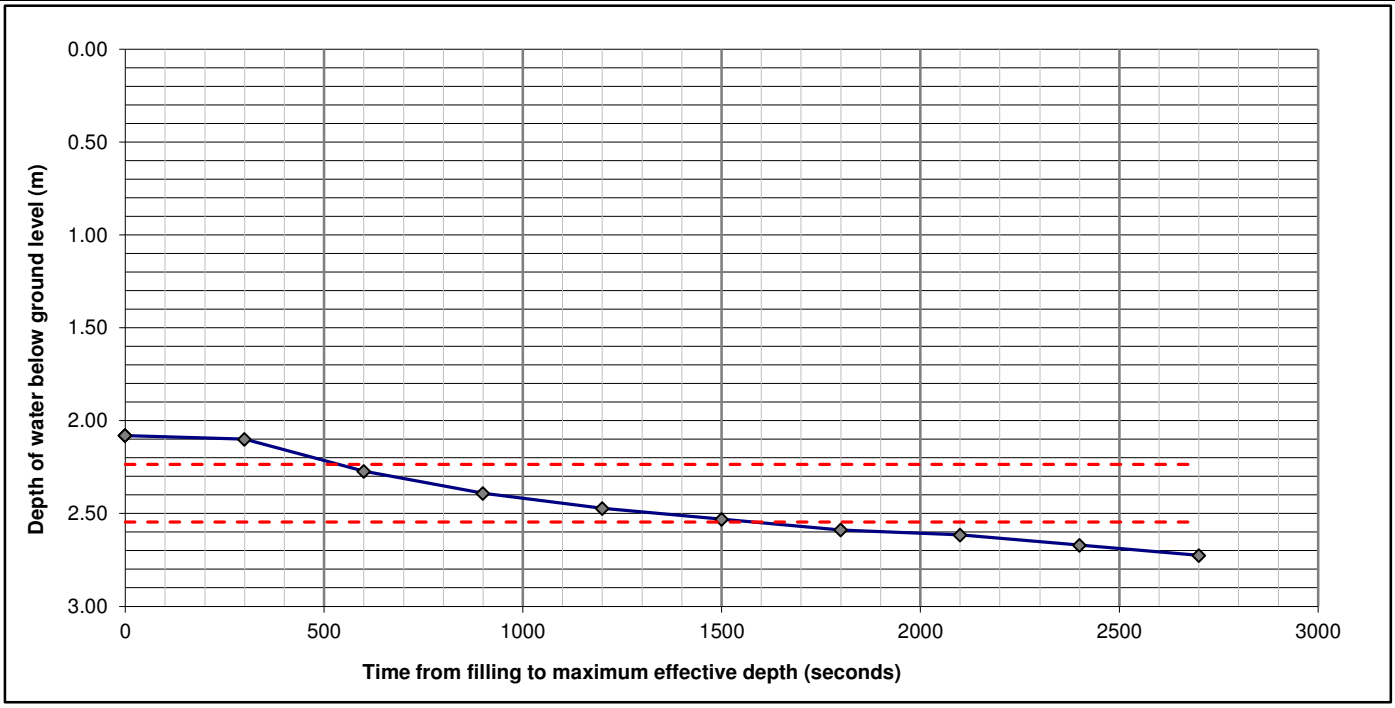
After BRE Digest 365, Soakaway Design, 2016

WYG Environment

Environmental Consultancy
Ground Engineering Services

DATE:	03/06/2020
PROJECT No:	A110489-6-1
PROJECT NAME:	Trinity Fields
CLIENT:	CCBC
TRIAL PIT ID:	SA02
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.00	2.080
	0.00	2.080
300	5.00	2.100
600	10.00	2.273
900	15.00	2.391
1200	20.00	2.472
1500	25.00	2.531
1800	30.00	2.589
2100	35.00	2.616
2400	40.00	2.670
2700	45.00	2.725

PIT LENGTH (m):	2.20	**Pit construction**
PIT WIDTH (m):	0.60	
PIT DEPTH (m):	2.70	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.82
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.41
Effective depth of Pit	(m)	0.62
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.82
Level of water in pit at 75% effective depth (p_{75})	(m)	0.16
Level of water in pit at 25% effective depth (p_{25})	(m)	0.47
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.41
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	3.06
Time at 75% effective depth (p_{75})	(s)	534
Time at 25% effective depth (p_{25})	(s)	1575
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	1040

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.29E-04**

WATER INPUT:	900	in	L

GEOLOGY OF TEST SECTION:

Glaciofouvial Deposits comprising gravelly clayey GRAVEL or gravelly CLAY.

Compiled by: SB
Checked by:

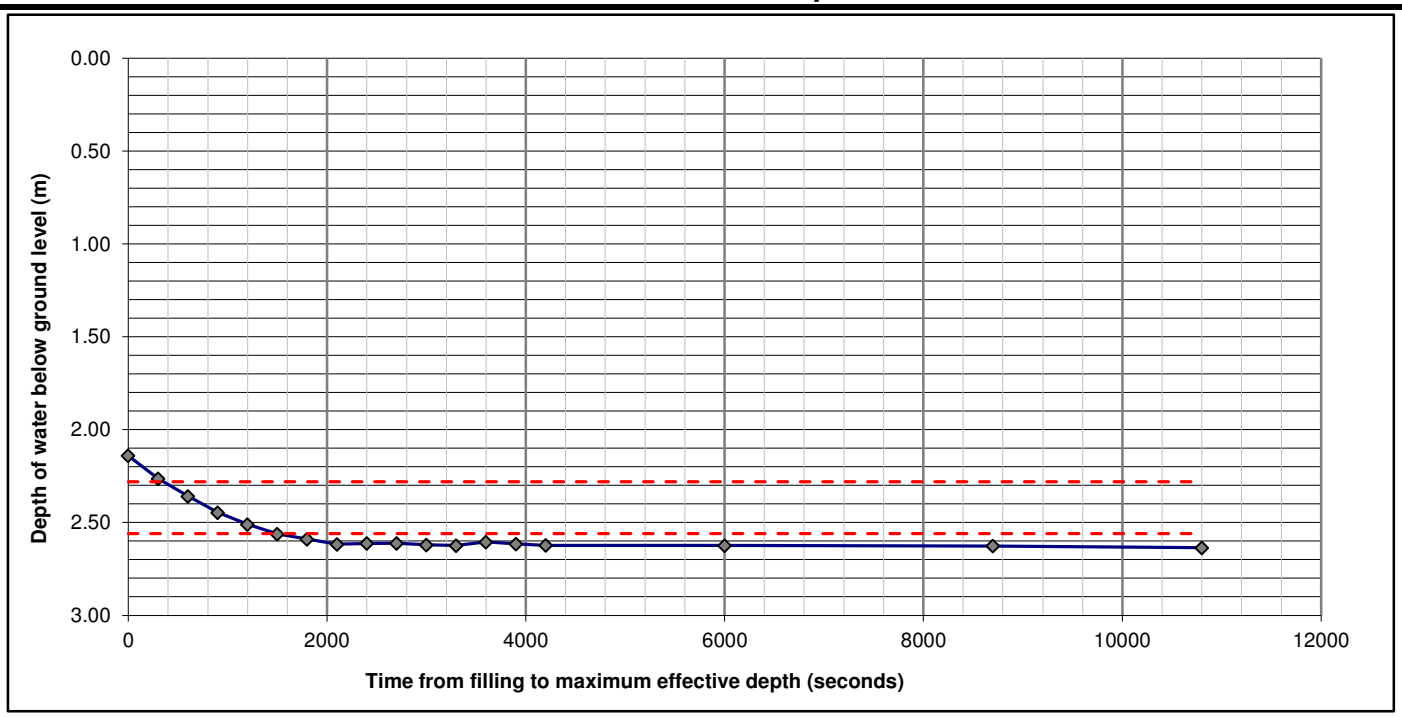
After BRE Digest 365, Soakaway Design, 2016

WYG Environment

Environmental Consultancy
Ground Engineering Services

DATE:	03/06/2020
PROJECT No:	A110489-6-1
PROJECT NAME:	Trinity Fields
CLIENT:	CCBC
TRIAL PIT ID:	SA02
TEST NUMBER:	1

SOAKAWAY TEST - SOIL INFILTRATION RATE/PERMEABILITY CALCULATION



Time Elapsed (s)	Time Elapsed (mins)	Distance to water surface from ground level (m)
0	0.00	2.140
300	5.00	2.264
600	10.00	2.359
900	15.00	2.446
1200	20.00	2.510
1500	25.00	2.562
1800	30.00	2.590
2100	35.00	2.617
2400	40.00	2.613
2700	45.00	2.612
3000	50.00	2.620
3300	55.00	2.623
3600	60.00	2.605
3900	65.00	2.615
4200	70.00	2.623
6000	100.00	2.623
8700	145.00	2.627
10800	180.00	2.636

PIT LENGTH (m):	2.20	**Pit construction**
PIT WIDTH (m):	0.60	
PIT DEPTH (m):	2.70	

INPUT PARAMETERS:		
Total volume of pit	(m^3)	0.74
Pit volume between 75% and 25% depths = L x W x ½D	(m^3)	0.37
Effective depth of Pit	(m)	0.56
Proportion of pit volume occupied by gravel solids	(0-1)	0.00
Maximum potential volume of Water	(m^3)	0.74
Level of water in pit at 75% effective depth (p_{75})	(m)	0.14
Level of water in pit at 25% effective depth (p_{25})	(m)	0.42
Effective volume between 75% & 25% depth $Vp_{75\text{-}25}$ = V x Pg	(m^3)	0.37
Surface area of pit up to 50% effective depth (A_{p50})	(m^2)	2.89
Time at 75% effective depth (p_{75})	(s)	352
Time at 25% effective depth (p_{25})	(s)	1490
Time for outflow for 75% and 25% effective depth (Tp75-25)	(s)	1139

OUTPUT:

SOIL INFILTRATION RATE (f)	$\frac{V_{p75-25}}{A_{p50} \times T_{p75-25}}$	(m/s)	**1.12E-04**

WATER INPUT:	1000	in	L

GEOLOGY OF TEST SECTION:

Glaciofouvial Deposits comprising gravelly clayey GRAVEL or gravelly CLAY.

Compiled by: SB
Checked by:

After BRE Digest 365, Soakaway Design, 2016

APPENDIX E – GEOTECHNICAL LABORATORY TEST RESULTS

Laboratory Report

2788

GEO Site & Testing Services Ltd

Contract Number: 48908

Client Ref: **A110489-6-1**
Client PO: **C20/362**

Report Date: **16-07-2020**

Client **WYG Group**
5th Floor
Longcross Court
47 Newport Road
Cardiff
CF24 0AD

Contract Title: **Trinity Fields, Caerphilly**
For the attention of: **Nicholas Bool**

Date Received: **22-06-2020**
Date Completed: **16-07-2020**

Test Description	Qty
Moisture Content BS 1377:1990 - Part 2 : 3.2 - * UKAS	13
4 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.3 & 5.3 - * UKAS	13
PSD Wet Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	17
PSD: Sedimentation by pipette carried out with Wet Sieve (Wet Sieve must also be selected) BS 1377:1990 - Part 2 : 9.4 - * UKAS	5
BRE Suite B Greenfield Site (pyrite present) **includes pH, water & acid soluble sulphate and total sulphur** BRE - BR279 - @ Non Accredited Test	12
BRE Suite D Brownfield Site (pyrite present) **includes pH, water & acid soluble sulphate, total sulphur, magnesium, chloride and nitrate** BRE - BR279 - @ Non Accredited Test	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 (Quality/Technical Manager) - Richard John (Advanced Testing Manager)
Sean Penn (Administrative/Accounts Assistant) - Shaun Jones (Laboratory manager) - Wayne Honey (Administrative/Quality Assistant)

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

Laboratory Report

2788

GEO Site & Testing Services Ltd

Contract Number: 48908

Test Description	Qty
Dry Den/MC (2.5kg Rammer Method 1 Litre Mould) BS 1377:1990 - Part 4 : 3.3 - * UKAS	4
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 (Quality/Technical Manager) - Richard John (Advanced Testing Manager)
Sean Penn (Administrative/Accounts Assistant) - Shaun Jones (Laboratory manager) - Wayne Honey (Administrative/Quality Assistant)

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	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5)	
Contract Number	48908	
Site Name	Trinity Fields, Caerphilly	
Date Tested	07/07/2020	
	DESCRIPTIONS	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Descriptions
BH01	1	B	0.20	-	0.80	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)
BH01	3	B	1.20	-	2.20	Brown silty fine to coarse sandy clayey fine to coarse GRAVEL
BH01	4	B	2.20	-	3.00	Brown fine to coarse gravelly sandy clayey SILT
BH02	2	B	1.20	-	2.00	Brown fine to coarse sandy silty/clayey fine to coarse GRAVEL (with cobbles)
BH03	4	B	3.20	-	3.65	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)
BH04	1	B	0.20	-	0.80	Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL
BH04	3	B	1.20	-	1.70	Brown silty clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)
BH04	4	B	1.70	-	2.70	Brown fine to coarse sandy silty/clayey fine to coarse GRAVEL (with cobbles)
BH05	1	B	0.30	-	0.80	Brown slightly sandy silty clayey fine to coarse GRAVEL
BH05	3	B	1.20	-	2.20	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL
BH05	4	B	2.20	-	3.20	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)
BH05A	1	B	0.20	-	1.20	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)
BH05A	4	B	3.00	-	3.70	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		
				-		

Operators	Checked	16/07/2020	Wayne Honey (Administrative/Quality Assistant)
Clayton Jenkins	Approved	16/07/2020	Paul Evans (Quality/Technical Manager)

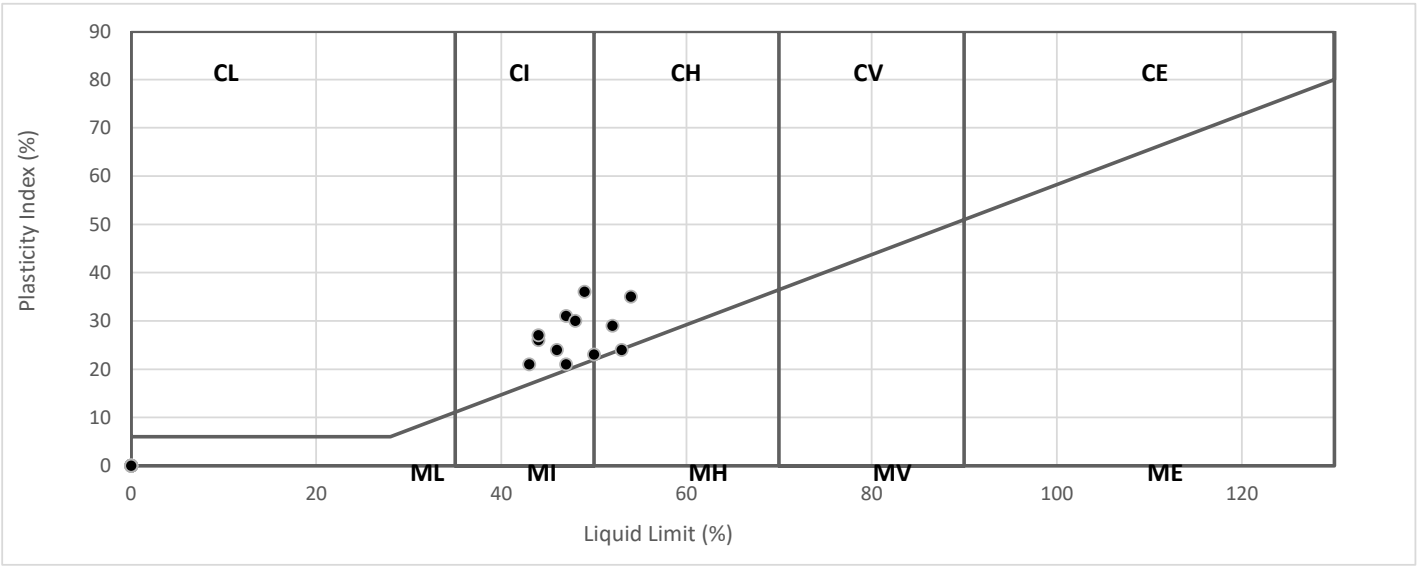
UKAS TESTING
2788

GSTL	NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX (BS 1377 : Part 2 : 1990 Method 5)	
Contract Number	**48908**	
Project Location	**Trinity Fields, Caerphilly**	
Date Tested	**07/07/2020**	

Sample/Hole Reference	Sample Number	Sample Type	Depth (m)			Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity index %	Passing 0.425mm %	Remarks
BH01	1	B	0.20	-	0.80	39	52	23	29	15	CH High Plasticity
BH01	3	B	1.20	-	2.20	11	43	22	21	53	CI Intermediate Plasticity
BH01	4	B	2.20	-	3.00	45	53	29	24	38	MH High Plasticity
BH02	2	B	1.20	-	2.00	26	47	16	31	22	CI Intermediate Plasticity
BH03	4	B	3.20	-	3.65	27	49	13	36	22	CI Intermediate Plasticity
BH04	1	B	0.20	-	0.80	13		NP		9	
BH04	3	B	1.20	-	1.70	32	47	26	21	29	CI Intermediate Plasticity
BH04	4	B	1.70	-	2.70	37	50	27	23	47	CI/H Inter/High Plasticity
BH05	1	B	0.30	-	0.80	35	48	18	30	31	CI Intermediate Plasticity
BH05	3	B	1.20	-	2.20	29	54	19	35	23	CH High Plasticity
BH05	4	B	2.20	-	3.20	25	44	18	26	26	CI Intermediate Plasticity
BH05A	1	B	0.20	-	1.20	30	46	22	24	28	CI Intermediate Plasticity
BH05A	4	B	3.00	-	3.70	28	44	17	27	33	CI Intermediate Plasticity
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							
				-							

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

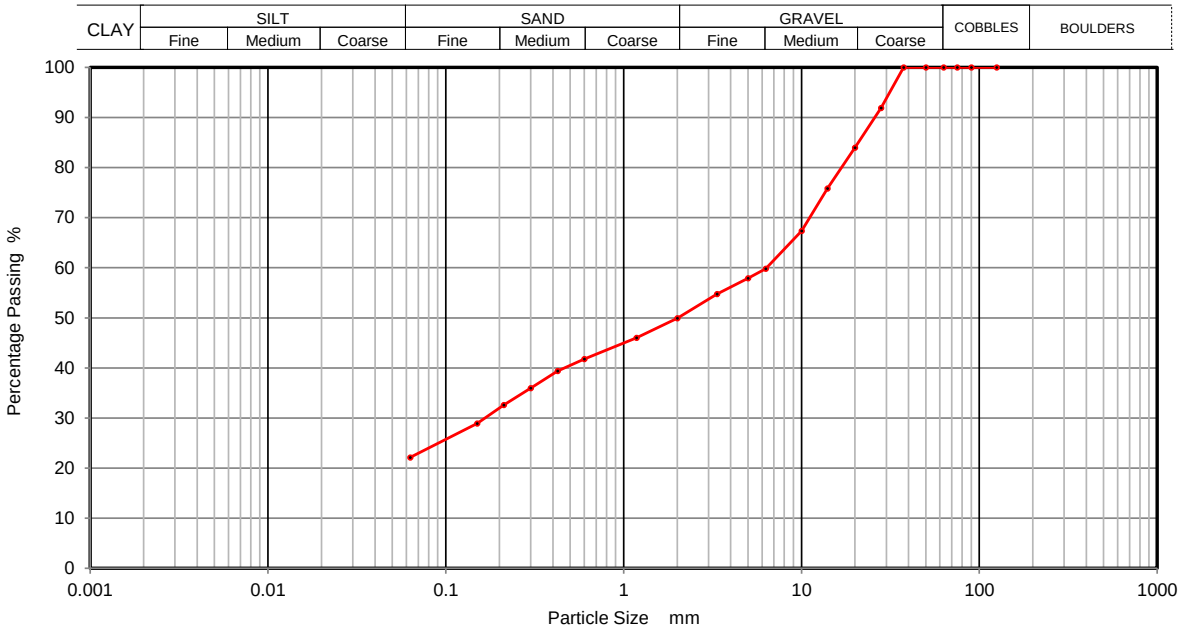
PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION
BS 5930:1999+A2:2010



Operators	Checked	16/07/2020	Wayne Honey (Administrative/Quality Assistant)
Clayton Jenkins	Approved	16/07/2020	Paul Evans (Quality/Technical Manager)

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH01
Site Name	Trinity Fields, Caerphilly	Sample No.	2
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	0.80
		Depth Base	1.20
Date Tested	14/07/2020	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	100		
28	92		
20	84		
14	76		
10	67		
6.3	60		
5	58		
3.35	55		
2	50		
1.18	46		
0.6	42		
0.425	39		
0.3	36		
0.212	33		
0.15	29		
0.063	22		

Sample Proportions	% dry mass
Cobbles	0
Gravel	50
Sand	28
Silt and Clay	22

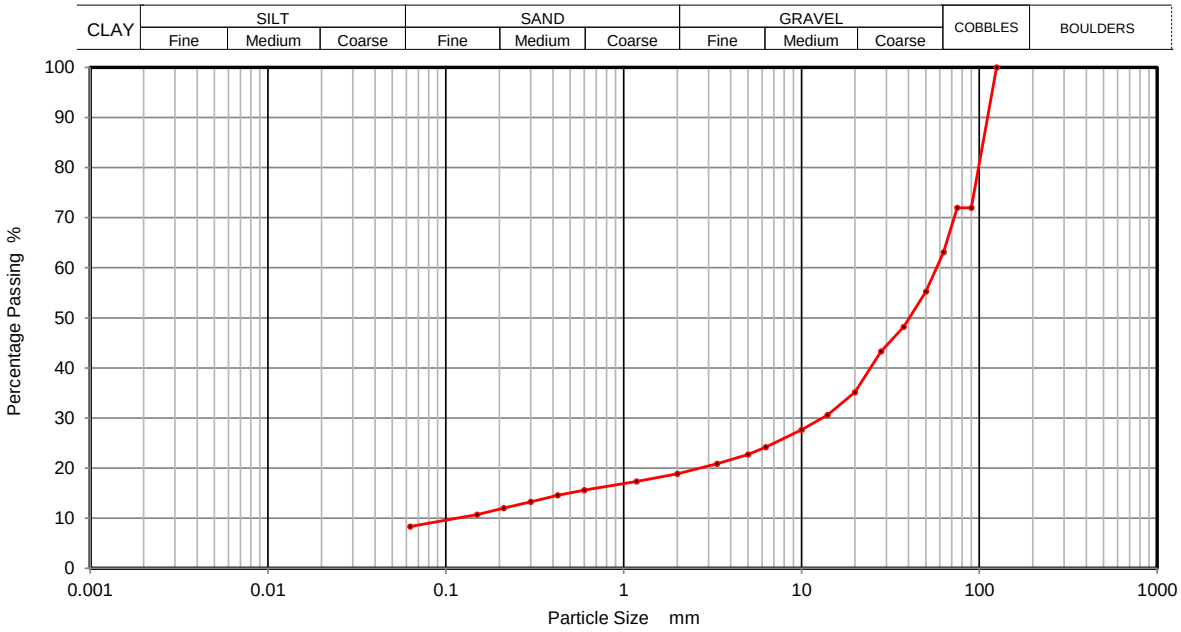
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH01
Site Name	Trinity Fields, Caerphilly	Sample No.	1
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	0.20
		Depth Base	0.80
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	72		
75	72		
63	63		
50	55		
37.5	48		
28	43		
20	35		
14	31		
10	28		
6.3	24		
5	23		
3.35	21		
2	19		
1.18	17		
0.6	16		
0.425	15		
0.3	13		
0.212	12		
0.15	11		
0.063	8		

Sample Proportions	% dry mass
Cobbles	37
Gravel	44
Sand	11
Silt and Clay	8

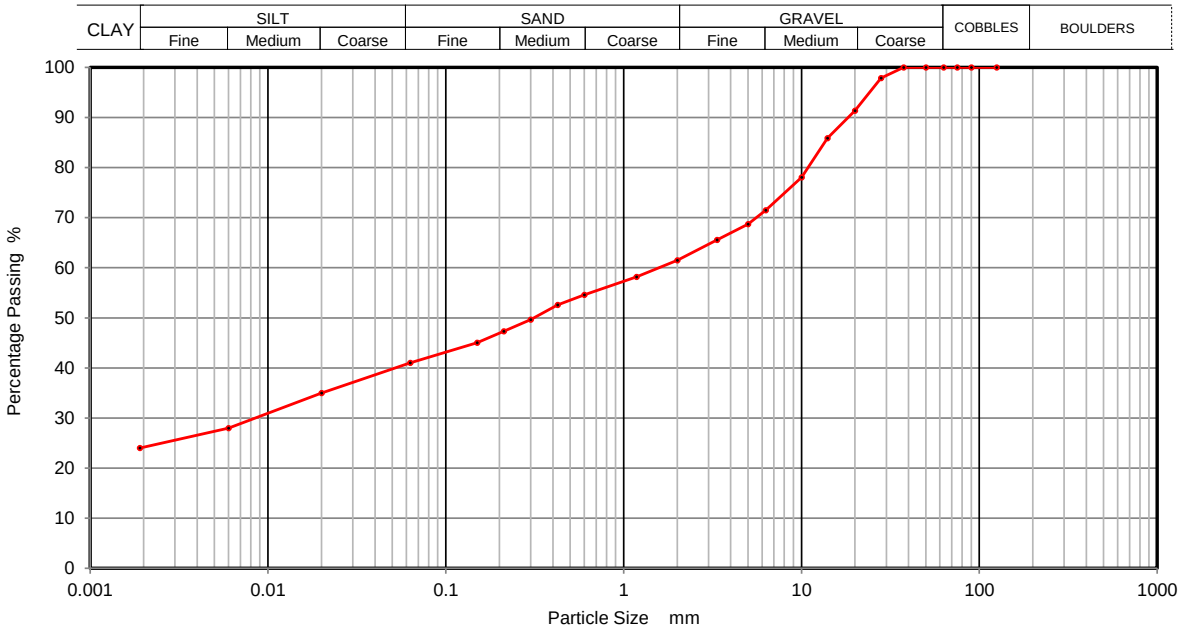
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	48908
		Borehole/Pit No.	BH01
Site Name	Trinity Fields, Caerphilly	Sample No.	3
Soil Description	Brown silty fine to coarse sandy clayey fine to coarse GRAVEL	Depth Top	1.20
		Depth Base	2.00
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	35
90	100	0.0060	28
75	100	0.0020	24
63	100		
50	100		
37.5	100		
28	98		
20	91		
14	86		
10	78		
6.3	71		
5	69		
3.35	66		
2	61		
1.18	58		
0.6	55		
0.425	53		
0.3	50		
0.212	47		
0.15	45		
0.063	41		

Sample Proportions	% dry mass
Cobbles	0
Gravel	39
Sand	20
Silt	17
Clay	24

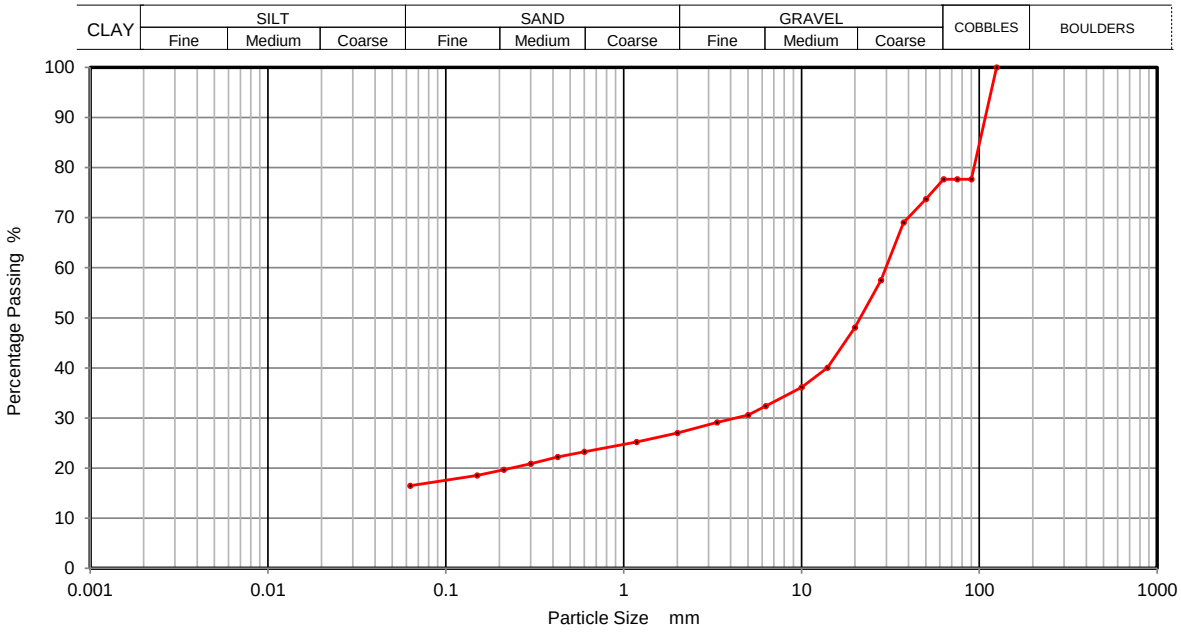
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH02
Site Name	Trinity Fields, Caerphilly	Sample No.	3
Soil Description	Brown fine to coarse sandy silty/clayey fine to coarse GRAVEL (with cobbles)	Depth Top	1.20
		Depth Base	2.20
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	78		
75	78		
63	78		
50	74		
37.5	69		
28	58		
20	48		
14	40		
10	36		
6.3	32		
5	31		
3.35	29		
2	27		
1.18	25		
0.6	23		
0.425	22		
0.3	21		
0.212	20		
0.15	19		
0.063	16		

Sample Proportions	% dry mass
Cobbles	22
Gravel	51
Sand	11
Silt and Clay	16

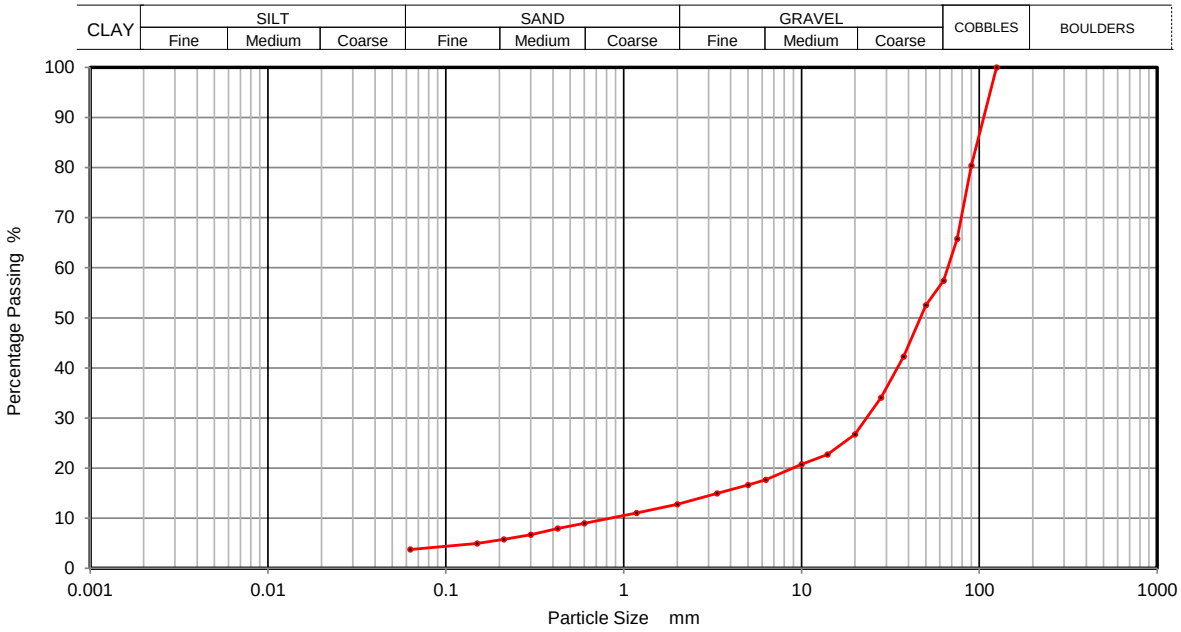
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH03
Site Name	Trinity Fields, Caerphilly	Sample No.	1
Soil Description	Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	0.20
		Depth Base	0.80
Date Tested	14/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	80		
75	66		
63	57		
50	53		
37.5	42		
28	34		
20	27		
14	23		
10	21		
6.3	18		
5	17		
3.35	15		
2	13		
1.18	11		
0.6	9		
0.425	8		
0.3	7		
0.212	6		
0.15	5		
0.063	4		

Sample Proportions	% dry mass
Cobbles	43
Gravel	44
Sand	9
Silt and Clay	4

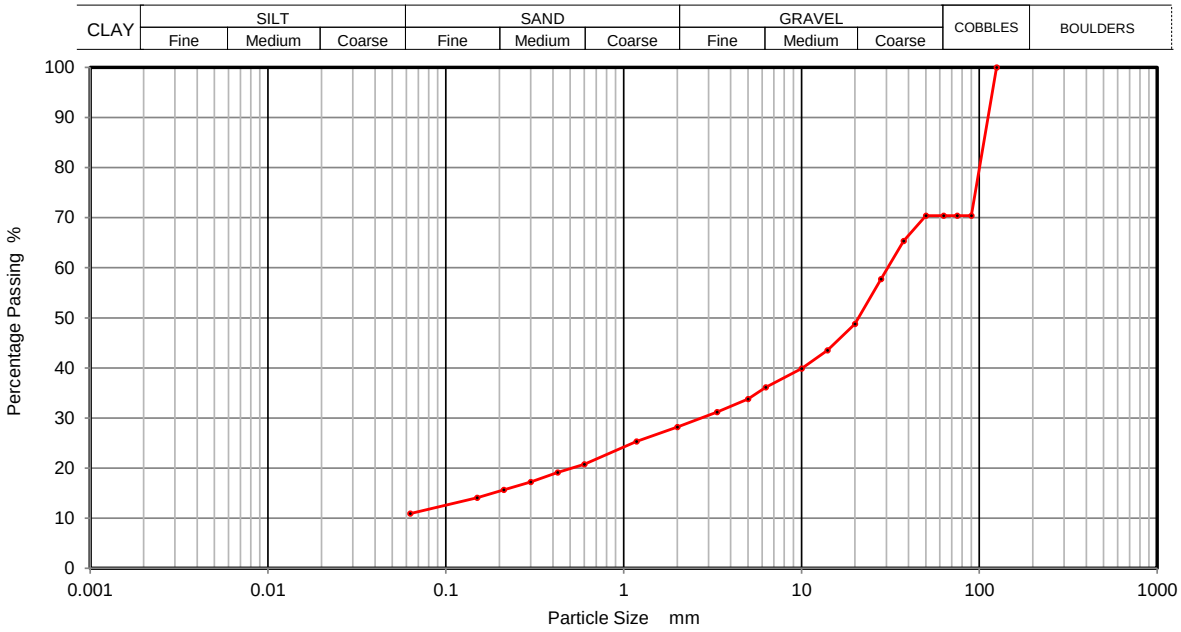
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH03
Site Name	Trinity Fields, Caerphilly	Sample No.	2
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	1.20
		Depth Base	1.65
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	70		
75	70		
63	70		
50	70		
37.5	65		
28	58		
20	49		
14	44		
10	40		
6.3	36		
5	34		
3.35	31		
2	28		
1.18	25		
0.6	21		
0.425	19		
0.3	17		
0.212	16		
0.15	14		
0.063	11		

Sample Proportions	% dry mass
Cobbles	30
Gravel	42
Sand	17
Silt and Clay	11

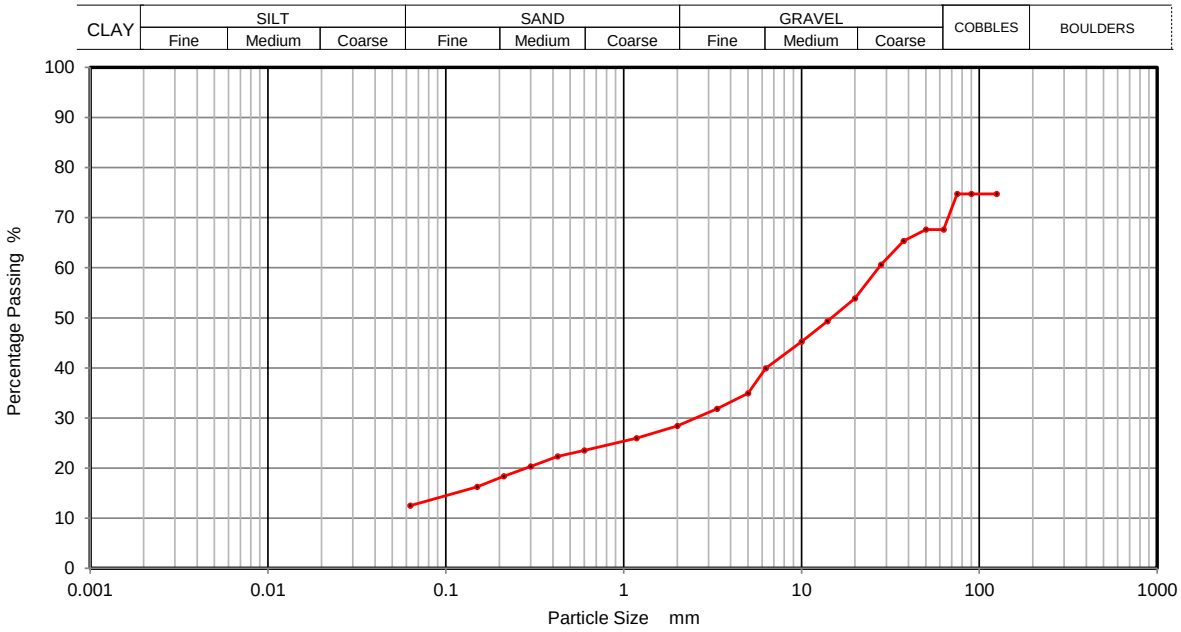
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH03
Site Name	Trinity Fields, Caerphilly	Sample No.	4
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	3.20
		Depth Base	3.65
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	75		
90	75		
75	75		
63	68		
50	68		
37.5	65		
28	61		
20	54		
14	49		
10	45		
6.3	40		
5	35		
3.35	32		
2	28		
1.18	26		
0.6	24		
0.425	22		
0.3	20		
0.212	18		
0.15	16		
0.063	12		

Sample Proportions	% dry mass
Cobbles	32
Gravel	40
Sand	16
Silt and Clay	12

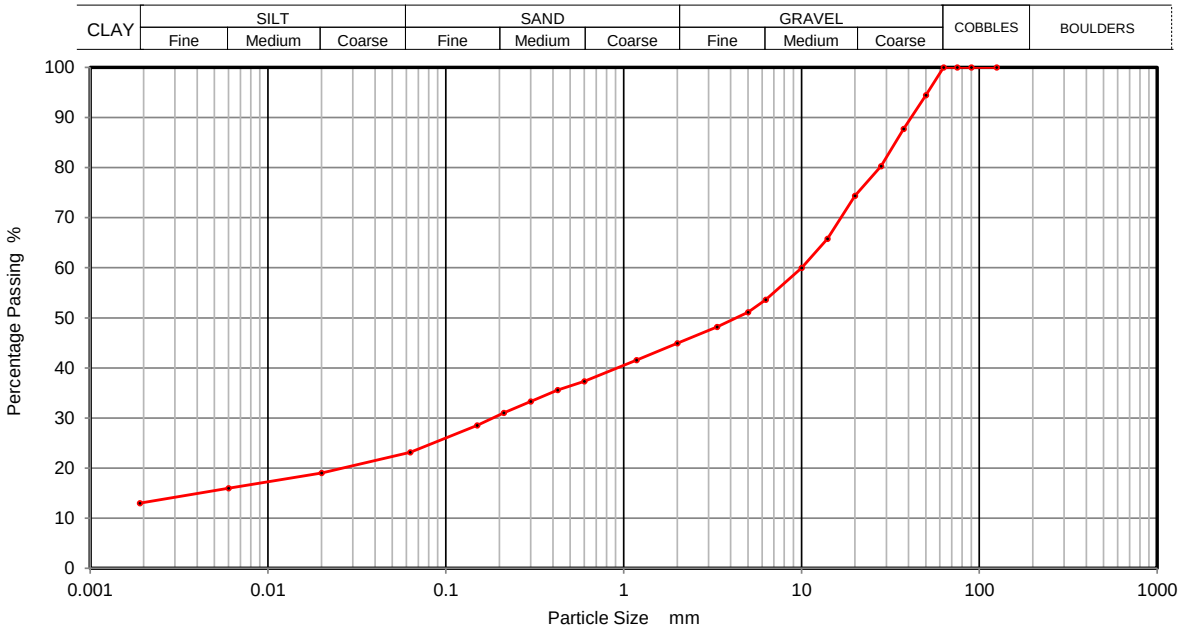
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	48908
		Borehole/Pit No.	BH03
Site Name	Trinity Fields, Caerphilly	Sample No.	6
Soil Description	Brown silty clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	4.20
		Depth Base	4.60
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	19
90	100	0.0060	16
75	100	0.0020	13
63	100		
50	94		
37.5	88		
28	80		
20	74		
14	66		
10	60		
6.3	54		
5	51		
3.35	48		
2	45		
1.18	42		
0.6	37		
0.425	36		
0.3	33		
0.212	31		
0.15	29		
0.063	23		

Sample Proportions	% dry mass
Cobbles	0
Gravel	55
Sand	22
Silt	10
Clay	13

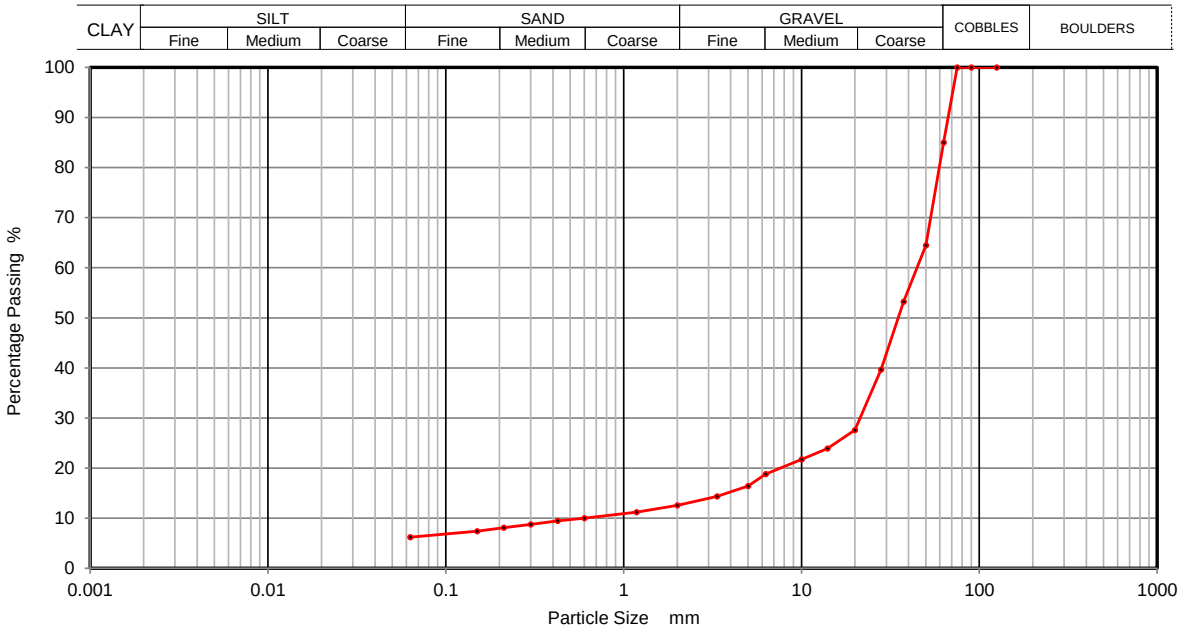
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH04
Site Name	Trinity Fields, Caerphilly	Sample No.	1
Soil Description	Brown slightly clayey/silty fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	0.20
		Depth Base	0.80
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	85		
50	64		
37.5	53		
28	40		
20	28		
14	24		
10	22		
6.3	19		
5	16		
3.35	14		
2	13		
1.18	11		
0.6	10		
0.425	9		
0.3	9		
0.212	8		
0.15	7		
0.063	6		

Sample Proportions	% dry mass
Cobbles	15
Gravel	72
Sand	7
Silt and Clay	6

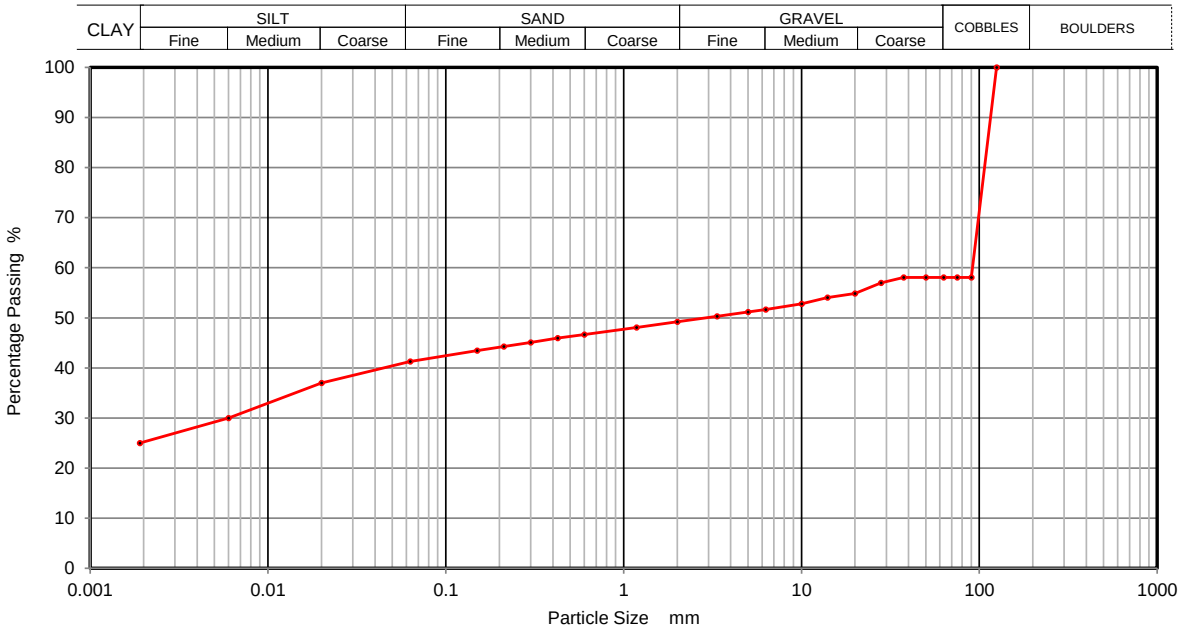
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	48908
		Borehole/Pit No.	BH04
Site Name	Trinity Fields, Caerphilly	Sample No.	4
Soil Description	Brown sandy silty clayey fine to coarse GRAVEL (with cobbles)	Depth Top	1.70
		Depth Base	2.70
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	37
90	58	0.0060	30
75	58	0.0020	25
63	58		
50	58		
37.5	58		
28	57		
20	55		
14	54		
10	53		
6.3	52		
5	51		
3.35	50		
2	49		
1.18	48		
0.6	47		
0.425	46		
0.3	45		
0.212	44		
0.15	43		
0.063	41		

Sample Proportions	% dry mass
Cobbles	42
Gravel	9
Sand	8
Silt	16
Clay	25

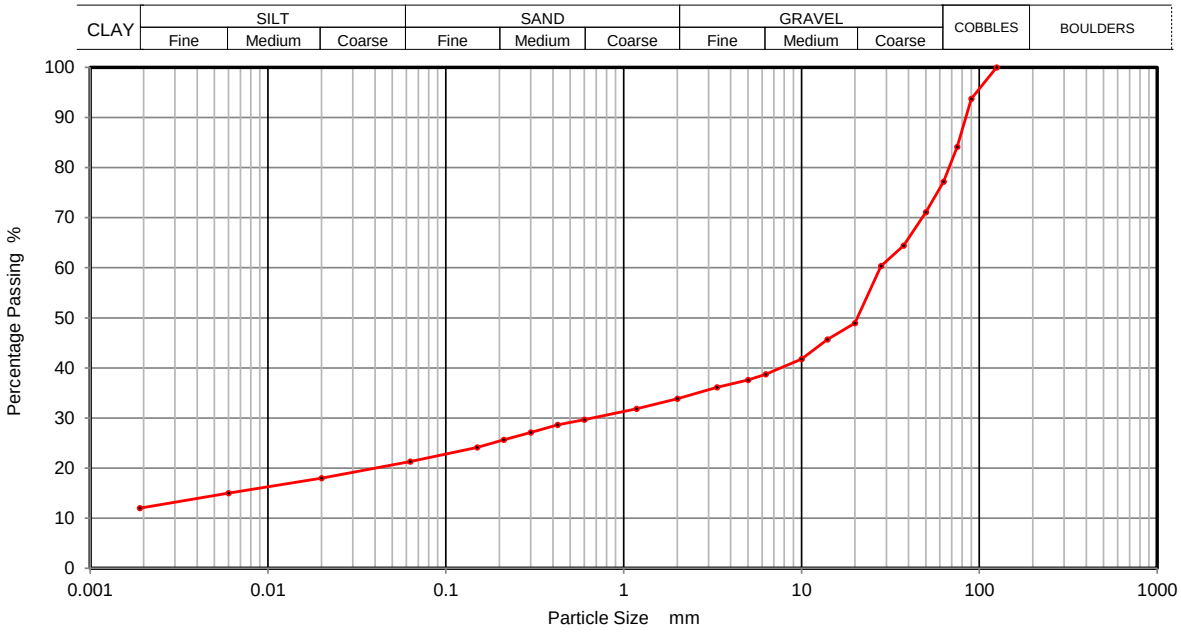
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	48908
		Borehole/Pit No.	BH04
Site Name	Trinity Fields, Caerphilly	Sample No.	3
Soil Description	Brown silty clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	1.20
		Depth Base	1.70
Date Tested	13/07/2020	Sample Type	0



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	18
90	94	0.0060	15
75	84	0.0020	12
63	77		
50	71		
37.5	64		
28	60		
20	49		
14	46		
10	42		
6.3	39		
5	38		
3.35	36		
2	34		
1.18	32		
0.6	30		
0.425	29		
0.3	27		
0.212	26		
0.15	24		
0.063	21		

Sample Proportions	% dry mass
Cobbles	23
Gravel	43
Sand	13
Silt	9
Clay	12

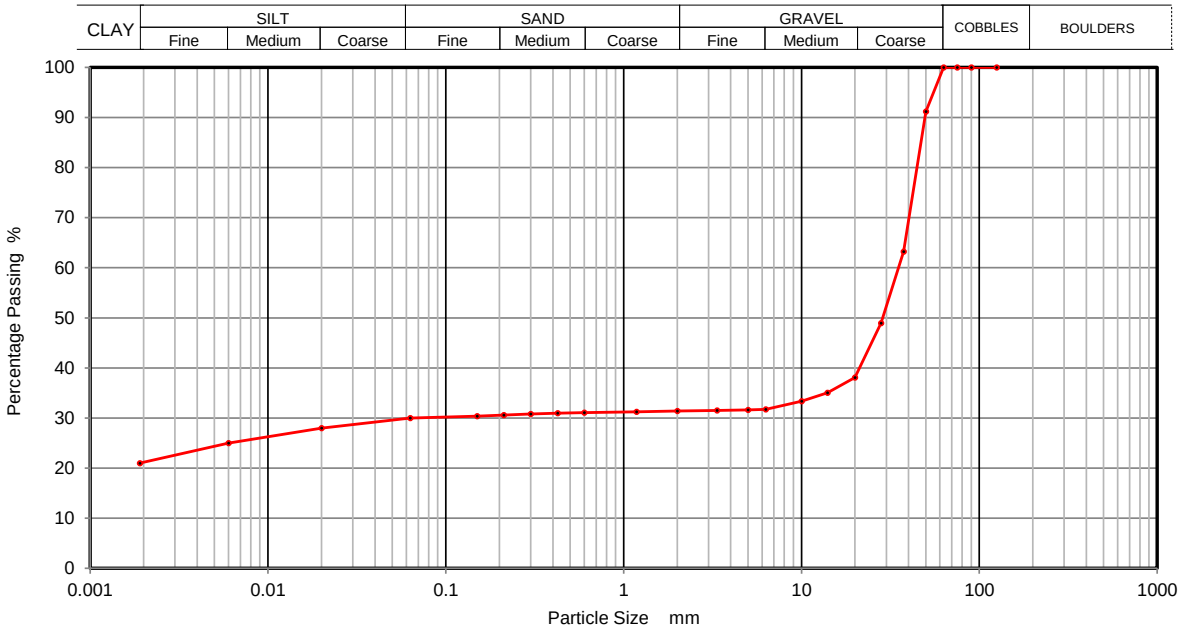
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4	Contract Number	48908
		Borehole/Pit No.	BH05
Site Name	Trinity Fields, Caerphilly	Sample No.	1
Soil Description	Brown slightly sandy silty clayey fine to coarse GRAVEL	Depth Top	0.30
		Depth Base	0.80
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	28
90	100	0.0060	25
75	100	0.0020	21
63	100		
50	91		
37.5	63		
28	49		
20	38		
14	35		
10	33		
6.3	32		
5	32		
3.35	32		
2	31		
1.18	31		
0.6	31		
0.425	31		
0.3	31		
0.212	31		
0.15	30		
0.063	30		

Sample Proportions	% dry mass
Cobbles	0
Gravel	69
Sand	1
Silt	9
Clay	21

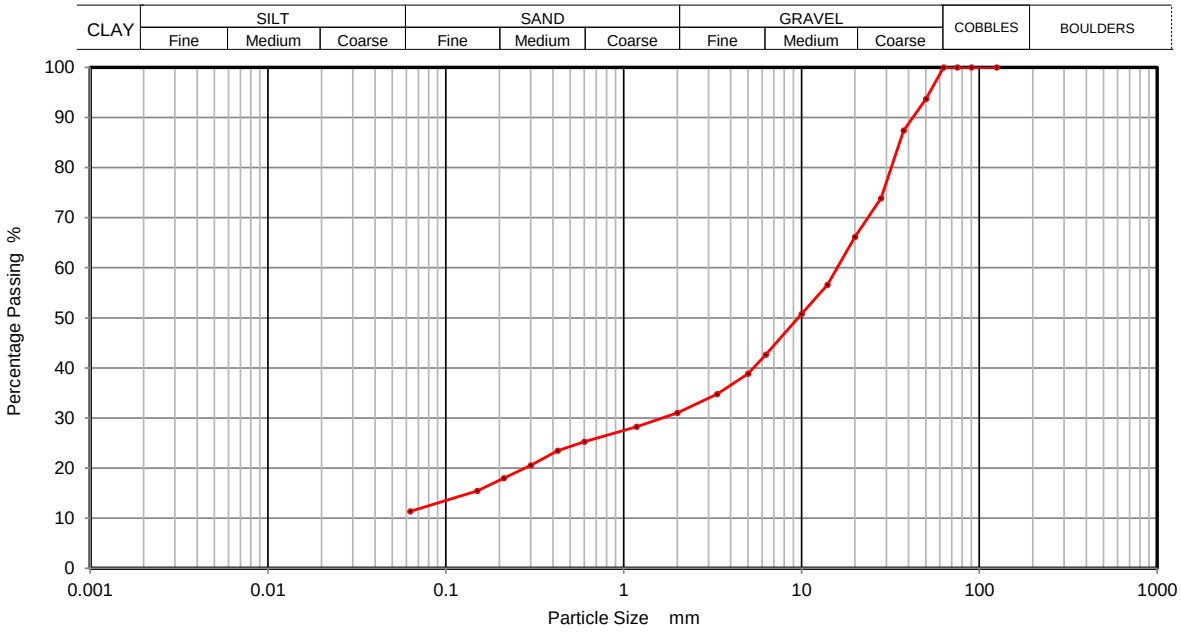
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH05
Site Name	Trinity Fields, Caerphilly	Sample No.	3
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	1.20
		Depth Base	2.20
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	94		
37.5	87		
28	74		
20	66		
14	57		
10	51		
6.3	43		
5	39		
3.35	35		
2	31		
1.18	28		
0.6	25		
0.425	23		
0.3	21		
0.212	18		
0.15	15		
0.063	11		

Sample Proportions	% dry mass
Cobbles	0
Gravel	69
Sand	20
Silt and Clay	11

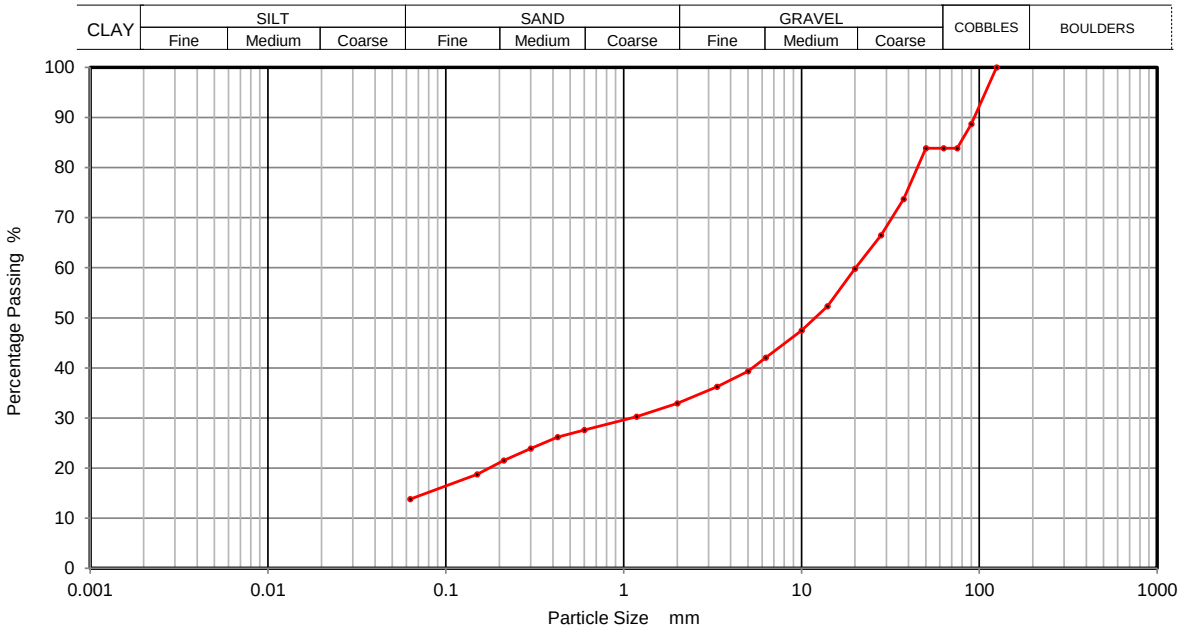
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING 2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH05
Site Name	Trinity Fields, Caerphilly	Sample No.	4
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	2.20
		Depth Base	3.20
Date Tested	14/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	89		
75	84		
63	84		
50	84		
37.5	74		
28	66		
20	60		
14	52		
10	47		
6.3	42		
5	39		
3.35	36		
2	33		
1.18	30		
0.6	28		
0.425	26		
0.3	24		
0.212	22		
0.15	19		
0.063	14		

Sample Proportions	% dry mass
Cobbles	16
Gravel	51
Sand	19
Silt and Clay	14

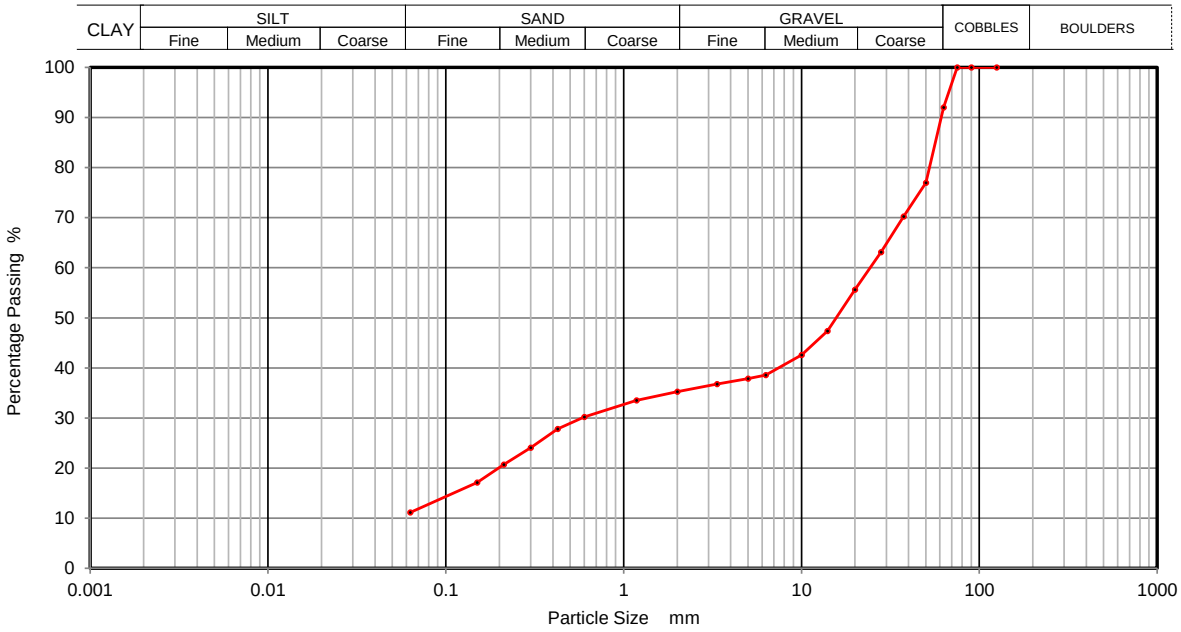
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH05A
Site Name	Trinity Fields, Caerphilly	Sample No.	1
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	0.20
		Depth Base	1.20
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	92		
50	77		
37.5	70		
28	63		
20	56		
14	47		
10	43		
6.3	39		
5	38		
3.35	37		
2	35		
1.18	34		
0.6	30		
0.425	28		
0.3	24		
0.212	21		
0.15	17		
0.063	11		

Sample Proportions	% dry mass
Cobbles	8
Gravel	57
Sand	24
Silt and Clay	11

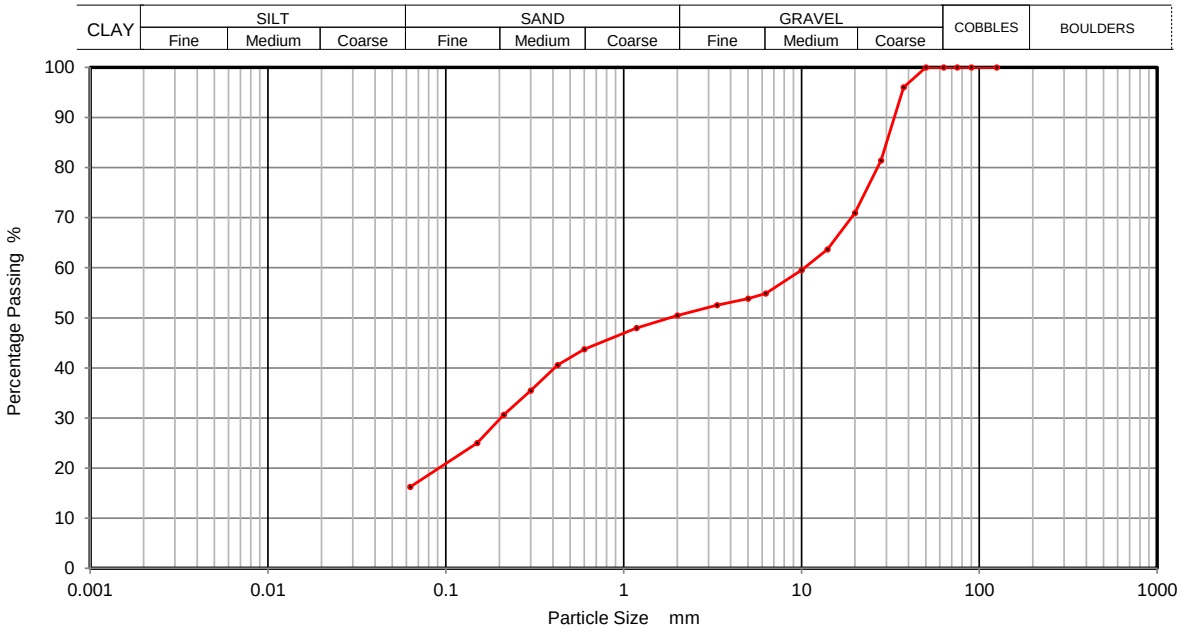
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH05A
Site Name	Trinity Fields, Caerphilly	Sample No.	2
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL	Depth Top	1.20
		Depth Base	2.20
Date Tested	13/07/2020	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	96		
28	81		
20	71		
14	64		
10	60		
6.3	55		
5	54		
3.35	53		
2	50		
1.18	48		
0.6	44		
0.425	41		
0.3	35		
0.212	31		
0.15	25		
0.063	16		

Sample Proportions	% dry mass
Cobbles	0
Gravel	50
Sand	34
Silt and Clay	16

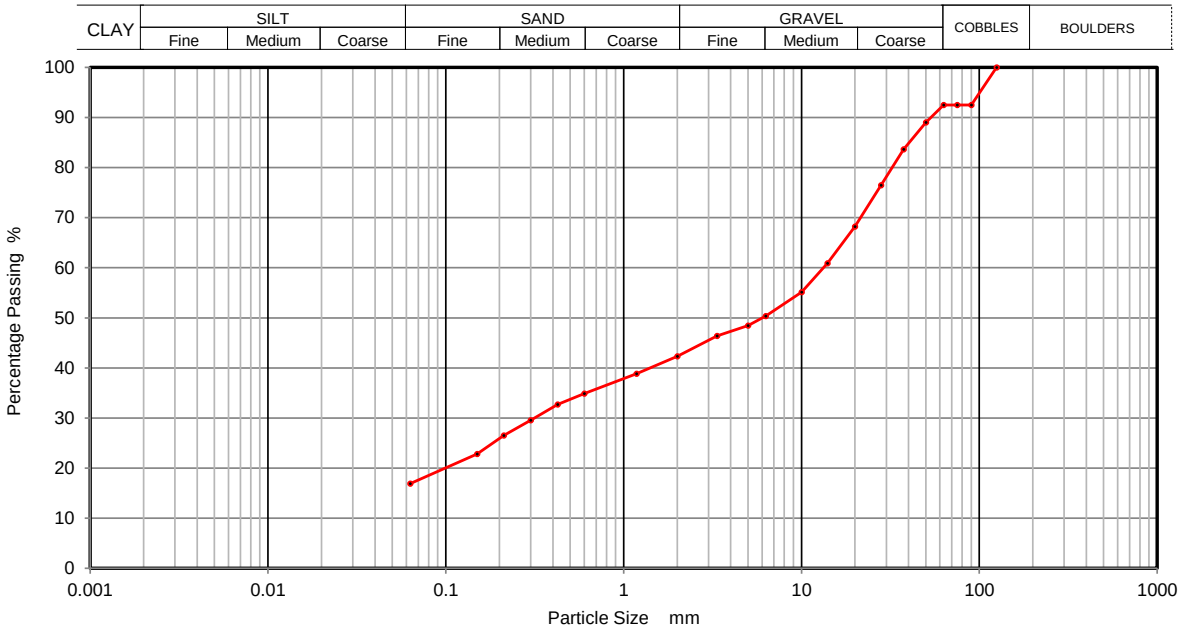
Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING
2788

GSTL	PARTICLE SIZE DISTRIBUTION BS 1377 Part 2:1990 Wet Sieve, Clause 9.2	Contract Number	48908
		Borehole/Pit No.	BH05A
Site Name	Trinity Fields, Caerphilly	Sample No.	4
Soil Description	Brown silty/clayey fine to coarse sandy fine to coarse GRAVEL (with cobbles)	Depth Top	3.00
		Depth Base	3.70
Date Tested	13/07/2020	Sample Type	B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	92		
75	92		
63	92		
50	89		
37.5	84		
28	76		
20	68		
14	61		
10	55		
6.3	50		
5	48		
3.35	46		
2	42		
1.18	39		
0.6	35		
0.425	33		
0.3	30		
0.212	26		
0.15	23		
0.063	17		

Sample Proportions	% dry mass
Cobbles	8
Gravel	50
Sand	25
Silt and Clay	17

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operators	Checked	15/07/2020	Wayne Honey	W. Honey
RO/MH	Approved	16/07/2020	Paul Evans	P Evans

UKAS TESTING
2788

GSTL	Certificate of Chemical Analysis (BRE BR 279)	Contract Number	48908
		Client Reference	A110489-6-1
Client	WYG	Date Received	
Site Name	Trinity Fields	Date Started	26/06/2020
		Date Completed	16/07/2020
		No. of Samples	13

Hole Number	Sample Number	Sample Type	Depth (m)			Acid Soluble Sulphate	Aqueous Extract Sulphate	Chloride Content	Ph Value	Total Sulphur	Magnesium	Nitrate
BH01	1	B	0.20	-	0.80	0.23	0.04		6.98	0.10		
BH01	2	B	0.80	-	1.20	0.33	0.04		7.02	0.14		
BH01	3	B	1.20	-	2.20	0.29	0.03		7.11	0.12		
BH02	1	B	0.30	-	1.20	0.27	0.04		7.20	0.11		
BH02	2	B	1.20	-	2.00	0.25	0.04		7.17	0.10		
BH03	1	B	0.20	-	0.80	0.27	0.04	NCP	7.20	0.12	<1	10-25
BH03	2	B	1.20	-	1.65	0.29	0.04		7.29	0.13		
BH04	1	B	0.20	-	0.80	0.33	0.03		7.35	0.14		
BH04	2	B	0.80	-	1.20	0.29	0.04		7.31	0.12		
BH05	1	B	0.30	-	0.80	0.33	0.04		7.17	0.14		
BH05	3	B	1.20	-	2.20	0.25	0.03		7.39	0.10		
BH05A	1	B	0.20	-	1.20	0.25	0.02		6.89	0.10		
WS04	2	B	0.60	-	0.90	0.35	0.04		7.26	0.15		
				-								
				-								
				-								
				-								
				-								
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				-								
				-								
				-								
				-								

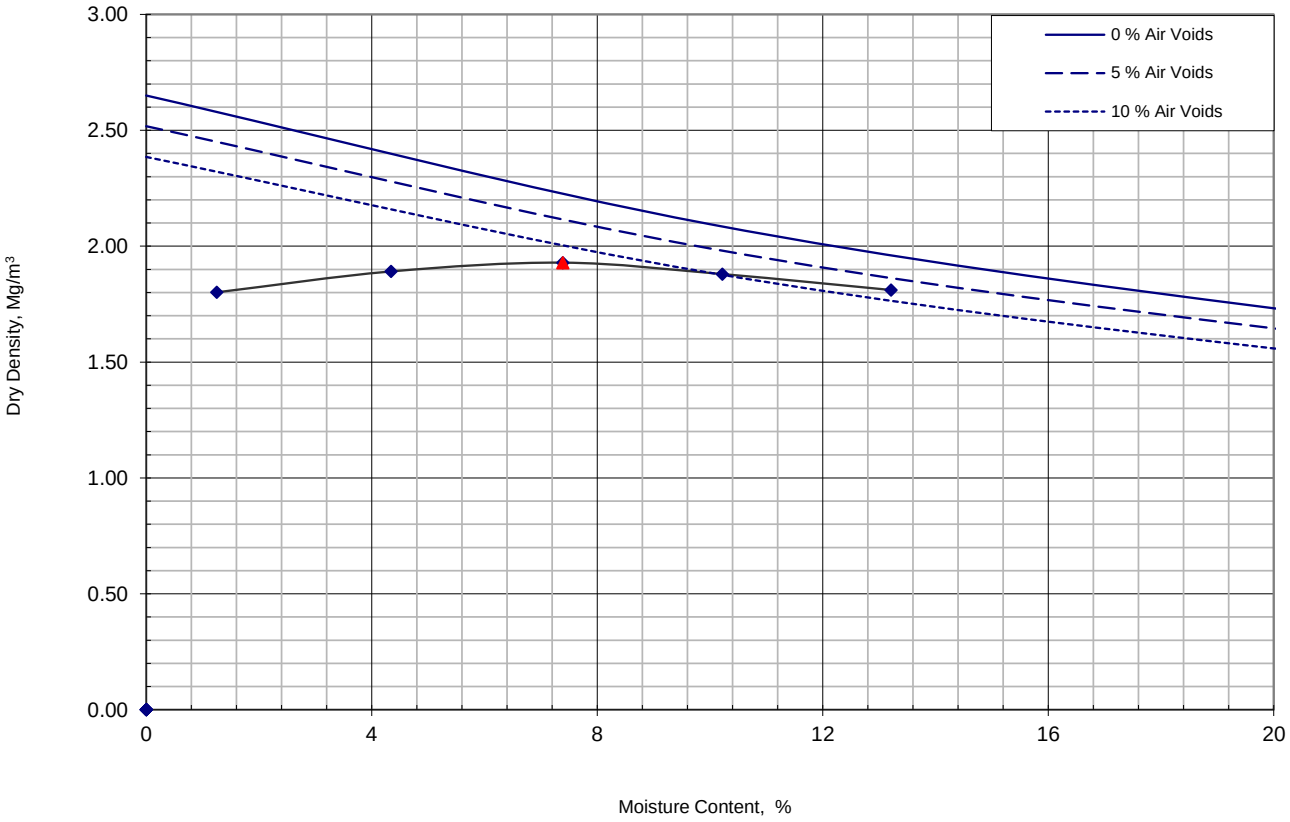
Key	Reported As
Acid Soluble Sulphate	% SO_4
Aqueous Extract Sulphate	g/l SO_4
Chloride Content (Semi)	mg Cl/l
PH Value	@ 25°
Total Sulphur	% S
Magnesium	g/l SO_4
Nitrate	NO_3 mg/l

Remarks

NCP = No Chloride Present

Test Operator	Checked and Authorised by		Paul Evans	
Darren Bourne	Date	16/07/2020		

GSTL	Dry Density / Moisture Content Relationship BS 1377:Part 4:1990	Contract Number	48908
		Borehole / Pit No	BH02
Project Location	Trinity Fields, Caerphilly	Sample No	1
Date Tested	26/06/2020	Depth Top	0.30
Compaction Method	2.5 Kg Rammer	Depth Base	1.20
Compaction Clause	BS1377:Part 4:1990, Clause 3.3	Sample Type	B
Sample Description	Brown fine to coarse gravelly clayey SILT		



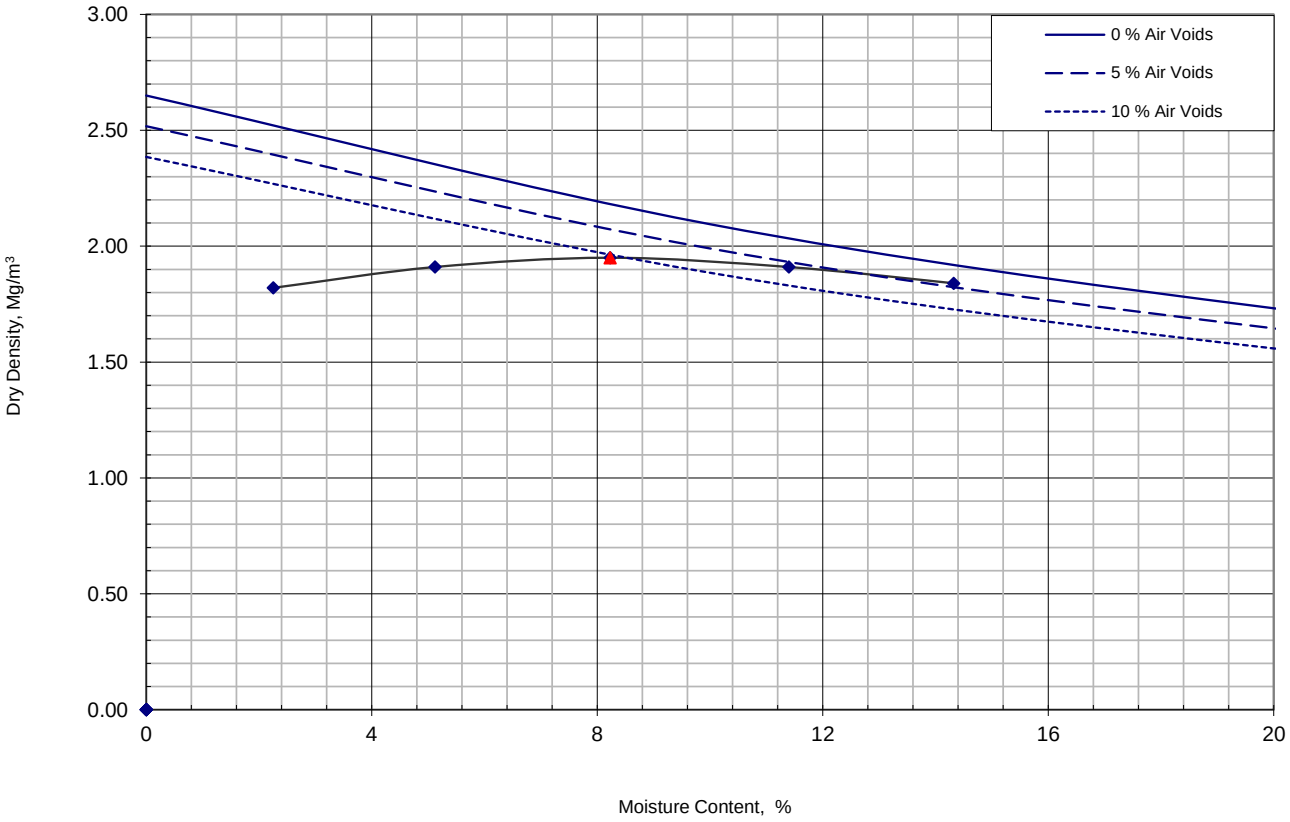
Compaction Point	1	2	3	4	5							
Moisture Content	1.3	4.3	7.4	10	13							
Bulk Density	1.82	1.97	2.07	2.07	2.05							
Dry Density	1.80	1.89	1.93	1.88	1.81							

Initial Moisture Content	10	%
Maximum Dry Density	1.93	Mg/m3
Optimum Moisture Content	7	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	18.4	%
Material Retained 20mm	5.75	%

Operators	Checked	15/07/2020	Emma Sharp	
CA	Approved	16/07/2020	Paul Evans	

UKAS TESTING 2788

GSTL	Dry Density / Moisture Content Relationship BS 1377:Part 4:1990	Contract Number	48908
		Borehole / Pit No	BH04
Project Location	**Trinity Fields, Caerphilly**	Sample No	**1**
Date Tested	**26/06/2020**	Depth Top	**0.20**
Compaction Method	**2.5 Kg Rammer**	Depth Base	**0.80**
Compaction Clause	**BS1377:Part 4:1990, Clause 3.4**	Sample Type	**B**
Sample Description			



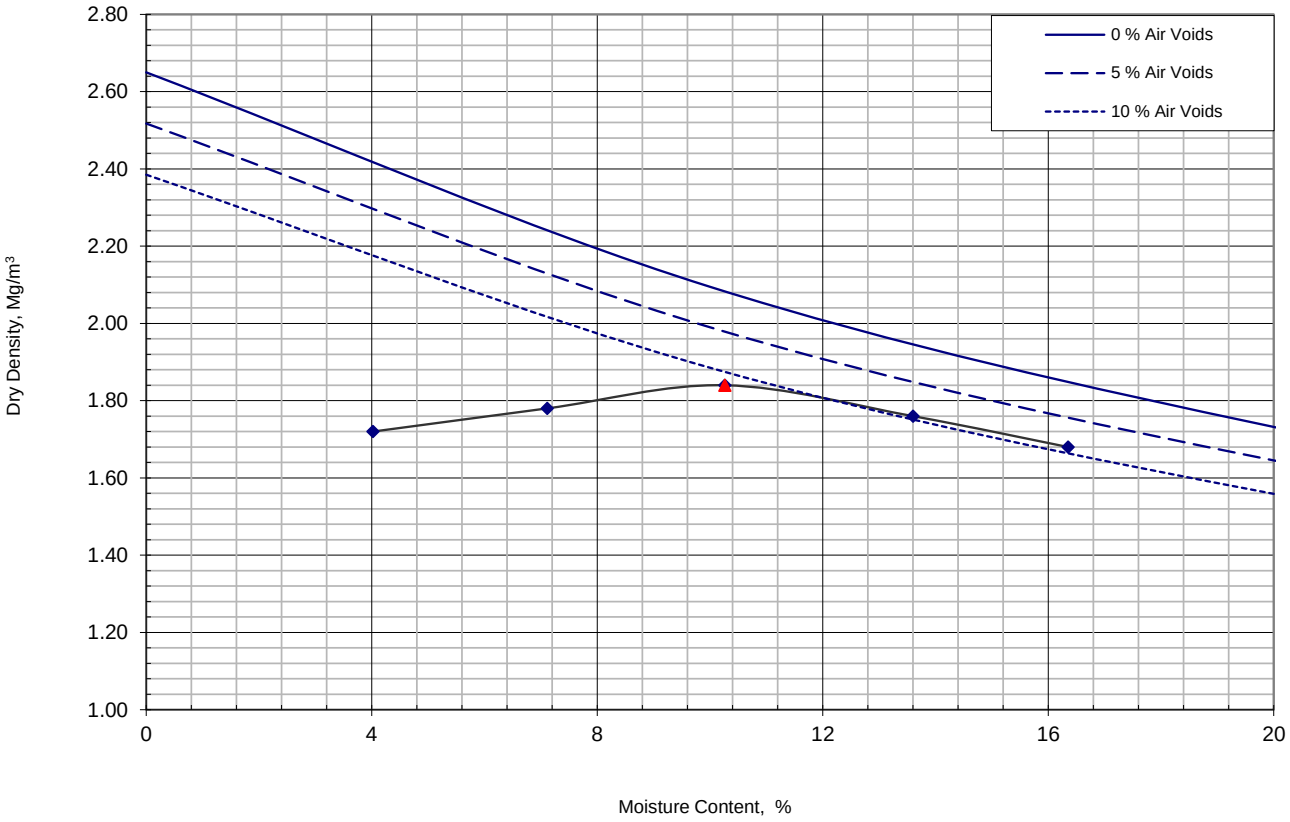
Compaction Point	1	2	3	4	5							
Moisture Content	2.3	5.1	8.2	11	14							
Bulk Density	1.86	2.01	2.11	2.13	2.10							
Dry Density	1.82	1.91	1.95	1.91	1.84							

Initial Moisture Content	11	%
Maximum Dry Density	1.95	Mg/m3
Optimum Moisture Content	8	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	47	%
Material Retained 20mm	25	%

Operators	Checked	15/07/2020	Emma Sharp	
CA	Approved	16/07/2020	Paul Evans	

UKAS TESTING
2788

GSTL	Dry Density / Moisture Content Relationship BS 1377:Part 4:1990	Contract Number	48908
		Borehole / Pit No	BH05
Project Location	**Trinity Fields, Caerphilly**	Sample No	**1**
Date Tested	**26/06/2020**	Depth Top	**0.30**
Compaction Method	**2.5 Kg Rammer**	Depth Base	**0.80**
Compaction Clause	**BS1377:Part 4:1990, Clause 3.4**	Sample Type	**B**
Sample Description			



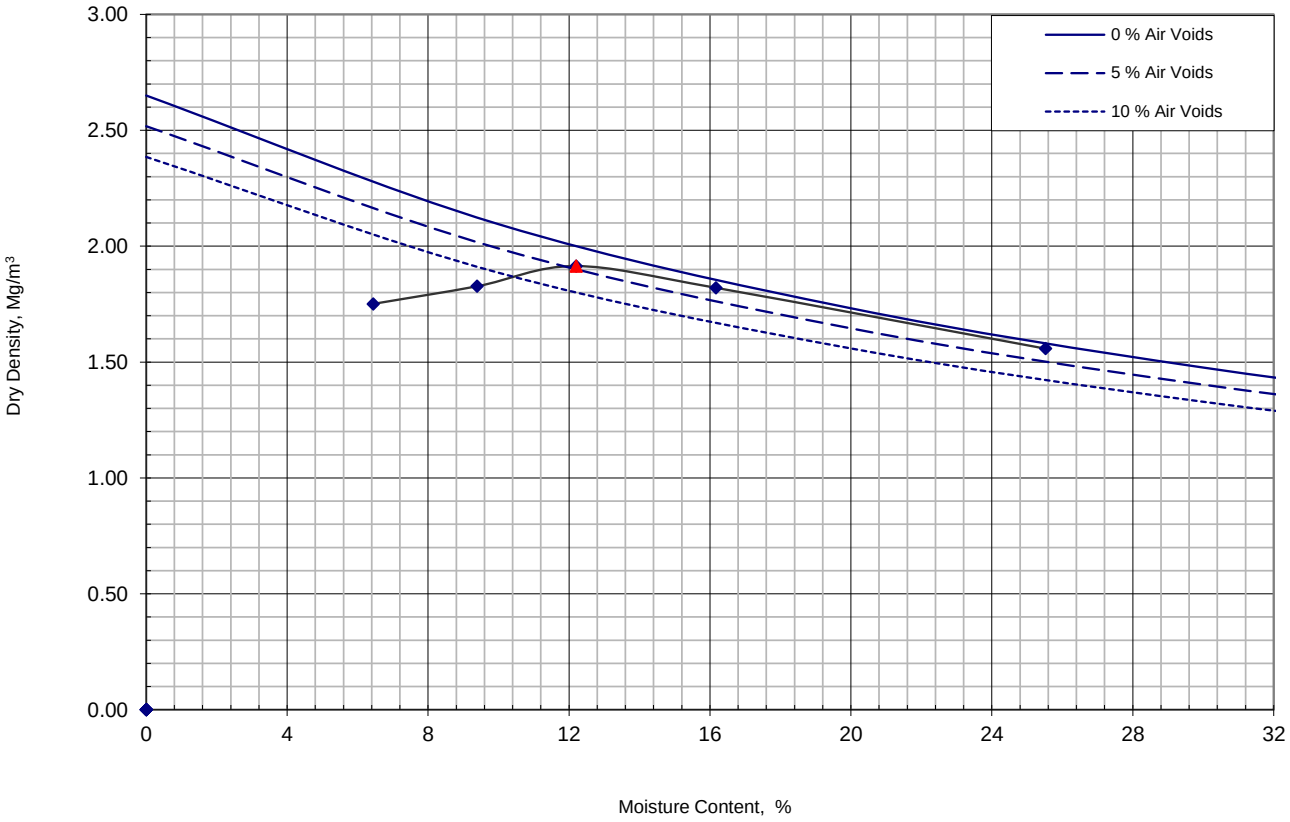
Compaction Point	1	2	3	4	5							
Moisture Content	4.0	7.1	10	14	16							
Bulk Density	1.79	1.91	2.03	2.00	1.95							
Dry Density	1.72	1.78	1.84	1.76	1.68							

Initial Moisture Content	14	%
Maximum Dry Density	1.84	Mg/m3
Optimum Moisture Content	10	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	37	%
Material Retained 20mm	25	%

Operators	Checked	15/07/2020	Emma Sharp	
CA	Approved	16/07/2020	Paul Evans	

UKAS TESTING
2788

GSTL	Dry Density / Moisture Content Relationship BS 1377:Part 4:1990	Contract Number	48908
		Borehole / Pit No	BH05A
Project Location	**Trinity Fields, Caerphilly**	Sample No	**1**
Date Tested	**26/06/2020**	Depth Top	**0.20**
Compaction Method	**2.5 Kg Rammer**	Depth Base	**1.20**
Compaction Clause	**BS1377:Part 4:1990, Clause 3.3**	Sample Type	**B**
Sample Description			



Compaction Point	1	2	3	4	5							
Moisture Content	6.4	9.4	12	16	26							
Bulk Density	1.86	2.00	2.15	2.11	1.96							
Dry Density	1.75	1.83	1.91	1.82	1.56							

Initial Moisture Content	26	%
Maximum Dry Density	1.91	Mg/m3
Optimum Moisture Content	12	%
Particle Density	2.65 Assumed	Mg/m3
Material Retained 37.5mm	30	%
Material Retained 20mm	14	%

Operators	Checked	15/07/2020	Emma Sharp	
CA	Approved	16/07/2020	Paul Evans	

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APPENDIX F – CHEMICAL LABORATORY TEST RESULTS

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

WYG Geo-Environment
5th Floor
Longcross Court
47 Newport Road
Cardiff
CF24 0AD

Attention: Sophie Brookes

CERTIFICATE OF ANALYSIS

Date of report Generation:	28 June 2020
Customer:	WYG Geo-Environment
Sample Delivery Group (SDG):	200606-40
Your Reference:	A110489-6-1
Location:	Trinity Fields
Report No:	556884

This report has been revised and directly supersedes 556881 in its entirety.

We received 14 samples on Saturday June 06, 2020 and 4 of these samples were scheduled for analysis which was completed on Sunday June 28, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
22263935	SA01	ES1	0.20 - 0.30	02/06/2020
22263972	SA01	ES2	0.60 - 0.80	02/06/2020
22263978	SA01	ES3	1.20 - 1.40	02/06/2020
22263985	SA02	ES1	0.20 - 0.30	02/06/2020
22263990	SA02	ES2	0.30 - 0.60	02/06/2020
22263998	SA02	ES3	0.60 - 1.00	02/06/2020
22263947	WS02	ES2	0.15 - 0.35	05/06/2020
22263942	WS02	ES1	0.45 - 0.70	05/06/2020
22264005	WS03	ES1	0.15 - 0.35	05/06/2020
22264010	WS03	ES2	0.90 - 1.20	05/06/2020
22263953	WS07	ES1	0.20 - 0.40	05/06/2020
22263959	WS07	ES2	0.80 - 1.00	05/06/2020
22264018	WS08	ES1	0.30 - 0.50	05/06/2020
22263966	WS10	ES1	0.20 - 0.30	05/06/2020

Maximum Sample/Coolbox Temperature (°C) : **12.6**

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			22263935			22263942			22263953			22263959		
Customer Sample Reference			SA01			WS02			WS07			WS07		
AGS Reference			ES1			ES1			ES1			ES2		
Depth (m)			0.20 - 0.30			0.45 - 0.70			0.20 - 0.40			0.80 - 1.00		
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S
Alkalinity Filtered as CaCO3	All	NDPs: 0 Tests: 2	X			X								
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2	X			X								
Anions by Kone (soil)	All	NDPs: 0 Tests: 4		X			X			X			X	
Anions by Kone (w)	All	NDPs: 0 Tests: 2	X			X								
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 4	X			X			X			X		
Boron Water Soluble	All	NDPs: 0 Tests: 4		X			X			X			X	
CEN Readings	All	NDPs: 0 Tests: 2	X			X								
Chromium III	All	NDPs: 0 Tests: 4		X			X			X			X	
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 6	X	X		X	X			X			X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2	X			X								
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 2	X			X								
EPH CWG (Aliphatic) Filtered GC (W)	All	NDPs: 0 Tests: 2	X			X								
EPH CWG (Aromatic) Filtered GC (W)	All	NDPs: 0 Tests: 2	X			X								
EPH CWG*	All	NDPs: 0 Tests: 4		X			X			X			X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 4			X			X			X			X

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

Results Legend

- X Test
- N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			22263935			22263942			22263953			22263959		
Customer Sample Reference			SA01			WS02			WS07			WS07		
AGS Reference			ES1			ES1			ES1			ES2		
Depth (m)			0.20 - 0.30			0.45 - 0.70			0.20 - 0.40			0.80 - 1.00		
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S
GRO by GC-FID (W)	All	NDPs: 0 Tests: 2	X			X								
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 4		X			X			X			X	
Mercury Dissolved	All	NDPs: 0 Tests: 2	X			X								
Metals in solid samples by OES	All	NDPs: 0 Tests: 4		X			X			X			X	
Nitrite by Kone (w)	All	NDPs: 0 Tests: 2	X			X								
PAH by GCMS	All	NDPs: 0 Tests: 4		X			X			X			X	
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 2	X			X								
pH	All	NDPs: 0 Tests: 4		X			X			X			X	
pH Value of Filtered Water	All	NDPs: 0 Tests: 2	X			X								
Phenols by HPLC (S)	All	NDPs: 0 Tests: 4		X			X			X			X	
Phenols by HPLC (W)	All	NDPs: 0 Tests: 2	X			X								
Sample description	All	NDPs: 0 Tests: 4		X			X			X			X	
Total Organic Carbon	All	NDPs: 0 Tests: 4		X			X			X			X	
TPH CWG Filtered (W)	All	NDPs: 0 Tests: 2	X			X								
TPH CWG GC (S)	All	NDPs: 0 Tests: 4		X			X			X			X	

Validated

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			2226393S			2226394S			2226395S			2226395S	
Customer Sample Reference			SA01			WS02			WS07			WS07	
AGS Reference			ES1			ES1			ES1			ES2	
Depth (m)			0.20 - 0.30			0.45 - 0.70			0.20 - 0.40			0.80 - 1.00	
Container	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	
Sample Type	S	S	S	S	S	S	S	S	S	S	S	S	
VOC MS (S) — All — NDPs: 0 Tests: 4			X			X			X			X	

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

Sample Descriptions

Grain Sizes

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

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
22263935	SA01	0.20 - 0.30	Dark Brown	Sand	Stones	Vegetation
22263942	WS02	0.45 - 0.70	Dark Brown	Sand	Stones	Vegetation
22263953	WS07	0.20 - 0.40	Dark Brown	Sand	Stones	Vegetation
22263959	WS07	0.80 - 1.00	Dark Brown	Sandy Loam	Stones	Vegetation

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

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

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

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SA01	WS02	WS07	WS07		
			Depth (m)	0.20 - 0.30	0.45 - 0.70	0.20 - 0.40	0.80 - 1.00		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	02/06/2020	05/06/2020	05/06/2020	05/06/2020		
			Sample Time	.	.	.	.		
			Date Received	06/06/2020	06/06/2020	06/06/2020	06/06/2020		
			SDG Ref	200606-40	200606-40	200606-40	200606-40		
			Lab Sample No.(s)	22263935	22263942	22263953	22263959		
			AGS Reference	ES1	ES1	ES1	ES2		
Total Aliphatics & Aromatics >C5-C44	<10 mg/kg	SUB		22	111	31	<10		
Moisture Content Ratio (% of as received sample)	%	PM024		4.9	7	7.1	14		
Ali >C12-C16*	<1 mg/kg	SUB		<1	1	<1	<1		
Ali >C16-C21*	<1 mg/kg	SUB		<1	3	<1	<1		
Ali >C21-C35*	<1 mg/kg	SUB		9	21	11	<1		
Aro >EC12-EC16*	<1 mg/kg	SUB		<1	3	<1	<1		
Aro >EC16-EC21*	<1 mg/kg	SUB		<1	9	<1	<1		
Aro >EC21-EC35*	<1 mg/kg	SUB		9	54	11	<1		
Ali >C35-C44*	<1 mg/kg	SUB		1	8	2	<1		
Aro >EC35-EC44*	<1 mg/kg	SUB		3	12	3	<1		
Total Aliphatics >C12-C44*	<4 mg/kg	SUB		10	33	15	<4		
Total Aromatics > EC12-EC44*	<4	SUB			78	16			
	<4 mg/kg	SUB		12			<4		
Phenol	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M	0.0108 M	<0.01 M		
Fraction Organic Carbon (FOC)	<0.002	TM132		0.0196 #	0.0217 #	0.0209 #	0.00683 #		
pH	1 pH Units	TM133		7.39 M	8.25 M	7.4 M	7.79 M		
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #	<0.6 #	<0.6 #		
Cyanide, Easily liberatable (low level)	<0.5 mg/kg	TM153		<0.5	<0.5	<0.5	<0.5		
Chromium, Trivalent	<0.9 mg/kg	TM181		4.07	12.3	7.06	3.49		
Arsenic	<0.6 mg/kg	TM181		13 M	14.8 M	17.7 M	7.22 M		
Beryllium	<0.01 mg/kg	TM181		0.727 M	0.627 M	0.451 M	0.269 M		
Cadmium	<0.02 mg/kg	TM181		0.251 M	0.588 M	0.326 M	0.113 M		
Chromium	<0.9 mg/kg	TM181		4.07 M	12.3 M	7.06 M	3.49 M		
Copper	<1.4 mg/kg	TM181		15.8 M	22.4 M	17.1 M	5.39 M		
Lead	<0.7 mg/kg	TM181		35.2 M	47.5 M	34.3 M	13.1 M		
Mercury	<0.14 mg/kg	TM181		<0.14 M	<0.14 M	<0.14 M	<0.14 M		
Nickel	<0.2 mg/kg	TM181		25 M	17.9 M	15.4 M	7.08 M		
Selenium	<1 mg/kg	TM181		<1 #	<1 #	<1 #	<1 #		
Vanadium	<0.2 mg/kg	TM181		16.2 #	21.4 #	20.4 #	17.4 #		
Zinc	<1.9 mg/kg	TM181		75.6 M	141 M	68.6 M	32.5 M		
Boron, water soluble	<1 mg/kg	TM222		<1 M	<1 M	<1 M	<1 M		
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243		0.0102 M	0.0225 M	0.0104 M	0.0114 M		

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

GRO by GC-FID (S)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SA01	WS02	WS07	WS07		
			Depth (m)	0.20 - 0.30	0.45 - 0.70	0.20 - 0.40	0.80 - 1.00		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	02/06/2020	05/06/2020	05/06/2020	05/06/2020		
			Sample Time	.	.	.	.		
			Date Received	06/06/2020	06/06/2020	06/06/2020	06/06/2020		
			SDG Ref	200606-40	200606-40	200606-40	200606-40		
			Lab Sample No.(s)	22263935	22263942	22263953	22263959		
			AGS Reference	ES1	ES1	ES1	ES2		
GRO Surrogate % recovery**	%	TM089		88.2	96.2	88	105		
Aliphatics >C5-C6	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aliphatics >C6-C8	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aliphatics >C8-C10	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aliphatics >C10-C12	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aromatics >EC5-EC7	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aromatics >EC7-EC8	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aromatics >EC8-EC10	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aromatics >EC10-EC12	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Total Aliphatics >C5-C10	<0.05 mg/kg	TM089		<0.05	<0.05	<0.05	<0.05		
Total Aromatics >EC5-EC10	<0.05 mg/kg	TM089		<0.05	<0.05	<0.05	<0.05		
GRO >C5-C10	<0.02 mg/kg	TM089		<0.02	<0.02	<0.02	<0.02		

Validated

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

PAH by GCMS

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SA01	WS02	WS07	WS07		
			Depth (m)	0.20 - 0.30	0.45 - 0.70	0.20 - 0.40	0.80 - 1.00		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	02/06/2020	05/06/2020	05/06/2020	05/06/2020		
			Sample Time	.	.	.	.		
			Date Received	06/06/2020	06/06/2020	06/06/2020	06/06/2020		
			SDG Ref	200606-40	200606-40	200606-40	200606-40		
			Lab Sample No.(s)	22263935	22263942	22263953	22263959		
			AGS Reference	ES1	ES1	ES1	ES2		
Naphthalene-d8 % recovery**	%	TM218		90.1	89.1	90.6	93.5		
Acenaphthene-d10 % recovery**	%	TM218		94.9	94.4	96.3	95.7		
Phenanthrene-d10 % recovery**	%	TM218		95.4	95.7	92.6	92		
Chrysene-d12 % recovery**	%	TM218		92.2	94.7	89.2	90.1		
Perylene-d12 % recovery**	%	TM218		90.4	92.2	86.1	87		
Naphthalene	<0.009 mg/kg	TM218		<0.009 M	0.0222 M	<0.045 M	<0.009 M		
Acenaphthylene	<0.012 mg/kg	TM218		<0.012 M	0.0771 M	<0.06 M	<0.012 M		
Acenaphthene	<0.008 mg/kg	TM218		<0.008 M	0.517 M	<0.04 M	<0.008 M		
Fluorene	<0.01 mg/kg	TM218		<0.01 M	0.436 M	<0.05 M	<0.01 M		
Phenanthrene	<0.015 mg/kg	TM218		0.0318 M	3.83 M	<0.075 M	<0.015 M		
Anthracene	<0.016 mg/kg	TM218		<0.016 M	0.844 M	<0.08 M	<0.016 M		
Fluoranthene	<0.017 mg/kg	TM218		0.0709 M	6.6 M	0.125 M	<0.017 M		
Pyrene	<0.015 mg/kg	TM218		0.0546 M	4.49 M	0.108 M	<0.015 M		
Benz(a)anthracene	<0.014 mg/kg	TM218		0.0488 M	4.16 M	0.0888 M	<0.014 M		
Chrysene	<0.01 mg/kg	TM218		0.0741 M	3.89 M	0.142 M	<0.01 M		
Benzo(b)fluoranthene	<0.015 mg/kg	TM218		0.118 M	5.57 M	0.235 M	<0.015 M		
Benzo(k)fluoranthene	<0.014 mg/kg	TM218		0.0313 M	1.79 M	<0.07 M	<0.014 M		
Benzo(a)pyrene	<0.015 mg/kg	TM218		0.049 M	2.91 M	0.102 M	<0.015 M		
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218		0.0444 M	2.07 M	<0.09 M	<0.018 M		
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218		<0.023 M	0.456 M	<0.115 M	<0.023 M		
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218		0.0372 M	1.66 M	<0.12 M	<0.024 M		
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218		0.561	39.3	0.801	<0.118		

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

VOC MS (S)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SA01	WS02	WS07	WS07		
			Depth (m)	0.20 - 0.30	0.45 - 0.70	0.20 - 0.40	0.80 - 1.00		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	02/06/2020	05/06/2020	05/06/2020	05/06/2020		
			Sample Time	.	.	.	.		
			Date Received	06/06/2020	06/06/2020	06/06/2020	06/06/2020		
			SDG Ref	200606-40	200606-40	200606-40	200606-40		
			Lab Sample No.(s)	22263935	22263942	22263953	22263959		
			AGS Reference	ES1	ES1	ES1	ES2		
Dibromofluoromethane**	%	TM116		104	110	105	108		
Toluene-d8**	%	TM116		92.2	98.8	88.9	96.3		
4-Bromofluorobenzene**	%	TM116		71.7	89.9	70	84.4		
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116		<0.01 M	<0.2 M	<0.01 M	<0.01 M		
Benzene	<0.009 mg/kg	TM116		<0.009 M	<0.18 M	<0.009 M	<0.009 M		
Toluene	<0.007 mg/kg	TM116		<0.007 M	<0.14 M	<0.007 M	<0.007 M		
Ethylbenzene	<0.004 mg/kg	TM116		<0.004 M	<0.08 M	<0.004 M	<0.004 M		
p/m-Xylene	<0.01 mg/kg	TM116		<0.01 #	<0.2 #	<0.01 #	<0.01 #		
o-Xylene	<0.01 mg/kg	TM116		<0.01 M	<0.2 M	<0.01 M	<0.01 M		

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

Asbestos Identification - Solid Samples

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
*	Subcontracted test.
(F)	Trigger breach confirmed
1-5&+$@	Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	SA01ES1 0.20 - 0.30 SOLID 02/06/2020 00:00:00 06/06/2020 11:52:00 200606-40 22263935 TM048	10/06/20203	Paul Poynton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS02ES1 0.45 - 0.70 SOLID 05/06/2020 00:00:00 06/06/2020 11:52:00 200606-40 22263942 TM048	10/06/2020	Christian Hallam	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS07ES1 0.20 - 0.40 SOLID 05/06/2020 00:00:00 06/06/2020 11:52:00 200606-40 22263953 TM048	10/06/2020	Paul Poynton	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS07ES2 0.80 - 1.00 SOLID 05/06/2020 00:00:00 06/06/2020 11:52:00 200606-40 22263959 TM048	10/06/2020	Christian Hallam	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Trinity Fields
Mass Sample taken (kg)	0.095	**Natural Moisture Content (%)**	5.86
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	94.5
Particle Size <4mm	>95%		

Case	
SDG	200606-40
Lab Sample Number(s)	22263935
Sampled Date	02-Jun-2020
Customer Sample Ref.	SA01 ES1
Depth (m)	0.20 - 0.30

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO2	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	5.11	<3	51.1	<30	-	-	-
Mercury Dissolved (CVAF)	0.0000241	<0.00001	0.000241	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH3	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.000914	<0.0005	0.00914	<0.005	-	-	-
Total Ammonium as NH4	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.225	<0.0002	2.25	<0.002	-	-	-
Nitrate as NO3	1.1	<0.3	11	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Boron	0.0407	<0.01	0.407	<0.1	-	-	-
Phenanthrene (diss.filt)	0.00000554	<0.000005	0.0000554	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO3	6.5	<2	65	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

Leach Test Information

Date Prepared	08-Jun-2020
pH (pH Units)	7.45
Conductivity (µS/cm)	15.70
Temperature (°C)	15.50
Volume Leachant (Litres)	0.895

Mcerts Certification does not apply to leachates

28/06/2020 12:37:06

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Trinity Fields
Mass Sample taken (kg)	0.095	**Natural Moisture Content (%)**	5.86
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	94.5
Particle Size <4mm	>95%		

Case	
SDG	200606-40
Lab Sample Number(s)	22263935
Sampled Date	02-Jun-2020
Customer Sample Ref.	SA01 ES1
Depth (m)	0.20 - 0.30

Eluate Analysis	**C_2 Conc^n in 10:1 eluate (mg/l)**		**A_2 10:1 conc^n leached (mg/kg)**				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	0.00109	<0.001	0.0109	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.00273	<0.0003	0.0273	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.00314	<0.0002	0.0314	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	<0.000082	<0.000082	<0.00082	<0.00082	-	-	-
Nickel	0.00125	<0.0004	0.0125	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.0344	<0.001	0.344	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

Leach Test Information

Date Prepared	08-Jun-2020
pH (pH Units)	7.45
Conductivity (µS/cm)	15.70
Temperature (°C)	15.50
Volume Leachant (Litres)	0.895

Mcerts Certification does not apply to leachates

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CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Trinity Fields
Mass Sample taken (kg)	0.099	**Natural Moisture Content (%)**	10.2
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	90.8
Particle Size <4mm	>95%		

Case	
SDG	200606-40
Lab Sample Number(s)	22263942
Sampled Date	05-Jun-2020
Customer Sample Ref.	WS02 ES1
Depth (m)	0.45 - 0.70

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO2	0.323	<0.05	3.23	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	5.11	<3	51.1	<30	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH3	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.000648	<0.0005	0.00648	<0.005	-	-	-
Total Ammonium as NH4	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.357	<0.0002	3.57	<0.002	-	-	-
Nitrate as NO3	2.22	<0.3	22.2	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.0000277	<0.000005	0.000277	<0.00005	-	-	-
Anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Boron	0.0411	<0.01	0.411	<0.1	-	-	-
Phenanthrene (diss.filt)	0.000014	<0.000005	0.00014	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO3	70	<2	700	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chrysene (diss.filt)	0.0000105	<0.000005	0.000105	<0.00005	-	-	-

Leach Test Information

Date Prepared	08-Jun-2020
pH (pH Units)	6.75
Conductivity (µS/cm)	109.00
Temperature (°C)	10.70
Volume Leachant (Litres)	0.891

Mcerts Certification does not apply to leachates

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CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Trinity Fields
Mass Sample taken (kg)	0.099	**Natural Moisture Content (%)**	10.2
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	90.8
Particle Size <4mm	>95%		

Case	
SDG	200606-40
Lab Sample Number(s)	22263942
Sampled Date	05-Jun-2020
Customer Sample Ref.	WS02 ES1
Depth (m)	0.45 - 0.70

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Pyrene (diss.filt)	0.0000228	<0.000005	0.000228	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	0.0000056	<0.000005	0.000056	<0.00005	-	-	-
Chromium	0.00104	<0.001	0.0104	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	0.0000187	<0.000005	0.000187	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	0.00000616	<0.000005	0.0000616	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	0.00000939	<0.000002	0.0000939	<0.00002	-	-	-
Copper	0.00353	<0.0003	0.0353	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.000308	<0.0002	0.00308	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	0.000115	<0.000082	0.00115	<0.00082	-	-	-
Nickel	0.000409	<0.0004	0.00409	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.0083	<0.001	0.083	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

Leach Test Information

Date Prepared	08-Jun-2020
pH (pH Units)	6.75
Conductivity (µS/cm)	109.00
Temperature (°C)	10.70
Volume Leachant (Litres)	0.891

Mcerts Certification does not apply to leachates

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Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
SUB		Subcontracted Test
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM243		Mixed Anions In Soils By Kone
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	200606-40	**Client Reference:**	A110489-6-1	**Report Number:**	556884
Location:	Trinity Fields	**Order Number:**	C20/344	**Superseded Report:**	556881

Test Completion Dates

Lab Sample No(s)	22263935	22263942	22263953	22263959
Customer Sample Ref.	SA01	WS02	WS07	WS07
AGS Ref.	ES1	ES1	ES1	ES2
Depth	0.20 - 0.30	0.45 - 0.70	0.20 - 0.40	0.80 - 1.00
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkalinity Filtered as CaCO3	11-Jun-2020	11-Jun-2020		
Ammoniacal Nitrogen	11-Jun-2020	11-Jun-2020		
Anions by Kone (soil)	10-Jun-2020	10-Jun-2020	10-Jun-2020	10-Jun-2020
Anions by Kone (w)	11-Jun-2020	11-Jun-2020		
Asbestos ID in Solid Samples	10-Jun-2020	10-Jun-2020	10-Jun-2020	10-Jun-2020
Boron Water Soluble	10-Jun-2020	10-Jun-2020	10-Jun-2020	10-Jun-2020
CEN 10:1 Leachate (1 Stage)	09-Jun-2020	09-Jun-2020		
CEN Readings	10-Jun-2020	10-Jun-2020		
Chromium III	11-Jun-2020	11-Jun-2020	11-Jun-2020	11-Jun-2020
Cyanide Comp/Free/Total/Thiocyanate	12-Jun-2020	12-Jun-2020	10-Jun-2020	10-Jun-2020
Dissolved Metals by ICP-MS	11-Jun-2020	11-Jun-2020		
Dissolved Organic/Inorganic Carbon	12-Jun-2020	12-Jun-2020		
EPH CWG (Aliphatic) Filtered GC (W)	13-Jun-2020	13-Jun-2020		
EPH CWG (Aromatic) Filtered GC (W)	13-Jun-2020	13-Jun-2020		
EPH CWG*	28-Jun-2020	24-Jun-2020	24-Jun-2020	28-Jun-2020
GRO by GC-FID (S)	10-Jun-2020	10-Jun-2020	10-Jun-2020	10-Jun-2020
GRO by GC-FID (W)	12-Jun-2020	12-Jun-2020		
Hexavalent Chromium (s)	10-Jun-2020	10-Jun-2020	10-Jun-2020	10-Jun-2020
Mercury Dissolved	11-Jun-2020	11-Jun-2020		
Metals in solid samples by OES	11-Jun-2020	11-Jun-2020	11-Jun-2020	11-Jun-2020
Moisture at 105C	08-Jun-2020	08-Jun-2020		
Nitrite by Kone (w)	11-Jun-2020	11-Jun-2020		
PAH by GCMS	09-Jun-2020	09-Jun-2020	09-Jun-2020	10-Jun-2020
PAH in waters by GC-MS (diss.filt)	12-Jun-2020	12-Jun-2020		
pH	08-Jun-2020	08-Jun-2020	08-Jun-2020	10-Jun-2020
pH Value of Filtered Water	11-Jun-2020	11-Jun-2020		
Phenols by HPLC (S)	11-Jun-2020	11-Jun-2020	11-Jun-2020	11-Jun-2020
Phenols by HPLC (W)	12-Jun-2020	12-Jun-2020		
Sample description	08-Jun-2020	08-Jun-2020	08-Jun-2020	08-Jun-2020
Total Organic Carbon	12-Jun-2020	10-Jun-2020	12-Jun-2020	12-Jun-2020
TPH CWG Filtered (W)	13-Jun-2020	13-Jun-2020		
TPH CWG GC (S)	28-Jun-2020	28-Jun-2020	28-Jun-2020	28-Jun-2020
VOC MS (S)	10-Jun-2020	11-Jun-2020	10-Jun-2020	10-Jun-2020

ASSOCIATED AQC DATA

Alkalinity Filtered as CaCO3

Component	Method Code	QC 2229	QC 2286
Total Alkalinity Filtered as CaCO3	TM043	**101.01** 95.62 : 106.88	**105.0** 100.35 : 114.15

Ammoniacal Nitrogen

Component	Method Code	QC 2210
Ammoniacal Nitrogen as N	TM099	**101.2** 93.14 : 108.60

Anions by Kone (soil)

Component	Method Code	QC 2243
Water Soluble Sulphate as SO4 2:1 Extract	TM243	**93.93** 75.60 : 131.10

Anions by Kone (w)

Component	Method Code	QC 2250
Chloride	TM184	**108.0** 92.93 : 115.43
Sulphate (soluble)	TM184	**104.8** 90.53 : 113.03
TON as NO3	TM184	**104.0** 94.00 : 111.10

Boron Water Soluble

Component	Method Code	QC 2285
Water Soluble Boron	TM222	**100.5** 85.80 : 112.50

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2285	QC 2292	QC 2238
Free Cyanide	TM153	**89.01** 82.09 : 117.91	**88.32** 82.09 : 117.91	
Free Cyanide (W)	TM227			**98.5** 90.50 : 114.50
Thiocyanate	TM153	**97.44** 90.48 : 109.52	**98.72** 90.48 : 109.52	

Cyanide Comp/Free/Total/Thiocyanate

		QC 2285	QC 2292	QC 2238
Thiocyanate (W)	TM227			**95.75** 90.50 : 113.00
Total Cyanide	TM153	**92.31** 86.12 : 113.88	**91.61** 86.12 : 113.88	
Total Cyanide (W)	TM227			**103.75** 91.75 : 112.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 2252
Aluminium	TM152	**105.0** 91.36 : 108.58
Antimony	TM152	**104.67** 88.37 : 130.57
Arsenic	TM152	**105.17** 92.62 : 113.52
Barium	TM152	**104.67** 88.14 : 108.73
Beryllium	TM152	**105.5** 89.98 : 116.88
Bismuth	TM152	**105.33** 92.62 : 115.02
Boron	TM152	**107.67** 86.31 : 120.88
Cadmium	TM152	**107.0** 93.85 : 111.65
Calcium	TM152	**96.67** 89.20 : 126.91
Chromium	TM152	**105.0** 92.22 : 109.85
Cobalt	TM152	**104.33** 85.01 : 114.87
Copper	TM152	**104.17** 89.87 : 119.73
Iron	TM152	**106.67** 93.02 : 113.86
Lead	TM152	**106.0** 91.11 : 116.98
Lithium	TM152	**104.33** 91.30 : 123.00
Magnesium	TM152	**96.67** 89.60 : 116.61
Manganese	TM152	**109.33** 93.97 : 112.46
Molybdenum	TM152	**102.0** 89.07 : 110.96
Nickel	TM152	**106.0** 93.70 : 112.15
Phosphorus	TM152	**99.33** 89.24 : 114.18
Potassium	TM152	**98.67** 93.20 : 115.55
Selenium	TM152	**104.17** 91.69 : 117.12

Dissolved Metals by ICP-MS

		QC 2252
Silver	TM152	**113.0** 90.93 : 121.73
Sodium	TM152	**96.0** 92.42 : 113.24
Strontium	TM152	**105.0** 92.14 : 116.24
Tellurium	TM152	**101.83** 89.88 : 111.78
Thallium	TM152	**102.0** 82.43 : 113.83
Tin	TM152	**104.0** 94.62 : 107.79
Titanium	TM152	**108.67** 90.29 : 115.23
Tungsten	TM152	**106.33** 77.61 : 132.31
Uranium	TM152	**105.33** 86.97 : 115.76
Vanadium	TM152	**105.17** 89.61 : 115.48
Zinc	TM152	**107.0** 87.51 : 116.26

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 2269
Dissolved Inorganic Carbon	TM090	**101.83** 93.58 : 112.28
Dissolved Organic Carbon	TM090	**103.0** 96.28 : 110.58

EPH CWG (Aromatic) Filtered GC (W)

Component	Method Code	QC 2235
Total Aromatics >EC10-EC40	TM174	**99.02** 73.75 : 120.32

GRO by GC-FID (S)

Component	Method Code	QC 2236	QC 2291
QC	TM089	**80.78** 70.75 : 114.19	**81.79** 70.34 : 111.95

GRO by GC-FID (W)

GRO by GC-FID (W)

Component	Method Code	QC 2250
Benzene by GC	TM245	**87.0** 79.13 : 118.84
Ethylbenzene by GC	TM245	**85.0** 79.54 : 115.99
m & p Xylene by GC	TM245	**84.75** 78.44 : 116.32
MTBE GC-FID	TM245	**98.5** 81.43 : 120.09
o Xylene by GC	TM245	**87.5** 76.85 : 120.29
QC	TM245	**124.98** 71.58 : 131.01
Toluene by GC	TM245	**86.0** 79.00 : 121.96

Hexavalent Chromium (s)

Component	Method Code	QC 2258	QC 2292
Hexavalent Chromium	TM151	**102.0** 95.60 : 107.60	**102.0** 95.60 : 107.60

Mercury Dissolved

Component	Method Code	QC 2297
Mercury Dissolved (CVAF)	TM183	**96.9** 75.00 : 111.00

Metals in solid samples by OES

Component	Method Code	QC 2208
Aluminium	TM181	**101.77** 73.56 : 108.85
Antimony	TM181	**106.1** 76.89 : 111.24
Arsenic	TM181	**102.03** 88.53 : 111.01
Barium	TM181	**99.08** 77.67 : 105.35
Beryllium	TM181	**101.12** 85.44 : 109.61
Boron	TM181	**94.27** 73.51 : 104.66
Cadmium	TM181	**92.18** 77.67 : 104.12
Chromium	TM181	**99.39** 82.26 : 104.55
Cobalt	TM181	**92.45** 82.27 : 101.60

Metals in solid samples by OES

		QC 2208
Copper	TM181	**95.42** 82.40 : 105.45
Iron	TM181	**97.62** 82.95 : 110.58
Lead	TM181	**92.57** 78.24 : 104.05
Manganese	TM181	**111.11** 94.29 : 119.51
Mercury	TM181	**93.0** 83.16 : 107.81
Molybdenum	TM181	**100.82** 87.11 : 106.87
Nickel	TM181	**94.87** 80.26 : 102.28
Phosphorus	TM181	**112.53** 94.56 : 124.28
Selenium	TM181	**100.78** 82.28 : 110.48
Strontium	TM181	**94.88** 79.13 : 102.79
Thallium	TM181	**96.02** 82.94 : 111.86
Tin	TM181	**101.14** 86.72 : 110.03
Titanium	TM181	**90.08** 66.23 : 102.06
Vanadium	TM181	**102.56** 86.19 : 109.45
Zinc	TM181	**99.38** 84.68 : 113.99

PAH by GCMS

Component	Method Code	QC 2209	QC 2221
Acenaphthene	TM218	**87.5** 76.79 : 103.90	**90.5** 76.79 : 103.90
Acenaphthylene	TM218	**87.5** 78.40 : 108.66	**91.0** 78.40 : 108.66
Anthracene	TM218	**85.0** 76.15 : 110.07	**83.5** 76.15 : 110.07
Benz(a)anthracene	TM218	**89.0** 73.77 : 119.26	**93.0** 73.77 : 119.26
Benzo(a)pyrene	TM218	**86.5** 73.20 : 114.18	**88.5** 73.20 : 114.18
Benzo(b)fluoranthene	TM218	**94.0** 75.36 : 117.58	**89.5** 75.36 : 117.58
Benzo(ghi)perylene	TM218	**73.5** 70.73 : 116.12	**86.5** 70.73 : 116.12
Benzo(k)fluoranthene	TM218	**90.0** 75.98 : 116.59	**90.5** 75.98 : 116.59
Chrysene	TM218	**85.5** 74.82 : 114.18	**90.0** 74.82 : 114.18
Dibenzo(ah)anthracene	TM218	**81.0** 69.17 : 115.30	**85.0** 69.17 : 115.30

PAH by GCMS

		QC 2209	QC 2221
Fluoranthene	TM218	**86.5** 75.88 : 112.84	**93.0** 75.88 : 112.84
Fluorene	TM218	**88.0** 78.50 : 114.02	**92.5** 78.50 : 114.02
Indeno(123cd)pyrene	TM218	**85.0** 70.26 : 117.95	**87.5** 70.26 : 117.95
Naphthalene	TM218	**81.0** 75.24 : 111.26	**83.5** 75.24 : 111.26
Phenanthrene	TM218	**86.5** 77.07 : 107.43	**88.0** 77.07 : 107.43
Pyrene	TM218	**84.5** 78.74 : 112.56	**89.0** 78.74 : 112.56

PAH in waters by GC-MS (diss.filt)

Component	Method Code	QC 2280
Acenaphthene (diss.filt)	TM178	**101.6** 94.40 : 118.40
Acenaphthylene (diss.filt)	TM178	**96.4** 92.00 : 116.00
Anthracene (diss.filt)	TM178	**101.2** 88.80 : 115.20
Benzo(a)anthracene (diss.filt)	TM178	**101.2** 85.20 : 118.80
Benzo(a)pyrene (diss.filt)	TM178	**104.4** 90.40 : 119.20
Benzo(b)fluoranthene (diss.filt)	TM178	**102.8** 86.40 : 122.40
Benzo(g,h,i)perylene (diss.filt)	TM178	**103.2** 92.00 : 116.00
Benzo(k)fluoranthene (diss.filt)	TM178	**100.0** 92.00 : 125.60
Chrysene (diss.filt)	TM178	**104.4** 95.20 : 121.60
Dibenzo(a,h)anthracene (diss.filt)	TM178	**97.2** 88.80 : 112.80
Fluoranthene (diss.filt)	TM178	**103.2** 87.60 : 118.80
Fluorene (diss.filt)	TM178	**102.4** 93.60 : 117.60
Indeno(1,2,3-cd)pyrene (diss.filt)	TM178	**96.8** 85.60 : 114.40
Naphthalene (diss.filt)	TM178	**104.0** 87.20 : 123.20
Phenanthrene (diss.filt)	TM178	**103.6** 94.00 : 118.00
Pyrene (diss.filt)	TM178	**102.0** 87.20 : 120.80

pH

pH

Component	Method Code	QC 2266	QC 2252
pH	TM133	**100.26** 98.47 : 102.33	**100.53** 97.80 : 101.67

pH Value of Filtered Water

Component	Method Code	QC 2261
pH Value of Filtered Water	TM256	**101.08** 99.73 : 102.16

Phenols by HPLC (S)

Component	Method Code	QC 2236
2.3.5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	**96.1** 83.23 : 109.71
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	**83.63** 76.34 : 104.11
Catechol by HPLC (S)	TM062 (S)	**91.43** 22.43 : 157.02
Cresols by HPLC (S)	TM062 (S)	**88.1** 90.22 : 116.89
Napthol by HPLC (S)	TM062 (S)	**112.86** 75.62 : 124.38
Phenol by HPLC (S)	TM062 (S)	**95.36** 79.53 : 120.47
Resorcinol HPLC (S)	TM062 (S)	**88.68** 71.43 : 129.59
Xylenols by HPLC (S)	TM062 (S)	**92.29** 89.90 : 107.23

Phenols by HPLC (W)

Component	Method Code	QC 2259
2.3.5 Trimethyl-Phenol by HPLC (W)	TM259	**102.0** 91.00 : 109.00
2-Isopropyl Phenol by HPLC (W)	TM259	**96.0** 90.00 : 114.00
Cresols by HPLC (W)	TM259	**103.33** 90.02 : 130.15
Napthol by HPLC (W)	TM259	**107.0** 86.00 : 128.00
Phenol by HPLC (W)	TM259	**99.0** 85.89 : 109.89
Xylenols by HPLC (W)	TM259	**100.17** 93.33 : 107.33

Total Organic Carbon

Total Organic Carbon

Component	Method Code	QC 2274	QC 2231
Total Organic Carbon	TM132	**94.92** 84.82 : 117.61	**100.78** 84.82 : 117.61

VOC MS (S)

Component	Method Code	QC 2225	QC 2262	QC 2243
1,1,1,2-tetrachloroethane	TM116	**106.2** 84.84 : 116.25	**102.4** 84.84 : 116.25	**97.8** 79.10 : 119.66
1,1,1-Trichloroethane	TM116	**101.0** 73.73 : 118.05	**98.0** 73.73 : 118.05	**96.2** 87.51 : 115.37
1,1,2-Trichloroethane	TM116	**103.6** 77.12 : 116.04	**103.4** 77.12 : 116.04	**99.6** 75.16 : 112.70
1,1-Dichloroethane	TM116	**106.4** 74.46 : 129.15	**100.8** 74.46 : 129.15	**100.2** 86.77 : 122.11
1,2-Dichloroethane	TM116	**117.8** 92.38 : 131.65	**118.0** 92.38 : 131.65	**114.0** 86.58 : 129.62
1,4-Dichlorobenzene	TM116	**103.4** 83.64 : 126.18	**100.8** 83.64 : 126.18	**95.4** 84.04 : 124.40
2-Chlorotoluene	TM116	**95.6** 75.26 : 110.11	**93.6** 75.26 : 110.11	**81.8** 73.76 : 115.43
4-Chlorotoluene	TM116	**92.2** 66.90 : 112.46	**90.8** 66.90 : 112.46	**84.4** 72.48 : 112.82
Benzene	TM116	**103.8** 88.60 : 113.80	**102.6** 88.60 : 113.80	**96.8** 84.29 : 112.22
Carbon Disulphide	TM116	**97.8** 74.91 : 122.14	**97.2** 74.91 : 122.14	**98.2** 75.11 : 124.81
Carbontetrachloride	TM116	**103.8** 80.31 : 124.50	**101.4** 80.31 : 124.50	**100.4** 82.35 : 126.46
Chlorobenzene	TM116	**105.4** 83.81 : 114.18	**104.0** 83.81 : 114.18	**93.6** 82.88 : 122.42
Chloroform	TM116	**110.6** 87.40 : 122.49	**104.0** 87.40 : 122.49	**101.6** 90.35 : 120.38
Chloromethane	TM116	**94.0** 65.05 : 142.63	**93.6** 65.05 : 142.63	**106.0** 52.88 : 131.36
Cis-1,2-Dichloroethene	TM116	**103.6** 80.67 : 126.72	**100.2** 80.67 : 126.72	**97.8** 78.27 : 128.90
Dibromomethane	TM116	**99.4** 76.06 : 125.74	**101.4** 76.06 : 125.74	**98.8** 76.00 : 120.73
Dichloromethane	TM116	**114.0** 81.11 : 133.25	**110.6** 81.11 : 133.25	**111.8** 89.49 : 128.89
Ethylbenzene	TM116	**97.8** 75.92 : 110.41	**96.6** 75.92 : 110.41	**83.2** 70.95 : 113.07
Hexachlorobutadiene	TM116	**86.0** 12.82 : 152.73	**68.0** 12.82 : 152.73	**45.6** 14.55 : 147.92
Isopropylbenzene	TM116	**83.8** 54.21 : 117.17	**82.0** 54.21 : 117.17	**61.8** 52.00 : 108.19
Naphthalene	TM116	**106.6** 80.86 : 128.81	**115.2** 80.86 : 128.81	**96.2** 80.29 : 135.77
o-Xylene	TM116	**90.2** 69.99 : 108.74	**89.2** 69.99 : 108.74	**75.6** 64.92 : 98.85

VOC MS (S)

		QC 2225	QC 2262	QC 2243
p/m-Xylene	TM116	**95.7** 68.32 : 108.91	**93.5** 68.32 : 108.91	**79.0** 72.04 : 104.04
Sec-Butylbenzene	TM116	**82.2** 44.91 : 118.40	**72.6** 44.91 : 118.40	**51.2** 27.03 : 135.73
Tetrachloroethene	TM116	**109.2** 76.95 : 121.02	**107.2** 76.95 : 121.02	**94.0** 81.43 : 126.65
Toluene	TM116	**98.8** 74.24 : 107.42	**97.2** 74.24 : 107.42	**89.6** 82.44 : 103.50
Trichloroethene	TM116	**99.8** 77.61 : 111.54	**100.2** 77.61 : 111.54	**93.4** 79.80 : 112.33
Trichlorofluoromethane	TM116	**107.4** 84.55 : 133.27	**103.2** 84.55 : 133.27	**107.4** 86.68 : 126.82
Vinyl Chloride	TM116	**97.8** 70.29 : 138.58	**98.0** 70.29 : 138.58	**110.6** 69.66 : 136.55

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.
The figure detailed is the percentage recovery result for the AQC.
The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 20/04843
Issue Number: s2 **Date:** 26 June, 2020

Client:
ALS Life Sciences Ltd
Units 7&8 Hawarden Business Park
Manor Road
Hawarden
Flintshire
CH5 3US

Project Manager: Hawarden Subcontracting
Project Name: Not specified
Project Ref: Various
Order No: Advised
Date Samples Received: 16/06/20
Date Instructions Received: 17/06/20
Date Analysis Completed: 24/06/20

Prepared by:

Sophie France
Client Service Manager

Approved by:

John Gustafson
Managing Director

Envirolab Job Number: 20/04843

Client Project Name: Not specified

Client Project Ref: Various

Lab Sample ID	20/04843/9	20/04843/10	20/04843/11	20/04843/12				Units	Limit of Detection	Method ref
Client Sample No	22302810	22302779	22302796	22302654						
Client Sample ID	SA01	WS02	WS07	WS07						
Depth to Top	0.20	0.45	0.20	0.80						
Depth To Bottom	0.30	0.70	0.40	1.00						
Date Sampled	02-Jun-20	05-Jun-20	05-Jun-20	05-Jun-20						
Sample Type	Soil	Soil	Soil	Soil						
Sample Matrix Code	6A	6AE	6AE	6AE						
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1				% w/w	0.1	A-T-044
Ali >C12-C16$_A^{M\#}$	<1	1	<1	<1				mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	<1	3	<1	<1				mg/kg	1	A-T-055s
Ali >C21-C35$_A$	9	21	11	<1				mg/kg	1	A-T-055s
Ali >C35-C44$_A$	1	8	2	<1				mg/kg	1	A-T-055s
Aro >C12-C16$_A$	<1	3	<1	<1				mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	<1	9	<1	<1				mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	9	54	11	<1				mg/kg	1	A-T-055s
Aro >C35-C44$_A$	3	12	3	<1				mg/kg	1	A-T-055s

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: ALS Life Sciences Ltd, Units 7&8 Hawarden Business Park, Manor Road, Hawarden, Flintshire, CH5 3US

Project:

Clients Project No: Various

Project No: 20/04843

Date Received: 17/06/2020 (am)

Cool Box Temperatures (°C): 9.6

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Appendix General

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

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

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

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

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

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

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

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

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

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

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

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

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

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

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **Asbestos**

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

Identification of Asbestos in Bulk Materials & Soils

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

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2017).*

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

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

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Hawarden
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email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

WYG Geo-Environment
5th Floor
Longcross Court
47 Newport Road
Cardiff
CF24 0AD

Attention: Sophie Brookes

CERTIFICATE OF ANALYSIS

Date of report Generation:	24 June 2020
Customer:	WYG Geo-Environment
Sample Delivery Group (SDG):	200610-85
Your Reference:	A110489-6-1
Location:	Trinity Fields
Report No:	556416

We received 6 samples on Wednesday June 10, 2020 and 4 of these samples were scheduled for analysis which was completed on Wednesday June 24, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.
The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan

Operations Manager

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
22281405	BH01	ES1	0.20 - 0.80	08/06/2020
22281410	BH01	ES2	0.80 - 1.20	08/06/2020
22281394	WS04	ES1	0.60 - 0.90	08/06/2020
22281416	WS05	ES1	0.30 - 0.50	09/06/2020
22281400	WS06	ES1	1.00 - 1.30	08/06/2020
22281389	WS09	ES1	0.40 - 0.60	08/06/2020

Maximum Sample/Coolbox Temperature (°C) : **4.8**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			22281405			22281410			22281394			22281389	
Customer Sample Reference			BH01			BH01			WS04			WS09	
AGS Reference			ES1			ES2			ES1			ES1	
Depth (m)			0.20 - 0.80			0.80 - 1.20			0.60 - 0.90			0.40 - 0.60	
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S
Alkalinity Filtered as CaCO3	All	NDPs: 0 Tests: 2	X									X		
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2	X									X		
Anions by Kone (soil)	All	NDPs: 0 Tests: 4		X			X			X			X	
Anions by Kone (w)	All	NDPs: 0 Tests: 2	X									X		
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 4	X			X			X			X		
Boron Water Soluble	All	NDPs: 0 Tests: 4		X			X			X			X	
CEN Readings	All	NDPs: 0 Tests: 2	X									X		
Chromium III	All	NDPs: 0 Tests: 4		X			X			X			X	
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 6	X	X			X			X		X	X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2	X									X		
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 2	X									X		
EPH CWG (Aliphatic) Filtered GC (W)	All	NDPs: 0 Tests: 2	X									X		
EPH CWG (Aromatic) Filtered GC (W)	All	NDPs: 0 Tests: 2	X									X		
EPH CWG GC (S)	All	NDPs: 0 Tests: 4		X			X			X			X	
GRO by GC-FID (S)	All	NDPs: 0 Tests: 4			X			X			X			X

Validated

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			22281405			22281410			22281394			22281389		
Customer Sample Reference			BH01			BH01			WS04			WS09		
AGS Reference			ES1			ES2			ES1			ES1		
Depth (m)			0.20 - 0.80			0.80 - 1.20			0.60 - 0.90			0.40 - 0.60		
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S
GRO by GC-FID (W)	All	NDPs: 0 Tests: 2	X									X		
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 4		X			X			X			X	
Mercury Dissolved	All	NDPs: 0 Tests: 2	X									X		
Metals in solid samples by OES	All	NDPs: 0 Tests: 4		X			X			X			X	
Nitrite by Kone (w)	All	NDPs: 0 Tests: 2	X									X		
PAH by GCMS	All	NDPs: 0 Tests: 4		X			X			X			X	
PAH in waters by GC-MS (diss.filt)	All	NDPs: 0 Tests: 2	X									X		
pH	All	NDPs: 0 Tests: 4		X			X			X			X	
pH Value of Filtered Water	All	NDPs: 0 Tests: 2	X									X		
Phenols by HPLC (S)	All	NDPs: 0 Tests: 4		X			X			X			X	
Phenols by HPLC (W)	All	NDPs: 0 Tests: 2	X									X		
Sample description	All	NDPs: 0 Tests: 4		X			X			X			X	
Total Organic Carbon	All	NDPs: 0 Tests: 4		X			X			X			X	
TPH CWG Filtered (W)	All	NDPs: 0 Tests: 2	X									X		
TPH CWG GC (S)	All	NDPs: 0 Tests: 4		X			X			X			X	

Validated

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

Results Legend

X **Test**

N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
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UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)				22281405			22281410			22281394			22281389										
Customer Sample Reference				BH01			BH01			WS04			WS09										
AGS Reference				ES1			ES2			ES1			ES1										
Depth (m)				0.20 - 0.80			0.80 - 1.20			0.60 - 0.90			0.40 - 0.60										
Container				1kg TUB with Handle (ALE260)		250g Amber Jar (ALE210)	60g VOC (ALE215)		1kg TUB with Handle (ALE260)		250g Amber Jar (ALE210)	60g VOC (ALE215)		1kg TUB with Handle (ALE260)		250g Amber Jar (ALE210)	60g VOC (ALE215)		1kg TUB with Handle (ALE260)		250g Amber Jar (ALE210)	60g VOC (ALE215)	
Sample Type				S		S	S		S		S	S		S		S	S		S		S	S	
VOC MS (S)	All	NDPs: 0 Tests: 4					X					X					X					X	

Sample Descriptions

Grain Sizes

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

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
22281405	BH01	0.20 - 0.80	Light Brown	Sandy Clay	Stones	Vegetation
22281410	BH01	0.80 - 1.20	Dark Brown	Clay Loam	Stones	Vegetation
22281394	WS04	0.60 - 0.90	Dark Brown	Sandy Loam	Stones	Vegetation
22281389	WS09	0.40 - 0.60	Dark Brown	Clay Loam	Stones	Vegetation

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

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

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

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH01	BH01	WS04	WS09		
			Depth (m)	0.20 - 0.80	0.80 - 1.20	0.60 - 0.90	0.40 - 0.60		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	08/06/2020	08/06/2020	08/06/2020	08/06/2020		
			Sample Time	.	.	.	.		
			Date Received	10/06/2020	10/06/2020	10/06/2020	10/06/2020		
			SDG Ref	200610-85	200610-85	200610-85	200610-85		
			Lab Sample No.(s)	22281405	22281410	22281394	22281389		
			AGS Reference	ES1	ES2	ES1	ES1		
Moisture Content Ratio (% of as received sample)	%	PM024		3.6	6.7	14	5.9		
Phenol	<0.01 mg/kg	TM062 (S)		<0.01 M	<0.01 M	<0.01 M	<0.01 M		
Fraction Organic Carbon (FOC)	<0.002	TM132		0.00974 #	0.0076 #	0.0145 #	0.0144 #		
pH	1 pH Units	TM133		8.33 M	8.56 M	7.64 M	7.63 M		
Chromium, Hexavalent	<0.6 mg/kg	TM151		<0.6 #	<0.6 #	<0.6 #	<0.6 #		
Cyanide, Easily liberatable (low level)	<0.5 mg/kg	TM153		<0.5	<0.5	<0.5	<0.5		
Chromium, Trivalent	<0.9 mg/kg	TM181		<0.9	2.78	8.07	<0.9		
Arsenic	<0.6 mg/kg	TM181		8.25 M	4.76 M	14.1 M	12.3 M		
Beryllium	<0.01 mg/kg	TM181		0.439 M	0.281 M	0.453 M	0.743 M		
Cadmium	<0.02 mg/kg	TM181		0.478 M	0.151 M	0.308 M	0.364 M		
Chromium	<0.9 mg/kg	TM181		<0.9 M	2.78 M	8.07 M	<0.9 M		
Copper	<1.4 mg/kg	TM181		7.81 M	3.66 M	12.2 M	22.1 M		
Lead	<0.7 mg/kg	TM181		19.2 M	6.88 M	28.6 M	27.1 M		
Mercury	<0.14 mg/kg	TM181		<0.14 M	<0.14 M	<0.14 M	<0.14 M		
Nickel	<0.2 mg/kg	TM181		13.5 M	11.7 M	17.8 M	31.1 M		
Selenium	<1 mg/kg	TM181		<1 #	<1 #	1.27 #	<1 #		
Vanadium	<0.2 mg/kg	TM181		9 #	5.77 #	19.2 #	14.5 #		
Zinc	<1.9 mg/kg	TM181		72.2 M	37.2 M	66 M	430 M		
Boron, water soluble	<1 mg/kg	TM222		<1 M	<1 M	<1 M	<1 M		
Water Soluble Sulphate as SO4 2:1 Extract	<0.004 g/l	TM243		0.0161 M	0.0541 M	<0.004 M	0.0395 M		

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

PAH by GCMS

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH01	BH01	WS04	WS09		
			Depth (m)	0.20 - 0.80	0.80 - 1.20	0.60 - 0.90	0.40 - 0.60		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	08/06/2020	08/06/2020	08/06/2020	08/06/2020		
			Sample Time	.	.	.	.		
			Date Received	10/06/2020	10/06/2020	10/06/2020	10/06/2020		
			SDG Ref	200610-85	200610-85	200610-85	200610-85		
			Lab Sample No.(s)	22281405	22281410	22281394	22281389		
			AGS Reference	ES1	ES2	ES1	ES1		
Naphthalene-d8 % recovery**	%	TM218		89	85.8	86.5	89.7		
Acenaphthene-d10 % recovery**	%	TM218		88.3	87.3	87.2	89.3		
Phenanthrene-d10 % recovery**	%	TM218		87	89	86.2	88		
Chrysene-d12 % recovery**	%	TM218		89.8	91.1	84.5	89.4		
Perylene-d12 % recovery**	%	TM218		85.1	85.7	78.5	85		
Naphthalene	<0.009 mg/kg	TM218		<0.009 M	0.0109 M	<0.009 M	<0.009 M		
Acenaphthylene	<0.012 mg/kg	TM218		<0.012 M	0.0132 M	<0.012 M	<0.012 M		
Acenaphthene	<0.008 mg/kg	TM218		<0.008 M	<0.008 M	<0.008 M	<0.008 M		
Fluorene	<0.01 mg/kg	TM218		<0.01 M	0.0156 M	<0.01 M	<0.01 M		
Phenanthrene	<0.015 mg/kg	TM218		0.0287 M	0.132 M	<0.015 M	<0.015 M		
Anthracene	<0.016 mg/kg	TM218		<0.016 M	0.0309 M	<0.016 M	<0.016 M		
Fluoranthene	<0.017 mg/kg	TM218		0.0721 M	0.184 M	0.0423 M	<0.017 M		
Pyrene	<0.015 mg/kg	TM218		0.0611 M	0.143 M	0.0317 M	<0.015 M		
Benz(a)anthracene	<0.014 mg/kg	TM218		0.0521 M	0.117 M	0.0278 M	<0.014 M		
Chrysene	<0.01 mg/kg	TM218		0.0662 M	0.142 M	0.0418 M	<0.01 M		
Benzo(b)fluoranthene	<0.015 mg/kg	TM218		0.1 M	0.162 M	0.0537 M	<0.015 M		
Benzo(k)fluoranthene	<0.014 mg/kg	TM218		0.0304 M	0.0509 M	0.0169 M	<0.014 M		
Benzo(a)pyrene	<0.015 mg/kg	TM218		0.0556 M	0.095 M	0.0266 M	<0.015 M		
Indeno(1,2,3-cd)pyrene	<0.018 mg/kg	TM218		0.0496 M	0.0718 M	0.0228 M	<0.018 M		
Dibenzo(a,h)anthracene	<0.023 mg/kg	TM218		<0.023 M	<0.023 M	<0.023 M	<0.023 M		
Benzo(g,h,i)perylene	<0.024 mg/kg	TM218		0.0456 M	0.0574 M	<0.024 M	<0.024 M		
PAH, Total Detected USEPA 16	<0.118 mg/kg	TM218		0.562	1.23	0.264	<0.118		

Validated

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

TPH CWG (S)

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH01	BH01	WS04	WS09		
			Depth (m)	0.20 - 0.80	0.80 - 1.20	0.60 - 0.90	0.40 - 0.60		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	08/06/2020	08/06/2020	08/06/2020	08/06/2020		
			Sample Time	.	.	.	.		
			Date Received	10/06/2020	10/06/2020	10/06/2020	10/06/2020		
			SDG Ref	200610-85	200610-85	200610-85	200610-85		
			Lab Sample No.(s)	22281405	22281410	22281394	22281389		
			AGS Reference	ES1	ES2	ES1	ES1		
GRO Surrogate % recovery**	%	TM089		95.4	99.4	93.8	101		
Aliphatics >C5-C6	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aliphatics >C6-C8	<0.01 mg/kg	TM089		<0.01	0.0257	<0.01	<0.01		
Aliphatics >C8-C10	<0.01 mg/kg	TM089		<0.01	0.0182	<0.01	<0.01		
Aliphatics >C10-C12	<1 mg/kg	TM414		<1	<1	<1	<1		
Aliphatics >C12-C16	<1 mg/kg	TM414		<1	<1	<1	<1		
Aliphatics >C16-C21	<1 mg/kg	TM414		<1	1.72	<1	<1		
Aliphatics >C21-C35	<1 mg/kg	TM414		17.2	28.2	4.25	1.66		
Aliphatics >C35-C44	<1 mg/kg	TM414		<1	2.95	<1	<1		
Total Aliphatics >C10-C44	<5 mg/kg	TM414		18.9	33	<5	<5		
Total Aliphatics & Aromatics >C10-C44	<10 mg/kg	TM414		34.1	44.6	<10	<10		
Aromatics >EC5-EC7	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aromatics >EC7-EC8	<0.01 mg/kg	TM089		<0.01	<0.01	<0.01	<0.01		
Aromatics >EC8-EC10	<0.01 mg/kg	TM089		<0.01	0.0118	<0.01	<0.01		
Aromatics > EC10-EC12	<1 mg/kg	TM414		<1	<1	<1	<1		
Aromatics > EC12-EC16	<1 mg/kg	TM414		<1	<1	<1	<1		
Aromatics > EC16-EC21	<1 mg/kg	TM414		<1	<1	<1	<1		
Aromatics > EC21-EC35	<1 mg/kg	TM414		12.1	8.93	1.34	<1		
Aromatics >EC35-EC44	<1 mg/kg	TM414		2.17	1.99	<1	<1		
Aromatics > EC40-EC44	<1 mg/kg	TM414		<1	1.06	<1	<1		
Total Aromatics > EC10-EC44	<5 mg/kg	TM414		15.2	11.6	<5	<5		
Total Aliphatics & Aromatics >C5-C44	<10 mg/kg	TM414		34.1	44.6	<10	<10		
Total Aliphatics >C5-C10	<0.05 mg/kg	TM089		<0.05	<0.05	<0.05	<0.05		
Total Aromatics >EC5-EC10	<0.05 mg/kg	TM089		<0.05	<0.05	<0.05	<0.05		
GRO >C5-C10	<0.02 mg/kg	TM089		<0.02	<0.02	<0.02	<0.02		

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

VOC MS (S)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH01	BH01	WS04	WS09		
			Depth (m)	0.20 - 0.80	0.80 - 1.20	0.60 - 0.90	0.40 - 0.60		
			Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
			Date Sampled	08/06/2020	08/06/2020	08/06/2020	08/06/2020		
			Sample Time	.	.	.	.		
			Date Received	10/06/2020	10/06/2020	10/06/2020	10/06/2020		
			SDG Ref	200610-85	200610-85	200610-85	200610-85		
			Lab Sample No.(s)	22281405	22281410	22281394	22281389		
			AGS Reference	ES1	ES2	ES1	ES1		
Dibromofluoromethane**	%	TM116		111	110	107	112		
Toluene-d8**	%	TM116		97.7	93	97.7	94.6		
4-Bromofluorobenzene**	%	TM116		94.5	71.3	96.4	82.7		
Methyl Tertiary Butyl Ether	<0.01 mg/kg	TM116		<0.2 M	<0.01 M	<0.2 M	<0.01 M		
Benzene	<0.009 mg/kg	TM116		<0.18 M	<0.009 M	<0.18 M	<0.009 M		
Toluene	<0.007 mg/kg	TM116		<0.14 M	<0.007 M	<0.14 M	<0.007 M		
Ethylbenzene	<0.004 mg/kg	TM116		<0.08 M	<0.004 M	<0.08 M	<0.004 M		
p/m-Xylene	<0.01 mg/kg	TM116		<0.2 #	<0.01 #	<0.2 #	<0.01 #		
o-Xylene	<0.01 mg/kg	TM116		<0.2 M	<0.01 M	<0.2 M	<0.01 M		

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

Asbestos Identification - Solid Samples

Results Legend

#	ISO17025 accredited.
M	*m*CERTS accredited.
*	Subcontracted test.
(F)	Trigger breach confirmed
1-5&♦§@	Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Fibrous Actinolite	Fibrous Anthophyllite	Fibrous Tremolite	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH01ES1 0.20 - 0.80 SOLID 08/06/2020 00:00:00 10/06/2020 12:16:00 200610-85 22281405 TM048	17/06/2020	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	BH01ES2 0.80 - 1.20 SOLID 08/06/2020 00:00:00 10/06/2020 12:16:00 200610-85 22281410 TM048	17/06/2020	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS04ES1 0.60 - 0.90 SOLID 08/06/2020 00:00:00 10/06/2020 12:16:00 200610-85 22281394 TM048	17/06/2020	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	WS09ES1 0.40 - 0.60 SOLID 08/06/2020 00:00:00 10/06/2020 12:16:00 200610-85 22281389 TM048	17/06/2020	Marcin Magdziarek	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Trinity Fields
Mass Sample taken (kg)	0.098	**Natural Moisture Content (%)**	8.59
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	92.1
Particle Size <4mm	>95%		

Case	
SDG	200610-85
Lab Sample Number(s)	22281389
Sampled Date	08-Jun-2020
Customer Sample Ref.	WS09 ES1
Depth (m)	0.40 - 0.60

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO2	<0.05	<0.05	<0.5	<0.5	-	-	-
Sulphate (soluble)	<2	<2	<20	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	<3	<3	<30	<30	-	-	-
Mercury Dissolved (CVAF)	0.0000109	<0.00001	0.000109	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH3	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	<0.0005	<0.0005	<0.005	<0.005	-	-	-
Total Ammonium as NH4	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.168	<0.0002	1.68	<0.002	-	-	-
Nitrate as NO3	0.958	<0.3	9.58	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Boron	0.0259	<0.01	0.259	<0.1	-	-	-
Phenanthrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO3	11	<2	110	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

Leach Test Information

Date Prepared	10-Jun-2020
pH (pH Units)	9.22
Conductivity (µS/cm)	30.40
Temperature (°C)	21.20
Volume Leachant (Litres)	0.892

Mcerts Certification does not apply to leachates

24/06/2020 12:24:04

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Trinity Fields
Mass Sample taken (kg)	0.098	**Natural Moisture Content (%)**	8.59
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	92.1
Particle Size <4mm	>95%		

Case	
SDG	200610-85
Lab Sample Number(s)	22281389
Sampled Date	08-Jun-2020
Customer Sample Ref.	WS09 ES1
Depth (m)	0.40 - 0.60

Eluate Analysis	**C_2 Conc^n in 10:1 eluate (mg/l)**		**A_2 10:1 conc^n leached (mg/kg)**				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.000993	<0.0003	0.00993	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	0.000342	<0.0002	0.00342	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	<0.003	<0.003	<0.03	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	<0.000082	<0.000082	<0.00082	<0.00082	-	-	-
Nickel	<0.0004	<0.0004	<0.004	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.00524	<0.001	0.0524	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

Leach Test Information

Date Prepared	10-Jun-2020
pH (pH Units)	9.22
Conductivity (µS/cm)	30.40
Temperature (°C)	21.20
Volume Leachant (Litres)	0.892

Mcerts Certification does not apply to leachates

24/06/2020 12:24:04

12:23:49 24/06/2020

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Trinity Fields
Mass Sample taken (kg)	0.095	**Natural Moisture Content (%)**	4.87
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	95.4
Particle Size <4mm	>95%		

Case	
SDG	200610-85
Lab Sample Number(s)	22281405
Sampled Date	08-Jun-2020
Customer Sample Ref.	BH01 ES1
Depth (m)	0.20 - 0.80

Eluate Analysis	**C_2** Conc^n in 10:1 eluate (mg/l)		**A_2** 10:1 conc^n leached (mg/kg)				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Aliphatics >C12-C16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C16-C21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C21-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aliphatics >C12-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC12-EC16	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC21	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC21-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC16-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
Total Aromatics >EC12-EC35	<0.01	<0.01	<0.1	<0.1	-	-	-
TPH (Total Aliphatics + Total Aromatics) >C5-C35	<0.01	<0.01	<0.1	<0.1	-	-	-
Nitrite as NO2	0.235	<0.05	2.35	<0.5	-	-	-
Sulphate (soluble)	3.9	<2	39	<20	-	-	-
Chloride	<2	<2	<20	<20	-	-	-
Dissolved Organic Carbon	5.04	<3	50.4	<30	-	-	-
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Antimony	<0.001	<0.001	<0.01	<0.01	-	-	-
Naphthalene (diss.filt)	<0.00001	<0.00001	<0.0001	<0.0001	-	-	-
Total Ammonia as NH3	<0.2	<0.2	<2	<2	-	-	-
Total Cyanide (W)	<0.05	<0.05	<0.5	<0.5	-	-	-
Acenaphthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Arsenic	0.000648	<0.0005	0.00648	<0.005	-	-	-
Total Ammonium as NH4	<0.3	<0.3	<3	<3	-	-	-
Acenaphthylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Barium	0.308	<0.0002	3.08	<0.002	-	-	-
Nitrate as NO3	1.52	<0.3	15.2	<3	-	-	-
Phenol by HPLC (W)	<0.002	<0.002	<0.02	<0.02	-	-	-
Beryllium	<0.0001	<0.0001	<0.001	<0.001	-	-	-
Fluoranthene (diss.filt)	0.00000676	<0.000005	0.0000676	<0.00005	-	-	-
Anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Boron	0.0315	<0.01	0.315	<0.1	-	-	-
Phenanthrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Total Alkalinity Filtered as CaCO3	70	<2	700	<20	-	-	-
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	-	-	-
Fluorene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chrysene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-

Leach Test Information

Date Prepared	10-Jun-2020
pH (pH Units)	8.02
Conductivity (µS/cm)	130.00
Temperature (°C)	21.00
Volume Leachant (Litres)	0.896

Mcerts Certification does not apply to leachates

24/06/2020 12:24:04

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

CEN 10:1 SINGLE STAGE LEACHATE TEST

CEN ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Trinity Fields
Mass Sample taken (kg)	0.095	**Natural Moisture Content (%)**	4.87
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	95.4
Particle Size <4mm	>95%		

Case	
SDG	200610-85
Lab Sample Number(s)	22281405
Sampled Date	08-Jun-2020
Customer Sample Ref.	BH01 ES1
Depth (m)	0.20 - 0.80

Eluate Analysis	**C_2 Concⁿ in 10:1 eluate (mg/l)**		**A_2 10:1 concⁿ leached (mg/kg)**				
	Result	**Limit of Detection**	**Result**	**Limit of Detection**			
Pyrene (diss.filt)	0.00000571	<0.000005	0.0000571	<0.00005	-	-	-
Benzo(a)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Chromium	<0.001	<0.001	<0.01	<0.01	-	-	-
Benzo(b)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(k)fluoranthene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Benzo(a)pyrene (diss.filt)	<0.000002	<0.000002	<0.00002	<0.00002	-	-	-
Copper	0.00294	<0.0003	0.0294	<0.003	-	-	-
Dibenzo(a,h)anthracene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Lead	<0.0002	<0.0002	<0.002	<0.002	-	-	-
Benzo(g,h,i)perylene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Indeno(1,2,3-cd)pyrene (diss.filt)	<0.000005	<0.000005	<0.00005	<0.00005	-	-	-
Molybdenum	0.00383	<0.003	0.0383	<0.03	-	-	-
PAH 16 EPA Total by GCMS (diss.filt)	<0.000082	<0.000082	<0.00082	<0.00082	-	-	-
Nickel	0.000543	<0.0004	0.00543	<0.004	-	-	-
Selenium	<0.001	<0.001	<0.01	<0.01	-	-	-
Zinc	0.00522	<0.001	0.0522	<0.01	-	-	-
TPH CWG (W)							
Surrogate Recovery	-	<0	-	<0	-	-	-
GRO TOT (C5-C12)	<0.05	<0.05	<0.5	<0.5	-	-	-
Aliphatics C5-C6	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C6-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C8-C10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aliphatics >C10-C12	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics C6-C7	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >C7-C8	<0.01	<0.01	<0.1	<0.1	-	-	-
MTBE GC-FID	<0.003	<0.003	<0.03	<0.03	-	-	-
Aromatics >EC8 -EC10	<0.01	<0.01	<0.1	<0.1	-	-	-
Aromatics >EC10-EC12	<0.01	<0.01	<0.1	<0.1	-	-	-
Benzene by GC	<0.007	<0.007	<0.07	<0.07	-	-	-
Toluene by GC	<0.004	<0.004	<0.04	<0.04	-	-	-
Ethylbenzene by GC	<0.005	<0.005	<0.05	<0.05	-	-	-
m & p Xylene by GC	<0.008	<0.008	<0.08	<0.08	-	-	-
o Xylene by GC	<0.003	<0.003	<0.03	<0.03	-	-	-
Sum m&p and o Xylene by GC	<0.011	<0.011	<0.11	<0.11	-	-	-
Sum of BTEX by GC	<0.028	<0.028	<0.28	<0.28	-	-	-

Leach Test Information

Date Prepared	10-Jun-2020
pH (pH Units)	8.02
Conductivity (µS/cm)	130.00
Temperature (°C)	21.00
Volume Leachant (Litres)	0.896

Mcerts Certification does not apply to leachates

24/06/2020 12:24:04

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:soil) by IRIS Emission Spectrometer
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM243		Mixed Anions In Soils By Kone
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	22281405	22281410	22281394	22281389
Customer Sample Ref.	BH01	BH01	WS04	WS09
AGS Ref.	ES1	ES2	ES1	ES1
Depth	0.20 - 0.80	0.80 - 1.20	0.60 - 0.90	0.40 - 0.60
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Alkalinity Filtered as CaCO3	16-Jun-2020			16-Jun-2020
Ammoniacal Nitrogen	15-Jun-2020			15-Jun-2020
Anions by Kone (soil)	12-Jun-2020	15-Jun-2020	12-Jun-2020	12-Jun-2020
Anions by Kone (w)	16-Jun-2020			16-Jun-2020
Asbestos ID in Solid Samples	17-Jun-2020	17-Jun-2020	17-Jun-2020	17-Jun-2020
Boron Water Soluble	12-Jun-2020	12-Jun-2020	12-Jun-2020	12-Jun-2020
CEN 10:1 Leachate (1 Stage)	11-Jun-2020			11-Jun-2020
CEN Readings	16-Jun-2020			16-Jun-2020
Chromium III	17-Jun-2020	17-Jun-2020	17-Jun-2020	17-Jun-2020
Cyanide Comp/Free/Total/Thiocyanate	16-Jun-2020	16-Jun-2020	16-Jun-2020	16-Jun-2020
Dissolved Metals by ICP-MS	16-Jun-2020			16-Jun-2020
Dissolved Organic/Inorganic Carbon	17-Jun-2020			17-Jun-2020
EPH CWG (Aliphatic) Filtered GC (W)	16-Jun-2020			16-Jun-2020
EPH CWG (Aromatic) Filtered GC (W)	16-Jun-2020			16-Jun-2020
EPH CWG GC (S)	22-Jun-2020	24-Jun-2020	22-Jun-2020	24-Jun-2020
GRO by GC-FID (S)	15-Jun-2020	15-Jun-2020	15-Jun-2020	15-Jun-2020
GRO by GC-FID (W)	15-Jun-2020			15-Jun-2020
Hexavalent Chromium (s)	11-Jun-2020	11-Jun-2020	15-Jun-2020	11-Jun-2020
Mercury Dissolved	15-Jun-2020			15-Jun-2020
Metals in solid samples by OES	17-Jun-2020	17-Jun-2020	17-Jun-2020	17-Jun-2020
Moisture at 105C	10-Jun-2020			10-Jun-2020
Nitrite by Kone (w)	15-Jun-2020			15-Jun-2020
PAH by GCMS	15-Jun-2020	15-Jun-2020	12-Jun-2020	12-Jun-2020
PAH in waters by GC-MS (diss.filt)	16-Jun-2020			16-Jun-2020
pH	12-Jun-2020	12-Jun-2020	12-Jun-2020	12-Jun-2020
pH Value of Filtered Water	16-Jun-2020			16-Jun-2020
Phenols by HPLC (S)	15-Jun-2020	12-Jun-2020	12-Jun-2020	15-Jun-2020
Phenols by HPLC (W)	16-Jun-2020			17-Jun-2020
Sample description	10-Jun-2020	10-Jun-2020	10-Jun-2020	10-Jun-2020
Total Organic Carbon	15-Jun-2020	15-Jun-2020	15-Jun-2020	15-Jun-2020
TPH CWG Filtered (W)	16-Jun-2020			16-Jun-2020
TPH CWG GC (S)	22-Jun-2020	24-Jun-2020	22-Jun-2020	24-Jun-2020
VOC MS (S)	16-Jun-2020	15-Jun-2020	16-Jun-2020	15-Jun-2020

ASSOCIATED AQC DATA

Alkalinity Filtered as CaCO3

Component	Method Code	QC 2252	QC 2275
Total Alkalinity Filtered as CaCO3	TM043	**101.01** 95.62 : 106.88	**110.0** 100.35 : 114.15

Ammoniacal Nitrogen

Component	Method Code	QC 2222
Ammoniacal Nitrogen as N	TM099	**100.0** 93.14 : 108.60

Anions by Kone (soil)

Component	Method Code	QC 2217
Chloride (soluble)	TM243	**94.3** 77.23 : 120.97
Water Soluble Sulphate as SO4 2:1 Extract	TM243	**94.86** 75.60 : 131.10

Anions by Kone (w)

Component	Method Code	QC 2280
Chloride	TM184	**101.0** 94.04 : 108.61
Sulphate (soluble)	TM184	**99.2** 91.99 : 109.30
TON as NO3	TM184	**101.5** 92.98 : 109.90

Boron Water Soluble

Component	Method Code	QC 2210	QC 2260
Water Soluble Boron	TM222	**101.0** 85.80 : 112.50	**97.0** 85.80 : 112.50

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2297	QC 2229	QC 2260	QC 2251	QC 2261
Free Cyanide	TM153	**100.99** 82.09 : 117.91	**102.97** 82.09 : 117.91	**94.75** 82.09 : 117.91		
Free Cyanide (W)	TM227				**109.0** 90.50 : 114.50	**103.75** 90.50 : 114.50
Thiocyanate	TM153	**105.13** 90.48 : 109.52	**105.77** 90.48 : 109.52	**96.15** 90.48 : 109.52		

Cyanide Comp/Free/Total/Thiocyanate

		QC 2297	QC 2229	QC 2260	QC 2251	QC 2261
Thiocyanate (W)	TM227				**101.0** 90.50 : 113.00	**98.25** 90.50 : 113.00
Total Cyanide	TM153	**105.59** 86.12 : 113.88	**103.5** 86.12 : 113.88	**91.61** 86.12 : 113.88		
Total Cyanide (W)	TM227				**108.25** 91.75 : 112.75	**108.0** 91.75 : 112.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 2221
Aluminium	TM152	**104.0** 91.36 : 108.58
Antimony	TM152	**99.17** 88.37 : 130.57
Arsenic	TM152	**99.17** 92.62 : 113.52
Barium	TM152	**97.67** 88.14 : 108.73
Beryllium	TM152	**105.17** 89.98 : 116.88
Bismuth	TM152	**101.17** 92.62 : 115.02
Boron	TM152	**109.67** 86.31 : 120.88
Cadmium	TM152	**101.5** 93.85 : 111.65
Calcium	TM152	**94.0** 89.20 : 126.91
Chromium	TM152	**101.0** 92.22 : 109.85
Cobalt	TM152	**100.33** 85.01 : 114.87
Copper	TM152	**101.0** 89.87 : 119.73
Iron	TM152	**103.33** 93.02 : 113.86
Lead	TM152	**102.17** 91.11 : 116.98
Lithium	TM152	**106.67** 91.30 : 123.00
Magnesium	TM152	**98.0** 89.60 : 116.61
Manganese	TM152	**106.0** 93.97 : 112.46
Molybdenum	TM152	**98.5** 89.07 : 110.96
Nickel	TM152	**102.83** 93.70 : 112.15
Phosphorus	TM152	**97.33** 89.24 : 114.18
Potassium	TM152	**94.67** 93.20 : 115.55
Selenium	TM152	**101.17** 91.69 : 117.12

Dissolved Metals by ICP-MS

		QC 2221
Silver	TM152	**109.33** 90.93 : 121.73
Sodium	TM152	**98.0** 92.42 : 113.24
Strontium	TM152	**98.67** 92.14 : 116.24
Tellurium	TM152	**95.67** 89.88 : 111.78
Thallium	TM152	**92.83** 82.43 : 113.83
Tin	TM152	**100.0** 94.62 : 107.79
Titanium	TM152	**106.0** 90.29 : 115.23
Tungsten	TM152	**99.67** 77.61 : 132.31
Uranium	TM152	**101.0** 86.97 : 115.76
Vanadium	TM152	**100.33** 89.61 : 115.48
Zinc	TM152	**103.33** 87.51 : 116.26

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 2269
Dissolved Inorganic Carbon	TM090	**106.0** 91.27 : 109.87
Dissolved Organic Carbon	TM090	**100.67** 97.87 : 108.77

EPH CWG GC (S)

Component	Method Code	QC 2204
EPH >C8-C40 Raw	TM414	**73.31** 58.30 : 125.82
Total Aliphatics Raw	TM414	**75.14** 62.99 : 136.42
Total Aromatics Raw	TM414	**102.19** 58.66 : 146.54

GRO by GC-FID (S)

Component	Method Code	QC 2290
QC	TM089	**83.78** 70.34 : 111.95

GRO by GC-FID (W)

GRO by GC-FID (W)

Component	Method Code	QC 2290
Benzene by GC	TM245	**97.5** 79.13 : 118.84
Ethylbenzene by GC	TM245	**102.0** 79.54 : 115.99
m & p Xylene by GC	TM245	**101.5** 78.44 : 116.32
MTBE GC-FID	TM245	**94.0** 81.43 : 120.09
o Xylene by GC	TM245	**101.0** 76.85 : 120.29
QC	TM245	**103.43** 71.58 : 131.01
Toluene by GC	TM245	**100.5** 79.00 : 121.96

Hexavalent Chromium (s)

Component	Method Code	QC 2223	QC 2206
Hexavalent Chromium	TM151	**100.0** 95.60 : 107.60	**100.0** 95.60 : 107.60

Mercury Dissolved

Component	Method Code	QC 2272	QC 2289
Mercury Dissolved (CVAF)	TM183	**98.0** 75.00 : 111.00	**79.8** 76.80 : 117.12

Metals in solid samples by OES

Component	Method Code	QC 2232
Aluminium	TM181	**109.73** 73.56 : 108.85
Antimony	TM181	**102.85** 76.89 : 111.24
Arsenic	TM181	**110.47** 88.53 : 111.01
Barium	TM181	**106.42** 77.67 : 105.35
Beryllium	TM181	**108.58** 85.44 : 109.61
Boron	TM181	**94.84** 73.51 : 104.66
Cadmium	TM181	**92.18** 77.67 : 104.12
Chromium	TM181	**103.85** 82.26 : 104.55
Cobalt	TM181	**100.31** 84.60 : 104.13

CERTIFICATE OF ANALYSIS

SDG:	200610-85	**Client Reference:**	A110489-6-1	**Report Number:**	556416
Location:	Trinity Fields	**Order Number:**	C20/345	**Superseded Report:**	

Metals in solid samples by OES

		QC 2232
Copper	TM181	**102.11** 82.40 : 105.45
Iron	TM181	**108.73** 82.95 : 110.58
Lead	TM181	**104.05** 78.24 : 104.05
Manganese	TM181	**120.56** 94.29 : 119.51
Mercury	TM181	**102.17** 83.16 : 107.81
Molybdenum	TM181	**106.17** 87.11 : 106.87
Nickel	TM181	**101.96** 80.26 : 102.28
Phosphorus	TM181	**115.15** 94.56 : 124.28
Selenium	TM181	**108.63** 82.28 : 110.48
Strontium	TM181	**98.89** 79.13 : 102.79
Thallium	TM181	**109.73** 82.94 : 111.86
Tin	TM181	**109.51** 86.72 : 110.03
Titanium	TM181	**70.38** 66.23 : 102.06
Vanadium	TM181	**102.56** 86.19 : 109.45
Zinc	TM181	**108.42** 84.68 : 113.99

PAH by GCMS

Component	**Method Code**	QC 2201
Acenaphthene	TM218	**95.5** 80.97 : 105.99
Acenaphthylene	TM218	**94.0** 80.24 : 105.29
Anthracene	TM218	**95.0** 73.72 : 109.23
Benz(a)anthracene	TM218	**101.0** 79.72 : 116.84
Benzo(a)pyrene	TM218	**97.0** 68.42 : 118.29
Benzo(b)fluoranthene	TM218	**87.5** 77.35 : 112.97
Benzo(ghi)perylene	TM218	**93.0** 77.68 : 107.38
Benzo(k)fluoranthene	TM218	**101.0** 82.61 : 111.93
Chrysene	TM218	**95.0** 80.28 : 111.42
Dibenzo(ah)anthracene	TM218	**94.0** 79.17 : 106.41

PAH by GCMS

		QC 2201
Fluoranthene	TM218	**99.5** 79.07 : 112.75
Fluorene	TM218	**95.0** 80.52 : 110.90
Indeno(123cd)pyrene	TM218	**97.0** 76.97 : 113.36
Naphthalene	TM218	**88.0** 78.94 : 110.91
Phenanthrene	TM218	**96.5** 79.34 : 111.91
Pyrene	TM218	**98.5** 74.43 : 114.36

PAH in waters by GC-MS (diss.filt)

Component	Method Code	QC 2268
Acenaphthene (diss.filt)	TM178	**108.4** 94.40 : 118.40
Acenaphthylene (diss.filt)	TM178	**101.2** 92.00 : 116.00
Anthracene (diss.filt)	TM178	**100.4** 88.80 : 115.20
Benzo(a)anthracene (diss.filt)	TM178	**101.2** 85.20 : 118.80
Benzo(a)pyrene (diss.filt)	TM178	**102.4** 90.40 : 119.20
Benzo(b)fluoranthene (diss.filt)	TM178	**107.6** 86.40 : 122.40
Benzo(g,h,i)perylene (diss.filt)	TM178	**100.8** 92.00 : 116.00
Benzo(k)fluoranthene (diss.filt)	TM178	**106.4** 92.00 : 125.60
Chrysene (diss.filt)	TM178	**104.0** 95.20 : 121.60
Dibenzo(a,h)anthracene (diss.filt)	TM178	**104.8** 88.80 : 112.80
Fluoranthene (diss.filt)	TM178	**103.6** 87.60 : 118.80
Fluorene (diss.filt)	TM178	**103.2** 93.60 : 117.60
Indeno(1,2,3-cd)pyrene (diss.filt)	TM178	**107.6** 85.60 : 114.40
Naphthalene (diss.filt)	TM178	**102.4** 87.20 : 123.20
Phenanthrene (diss.filt)	TM178	**101.6** 94.00 : 118.00
Pyrene (diss.filt)	TM178	**102.8** 87.20 : 120.80

pH

pH

Component	Method Code	QC 2209
pH	TM133	**101.19** 98.47 : 102.33

pH Value of Filtered Water

Component	Method Code	QC 2276
pH	TM256	**102.16** 100.13 : 103.37

Phenols by HPLC (S)

Component	Method Code	QC 2205	QC 2281
2.3.5 Trimethyl-Phenol by HPLC (S)	TM062 (S)	**103.9** 65.50 : 89.50	**111.69** 65.50 : 89.50
2-Isopropyl Phenol by HPLC (S)	TM062 (S)	**91.81** 84.00 : 124.00	**92.98** 84.00 : 124.00
Catechol by HPLC (S)	TM062 (S)	**93.33** 19.39 : 135.70	**95.24** 19.39 : 135.70
Cresols by HPLC (S)	TM062 (S)	**97.49** 81.00 : 112.20	**101.25** 81.00 : 112.20
Napthol by HPLC (S)	TM062 (S)	**118.57** 57.50 : 102.50	**128.57** 57.50 : 102.50
Phenol by HPLC (S)	TM062 (S)	**105.3** 88.67 : 124.67	**109.93** 88.67 : 124.67
Resorcinol HPLC (S)	TM062 (S)	**94.97** 69.99 : 127.22	**101.26** 69.99 : 127.22
Xylenols by HPLC (S)	TM062 (S)	**99.58** 90.22 : 114.22	**106.25** 95.22 : 115.89

Phenols by HPLC (W)

Component	Method Code	QC 2268	QC 2255
2.3.5 Trimethyl-Phenol by HPLC (W)	TM259	**95.0** 78.51 : 104.18	**97.0** 91.00 : 109.00
2-Isopropyl Phenol by HPLC (W)	TM259	**96.0** 84.55 : 110.90	**92.0** 85.00 : 109.00
Cresols by HPLC (W)	TM259	**91.0** 90.00 : 112.00	**99.0** 93.00 : 115.00
Napthol by HPLC (W)	TM259	**106.0** 82.00 : 124.00	**103.0** 86.00 : 128.00
Phenol by HPLC (W)	TM259	**96.0** 86.80 : 112.60	**99.0** 88.24 : 111.76
Xylenols by HPLC (W)	TM259	**99.33** 94.74 : 115.71	**98.83** 93.33 : 107.33

Total Organic Carbon

Total Organic Carbon

Component	Method Code	QC 2270
Total Organic Carbon	TM132	**99.61** 84.82 : 117.61

VOC MS (S)

Component	Method Code	QC 2212	QC 2269
1,1,1,2-tetrachloroethane	TM116	**102.6** 84.84 : 116.25	**103.6** 84.84 : 116.25
1,1,1-Trichloroethane	TM116	**91.2** 73.73 : 118.05	**95.6** 73.73 : 118.05
1,1,2-Trichloroethane	TM116	**99.0** 77.12 : 116.04	**110.2** 77.12 : 116.04
1,1-Dichloroethane	TM116	**97.0** 74.46 : 129.15	**100.2** 74.46 : 129.15
1,2-Dichloroethane	TM116	**113.8** 92.38 : 131.65	**121.8** 92.38 : 131.65
1,4-Dichlorobenzene	TM116	**96.2** 83.64 : 126.18	**100.0** 83.64 : 126.18
2-Chlorotoluene	TM116	**89.0** 75.26 : 110.11	**91.4** 75.26 : 110.11
4-Chlorotoluene	TM116	**85.8** 66.90 : 112.46	**87.4** 66.90 : 112.46
Benzene	TM116	**99.4** 88.60 : 113.80	**102.8** 88.60 : 113.80
Carbon Disulphide	TM116	**93.0** 74.91 : 122.14	**93.6** 74.91 : 122.14
Carbontetrachloride	TM116	**103.2** 80.31 : 124.50	**103.8** 80.31 : 124.50
Chlorobenzene	TM116	**102.6** 83.81 : 114.18	**104.2** 83.81 : 114.18
Chloroform	TM116	**102.0** 87.40 : 122.49	**106.2** 87.40 : 122.49
Chloromethane	TM116	**100.2** 65.05 : 142.63	**94.0** 65.05 : 142.63
Cis-1,2-Dichloroethene	TM116	**95.4** 80.67 : 126.72	**100.8** 80.67 : 126.72
Dibromomethane	TM116	**99.4** 76.06 : 125.74	**110.0** 76.06 : 125.74
Dichloromethane	TM116	**106.4** 81.11 : 133.25	**115.4** 81.11 : 133.25
Ethylbenzene	TM116	**92.4** 75.92 : 110.41	**92.8** 75.92 : 110.41
Hexachlorobutadiene	TM116	**71.6** 12.82 : 152.73	**67.4** 12.82 : 152.73
Isopropylbenzene	TM116	**70.8** 54.21 : 117.17	**72.4** 54.21 : 117.17
Naphthalene	TM116	**113.4** 80.86 : 128.81	**113.8** 80.86 : 128.81
o-Xylene	TM116	**84.8** 69.99 : 108.74	**87.0** 69.99 : 108.74

		QC 2212	QC 2269
p/m-Xylene	TM116	**89.0** 68.32 : 108.91	**90.3** 68.32 : 108.91
Sec-Butylbenzene	TM116	**58.4** 44.91 : 118.40	**58.6** 44.91 : 118.40
Tetrachloroethene	TM116	**104.2** 76.95 : 121.02	**102.0** 76.95 : 121.02
Toluene	TM116	**93.2** 74.24 : 107.42	**97.4** 74.24 : 107.42
Trichloroethene	TM116	**97.8** 77.61 : 111.54	**101.4** 77.61 : 111.54
Trichlorofluoromethane	TM116	**107.2** 84.55 : 133.27	**103.0** 84.55 : 133.27
Vinyl Chloride	TM116	**101.0** 70.29 : 138.58	**97.0** 70.29 : 138.58

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.
The figure detailed is the percentage recovery result for the AQC.
The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

Appendix General

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

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

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

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

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

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

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

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

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

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

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

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

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

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

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **Asbestos**

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

Identification of Asbestos in Bulk Materials & Soils

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

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2017).*

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

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

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WYG Geo-Environment
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Attention: Sophie Brookes

CERTIFICATE OF ANALYSIS

Date of report Generation:	02 July 2020
Customer:	WYG Geo-Environment
Sample Delivery Group (SDG):	200625-47
Your Reference:	A110489-6-1
Location:	Trinity Fields
Report No:	557549

We received 2 samples on Thursday June 25, 2020 and 2 of these samples were scheduled for analysis which was completed on Thursday July 02, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.
Incorrect sampling dates and/or sample information will affect the validity of results.

Approved By:

Sonia McWhan

Operations Manager

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

Version: 2.4 Version Issued: 02/07/2020

CERTIFICATE OF ANALYSIS

SDG:	200625-47	**Client Reference:**	A110489-6-1	**Report Number:**	557549
Location:	Trinity Fields	**Order Number:**	C20/377	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
22370917	BH3	ES1	0.00 - 0.00	23/06/2020
22370928	BH4	ES2	0.00 - 0.00	23/06/2020

Maximum Sample/Coolbox Temperature (°C) : **20.2**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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

Validated

CERTIFICATE OF ANALYSIS

SDG:	200625-47	**Client Reference:**	A110489-6-1	**Report Number:**	557549
Location:	Trinity Fields	**Order Number:**	C20/377	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)														22370917	22370928
Customer Sample Reference														BH3	BH4
AGS Reference														ES1	ES2
Depth (m)														0.00 - 0.00	0.00 - 0.00
Container														1000ml glass bottle (ALE220)	250ml Amber Gl. PTFE/PE (ALE219)	500ml Plastic (ALE208)	H2SO4 (ALE244)	NaOH (ALE245)	Vial (ALE297)	1000ml glass bottle (ALE220)	250ml Amber Gl. PTFE/PE (ALE219)	500ml Plastic (ALE208)	H2SO4 (ALE244)	NaOH (ALE245)	Vial (ALE297)
Sample Type														GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW	GW
Alkalinity as CaCO3	All	NDPs: 0 Tests: 2														X						X			
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2															X						X		
Anions by Kone (w)	All	NDPs: 0 Tests: 2														X						X			
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 2																X						X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2														X						X			
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 2	X							X															
EPH CWG (Aliphatic) Aqueous GC (W)	All	NDPs: 0 Tests: 2		X							X														
EPH CWG (Aromatic) Aqueous GC (W)	All	NDPs: 0 Tests: 2		X							X														
GRO by GC-FID (W)	All	NDPs: 0 Tests: 2						X							X										X
Mercury Dissolved	All	NDPs: 0 Tests: 2														X						X			
Nitrite by Kone (w)	All	NDPs: 0 Tests: 2																X						X	
PAH Spec MS - Aqueous (W)	All	NDPs: 0 Tests: 2		X							X														
pH Value	All	NDPs: 0 Tests: 2														X						X			
Phenols by HPLC (W)	All	NDPs: 0 Tests: 2															X						X		
TPH CWG (W)	All	NDPs: 0 Tests: 2	X							X															

Validated

CERTIFICATE OF ANALYSIS

SDG:	200625-47	**Client Reference:**	A110489-6-1	**Report Number:**	557549
Location:	Trinity Fields	**Order Number:**	C20/377	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH3	BH4				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Ground Water (GW)	Ground Water (GW)				
			Date Sampled	23/06/2020	23/06/2020				
			Sample Time	.	.				
			Date Received	25/06/2020	25/06/2020				
			SDG Ref	200625-47	200625-47				
			Lab Sample No.(s)	22370917	22370928				
			AGS Reference	ES1	ES2				
Alkalinity, Total as CaCO3	<2 mg/l	TM043		237 #	340 #				
Carbon, Organic (diss.filt)	<3 mg/l	TM090		<3	3.21				
Ammoniacal Nitrogen as NH3	<0.2 mg/l	TM099		<0.2 #	<0.2 #				
Ammoniacal Nitrogen as NH4	<0.3 mg/l	TM099		<0.3 #	<0.3 #				
Antimony (diss.filt)	<1 µg/l	TM152		<1 2 #	<1 2 #				
Arsenic (diss.filt)	<0.5 µg/l	TM152		<0.5 2 #	0.546 2 #				
Barium (diss.filt)	<0.2 µg/l	TM152		76.6 2 #	40.8 2 #				
Beryllium (diss.filt)	<0.1 µg/l	TM152		<0.1 2 #	<0.1 2 #				
Boron (diss.filt)	<10 µg/l	TM152		18.9 2 #	13.8 2 #				
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 2 #	<0.08 2 #				
Chromium (diss.filt)	<1 µg/l	TM152		<1 2 #	4.47 2 #				
Copper (diss.filt)	<0.3 µg/l	TM152		0.885 2 #	4.8 2 #				
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 2 #	<0.2 2 #				
Molybdenum (diss.filt)	<3 µg/l	TM152		<3 2 #	<3 2 #				
Nickel (diss.filt)	<0.4 µg/l	TM152		<0.4 2 #	0.442 2 #				
Selenium (diss.filt)	<1 µg/l	TM152		3.14 2 #	21.4 2 #				
Zinc (diss.filt)	<1 µg/l	TM152		<1 2 #	1.47 2 #				
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01 2 #	<0.01 2 #				
Nitrite as NO2	<0.05 mg/l	TM184		<0.05 #	0.162 #				
Sulphate	<2 mg/l	TM184		17.5 #	61.6 #				
Chloride	<2 mg/l	TM184		13.4 #	11.7 #				
Nitrate as NO3	<0.3 mg/l	TM184		6.12	1.28				
Cyanide, Total	<0.05 mg/l	TM227		<0.05 #	<0.05 #				
pH	<1 pH Units	TM256		7.59 #	8.08 #				
Phenol	<0.002 mg/l	TM259		<0.002 #	<0.002 #				

CERTIFICATE OF ANALYSIS

SDG:	200625-47	**Client Reference:**	A110489-6-1	**Report Number:**	557549
Location:	Trinity Fields	**Order Number:**	C20/377	**Superseded Report:**	

PAH Spec MS - Aqueous (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH3	BH4
			Depth (m)	0.00 - 0.00	0.00 - 0.00
			Sample Type	Ground Water (GW)	Ground Water (GW)
			Date Sampled	23/06/2020	23/06/2020
			Sample Time	.	.
			Date Received	25/06/2020	25/06/2020
			SDG Ref	200625-47	200625-47
			Lab Sample No.(s)	22370917	22370928
			AGS Reference	ES1	ES2
Naphthalene (aq)	<0.01 µg/l	TM178		0.0122 #	0.0308 #
Acenaphthene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.01 #
Acenaphthylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.01 #
Fluoranthene (aq)	<0.005 µg/l	TM178		0.0124 #	0.0469 #
Anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.01 #
Phenanthrene (aq)	<0.005 µg/l	TM178		0.0341 #	0.0957 #
Fluorene (aq)	<0.005 µg/l	TM178		0.00657 #	0.0182 #
Chrysene (aq)	<0.005 µg/l	TM178		0.0102 #	0.0315 #
Pyrene (aq)	<0.005 µg/l	TM178		0.0205 #	0.0525 #
Benzo(a)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	0.0162 #
Benzo(b)fluoranthene (aq)	<0.005 µg/l	TM178		0.00997 #	0.0354 #
Benzo(k)fluoranthene (aq)	<0.005 µg/l	TM178		<0.005 #	0.015 #
Benzo(a)pyrene (aq)	<0.002 µg/l	TM178		0.00485 #	0.023 #
Dibenzo(a,h)anthracene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.01 #
Benzo(g,h,i)perylene (aq)	<0.005 µg/l	TM178		<0.005 #	<0.01 #
Indeno(1,2,3-cd)pyrene (aq)	<0.005 µg/l	TM178		<0.005 #	0.0154 #
PAH, Total Detected USEPA 16 (aq)	<0.082 µg/l	TM178		0.111 #	0.381 #

Validated

CERTIFICATE OF ANALYSIS

SDG:	200625-47	**Client Reference:**	A110489-6-1	**Report Number:**	557549
Location:	Trinity Fields	**Order Number:**	C20/377	**Superseded Report:**	

TPH CWG (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	BH3	BH4				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Ground Water (GW)	Ground Water (GW)				
			Date Sampled	23/06/2020	23/06/2020				
			Sample Time	.	.				
			Date Received	25/06/2020	25/06/2020				
			SDG Ref	200625-47	200625-47				
			Lab Sample No.(s)	22370917	22370928				
			AGS Reference	ES1	ES2				
GRO Surrogate % recovery**	%	TM245		116	109				
GRO >C5-C12	<50 µg/l	TM245		<50 #	<50 #				
Methyl tertiary butyl ether (MTBE)	<3 µg/l	TM245		<3 #	<3 #				
Benzene	<7 µg/l	TM245		<7 #	<7 #				
Toluene	<4 µg/l	TM245		<4 #	<4 #				
Ethylbenzene	<5 µg/l	TM245		<5 #	<5 #				
m,p-Xylene	<8 µg/l	TM245		<8 #	<8 #				
o-Xylene	<3 µg/l	TM245		<3 #	<3 #				
Sum of detected Xylenes	<11 µg/l	TM245		<11	<11				
Sum of detected BTEX	<28 µg/l	TM245		<28	<28				
Aliphatics >C5-C6	<10 µg/l	TM245		<10	<10				
Aliphatics >C6-C8	<10 µg/l	TM245		<10	<10				
Aliphatics >C8-C10	<10 µg/l	TM245		<10	<10				
Aliphatics >C10-C12	<10 µg/l	TM245		<10	<10				
Aliphatics >C12-C16 (aq)	<10 µg/l	TM174		<10	<20				
Aliphatics >C16-C21 (aq)	<10 µg/l	TM174		<10	<20				
Aliphatics >C21-C35 (aq)	<10 µg/l	TM174		<10	<20				
Total Aliphatics >C12-C35 (aq)	<10 µg/l	TM174		<10	<20				
Aromatics >EC5-EC7	<10 µg/l	TM245		<10	<10				
Aromatics >EC7-EC8	<10 µg/l	TM245		<10	<10				
Aromatics >EC8-EC10	<10 µg/l	TM245		<10	<10				
Aromatics >EC10-EC12	<10 µg/l	TM245		<10	<10				
Aromatics >EC12-EC16 (aq)	<10 µg/l	TM174		<10	<20				
Aromatics >EC16-EC21 (aq)	<10 µg/l	TM174		<10	<20				
Aromatics >EC21-EC35 (aq)	<10 µg/l	TM174		<10	<20				
Total Aromatics >EC12-EC35 (aq)	<10 µg/l	TM174		<10	<20				
Total Aliphatics & Aromatics >C5-35 (aq)	<10 µg/l	TM174		<10	<20				
Aliphatics >C16-C35 Aqueous	<10 µg/l	TM174		<10	<20				

Table of Results - Appendix

Method No	Reference	Description
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM174	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Waters by GC-FID
TM178	Modified: US EPA Method 8100	Determination of Polynuclear Aromatic Hydrocarbons (PAH) by GC-MS in Waters
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM245	By GC-FID	Determination of GRO by Headspace in waters
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM) or ALS Life Sciences Ltd Aberdeen (Method codes S).

CERTIFICATE OF ANALYSIS

SDG:	200625-47	**Client Reference:**	A110489-6-1	**Report Number:**	557549
Location:	Trinity Fields	**Order Number:**	C20/377	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	22370917	22370928
Customer Sample Ref.	BH3	BH4
AGS Ref.	ES1	ES2
Depth	0.00 - 0.00	0.00 - 0.00
Type	Ground Water	Ground Water
Alkalinity as CaCO3	02-Jul-2020	02-Jul-2020
Ammoniacal Nitrogen	27-Jun-2020	27-Jun-2020
Anions by Kone (w)	30-Jun-2020	30-Jun-2020
Cyanide Comp/Free/Total/Thiocyanate	01-Jul-2020	01-Jul-2020
Dissolved Metals by ICP-MS	02-Jul-2020	02-Jul-2020
Dissolved Organic/Inorganic Carbon	02-Jul-2020	02-Jul-2020
EPH CWG (Aliphatic) Aqueous GC (W)	02-Jul-2020	02-Jul-2020
EPH CWG (Aromatic) Aqueous GC (W)	02-Jul-2020	02-Jul-2020
GRO by GC-FID (W)	30-Jun-2020	30-Jun-2020
Mercury Dissolved	30-Jun-2020	30-Jun-2020
Nitrite by Kone (w)	29-Jun-2020	29-Jun-2020
PAH Spec MS - Aqueous (W)	02-Jul-2020	02-Jul-2020
pH Value	30-Jun-2020	30-Jun-2020
Phenols by HPLC (W)	30-Jun-2020	30-Jun-2020
TPH CWG (W)	02-Jul-2020	02-Jul-2020

ASSOCIATED AQC DATA

Alkalinity as CaCO3

Component	Method Code	QC 2203
Total Alkalinity as CaCO3	TM043	**98.48** 94.47 : 104.41

Ammoniacal Nitrogen

Component	Method Code	QC 2243	QC 2258
Ammoniacal Nitrogen as N	TM099	**100.4** 93.14 : 108.60	**101.2** 93.14 : 108.60

Anions by Kone (w)

Component	Method Code	QC 2255
Chloride	TM184	**106.0** 92.93 : 115.43
Sulphate (soluble)	TM184	**103.2** 90.53 : 113.03
TON as NO3	TM184	**106.0** 94.00 : 111.10

Cyanide Comp/Free/Total/Thiocyanate

Component	Method Code	QC 2246
Free Cyanide (W)	TM227	**98.25** 90.50 : 114.50
Thiocyanate (W)	TM227	**99.5** 90.50 : 113.00
Total Cyanide (W)	TM227	**97.5** 91.75 : 112.75

Dissolved Metals by ICP-MS

Component	Method Code	QC 2293
Aluminium	TM152	**107.0** 94.21 : 111.52
Antimony	TM152	**106.33** 88.37 : 130.57
Arsenic	TM152	**105.5** 92.62 : 113.52
Barium	TM152	**104.5** 88.62 : 113.14
Beryllium	TM152	**104.83** 89.98 : 116.88
Bismuth	TM152	**103.5** 92.62 : 115.02
Boron	TM152	**109.67** 86.31 : 120.88

Dissolved Metals by ICP-MS

		QC 2293
Cadmium	TM152	**106.33** 93.85 : 111.65
Calcium	TM152	**103.33** 89.20 : 126.91
Chromium	TM152	**106.5** 92.22 : 109.85
Cobalt	TM152	**106.33** 85.01 : 114.87
Copper	TM152	**106.33** 89.87 : 119.73
Iron	TM152	**106.67** 93.02 : 113.86
Lead	TM152	**104.5** 91.11 : 116.98
Lithium	TM152	**102.5** 91.30 : 123.00
Magnesium	TM152	**100.67** 89.60 : 116.61
Manganese	TM152	**108.5** 93.97 : 112.46
Molybdenum	TM152	**105.67** 89.07 : 110.96
Nickel	TM152	**107.83** 93.70 : 112.15
Phosphorus	TM152	**101.5** 89.24 : 114.18
Potassium	TM152	**103.33** 93.20 : 115.55
Selenium	TM152	**111.0** 91.69 : 117.12
Silver	TM152	**117.67** 90.93 : 121.73
Sodium	TM152	**101.33** 92.42 : 113.24
Strontium	TM152	**104.0** 92.14 : 116.24
Tellurium	TM152	**102.0** 89.88 : 111.78
Thallium	TM152	**83.5** 82.43 : 113.83
Tin	TM152	**105.5** 94.62 : 107.79
Titanium	TM152	**110.17** 90.29 : 115.23
Tungsten	TM152	**103.5** 77.61 : 132.31
Uranium	TM152	**102.83** 86.97 : 115.76
Vanadium	TM152	**109.33** 89.61 : 115.48
Zinc	TM152	**109.33** 87.51 : 116.26

Dissolved Organic/Inorganic Carbon

Dissolved Organic/Inorganic Carbon

Component	Method Code	QC 2223
Dissolved Inorganic Carbon	TM090	**99.0** 91.27 : 109.87
Dissolved Organic Carbon	TM090	**101.5** 96.58 : 107.98

EPH CWG (Aliphatic) Aqueous GC (W)

Component	Method Code	QC 2278
Total Aliphatics >C10-C40	TM174	**117.0** 68.59 : 134.82

EPH CWG (Aromatic) Aqueous GC (W)

Component	Method Code	QC 2287
Total Aromatics >EC10-EC40	TM174	**86.83** 60.75 : 129.09

GRO by GC-FID (W)

Component	Method Code	QC 2218
Benzene by GC	TM245	**102.5** 81.54 : 119.70
Ethylbenzene by GC	TM245	**108.0** 80.99 : 121.09
m & p Xylene by GC	TM245	**106.0** 82.77 : 123.19
MTBE GC-FID	TM245	**106.5** 80.06 : 123.27
o Xylene by GC	TM245	**106.5** 84.26 : 121.50
QC	TM245	**100.0** 76.13 : 145.89
Toluene by GC	TM245	**105.5** 82.78 : 121.99

Mercury Dissolved

Component	Method Code	QC 2239
Mercury Dissolved (CVAF)	TM183	**97.4** 76.80 : 117.12

PAH Spec MS - Aqueous (W)

PAH Spec MS - Aqueous (W)

Component	Method Code	QC 2295
Acenaphthene by GCMS	TM178	**110.0** 100.00 : 119.20
Acenaphthylene by GCMS	TM178	**108.8** 95.20 : 119.20
Anthracene by GCMS	TM178	**107.2** 91.60 : 113.20
Benz(a)anthracene by GCMS	TM178	**106.4** 90.40 : 119.20
Benzo(a)pyrene by GCMS	TM178	**108.8** 92.80 : 119.20
Benzo(b)fluoranthene by GCMS	TM178	**112.4** 89.60 : 120.80
Benzo(ghi)perylene by GCMS	TM178	**104.8** 93.20 : 117.20
Benzo(k)fluoranthene by GCMS	TM178	**111.2** 96.40 : 120.40
Chrysene by GCMS	TM178	**109.6** 96.40 : 125.20
Dibenzo(ah)anthracene by GCMS	TM178	**104.8** 92.00 : 113.60
Fluoranthene by GCMS	TM178	**107.2** 91.20 : 117.60
Fluorene by GCMS	TM178	**108.8** 95.60 : 122.00
Indeno(123cd)pyrene by GCMS	TM178	**108.4** 90.40 : 112.00
Naphthalene by GCMS	TM178	**108.4** 98.00 : 122.00
Phenanthrene by GCMS	TM178	**106.8** 94.00 : 120.40
Pyrene by GCMS	TM178	**106.8** 92.40 : 118.80

pH Value

Component	Method Code	QC 2252
pH	TM256	**101.89** 100.13 : 103.37

Phenols by HPLC (W)

Component	Method Code	QC 2298
2.3.5 Trimethyl-Phenol by HPLC (W)	TM259	**100.0** 91.00 : 109.00
2-Isopropyl Phenol by HPLC (W)	TM259	**99.0** 85.00 : 109.00
Cresols by HPLC (W)	TM259	**102.33** 93.00 : 115.00
Napthol by HPLC (W)	TM259	**109.0** 86.00 : 128.00
Phenol by HPLC (W)	TM259	**104.0** 88.24 : 111.76

CERTIFICATE OF ANALYSIS

SDG:	200625-47	**Client Reference:**	A110489-6-1	**Report Number:**	557549
Location:	Trinity Fields	**Order Number:**	C20/377	**Superseded Report:**	

Phenols by HPLC (W)

		QC 2298
Xylenols by HPLC (W)	TM259	**101.0** 93.33 : 107.33

The above information details the reference name of the analytical quality control sample (AQC) that has been run with the samples contained in this report for the different methods of analysis.
The figure detailed is the percentage recovery result for the AQC.
The subscript numbers below are the percentage recovery lower control limit (LCL) and the upper control limit (UCL). The percentage recovery result for the AQC should be between these limits to be statistically in control.

Appendix General

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

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

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

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

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

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

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

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

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

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

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

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

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

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

17. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as “mixed hydrocarbons”. Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

18. **Sample Deviations**

If a sample is classed as deviated then the associated results may be compromised.

1	**Container with Headspace provided for volatiles analysis**
2	**Incorrect container received**
3	**Deviation from method**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **Asbestos**

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

Identification of Asbestos in Bulk Materials & Soils

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

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2017).*

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

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

APPENDIX G – GROUNDWATER AND GROUND GAS MONITORING DATA

WYG Environmental Planning and Transport

LANDGAS AND GROUNDWATER MONITORING RESULTS

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD

Site Name: Trinity Fields
Job No.: A110489-6-1
Client: CCBC

Date Monitored: 17/06/20
Monitoring Engineer: SB
Weather: Warm

EQUIPMENT USED			
Type	Make	Serial	Last Calibrated
Gas Analyser	**Landtec GA5000**	**G502044**	**Mar-19**
Interface Meter	**Solinst**	**122-004988-1**	**N/A**

LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS

Exploratory Hole No	Peak		Steady								
	CH_4 (% vol)	CO_2 (% vol)	CH_4 (% vol)	CO_2 (% vol)	O_2 (% vol)	BAL (%)	PID (ppm)	H_2S (ppm)	HCN (ppm)	CO (ppm)	Time
BH03	0.1	1.1	0.1	1.1	18.1	80.7	nt	<1	nt	1	14:51:00
BH04	<0.1	0.2	<0.1	0.2	18.2	81.6	nt	<1	nt	3	15:08:00
WS01	<0.1	<0.1	<0.1	<0.1	20.6	79.3	nt	<1	nt	<1	15:01:00
WS02	<0.1	1.6	<0.1	1.6	18.8	79.5	nt	<1	nt	1	15:20:00
WS10	0.1	1.6	0.1	1.6	18.5	79.8	nt	<1	nt	<1	14:40:00

LANDGAS - PHYSICAL PARAMETERS

Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks
			Peak (L/hr)	Steady (L/hr)	Peak (mbar)	Steady (mbar)	
BH03	1005	nt	0.3	0.3	0.17	0.05	
BH04	1005	nt	0.2	0.2	0.12	0.07	
WS01	1005	nt	0.2	0.1	-0.02	0.00	
WS02	1003	nt	0.2	0.2	-0.10	-0.02	
WS10	1003	nt	0.3	0.3	-0.27	-0.15	

AMBIENT ATMOSPHERIC CONDITIONS			ATMOSPHERIC PRESSURE CONDITIONS	
Parameter	Before Monitoring	After Monitoring		
CH_4 (% vol)	0.1	<0.1	3 days prior (m bar)	1013
CO_2 (% vol)	<0.1	<0.1	2 days prior (m bar)	1016
O_2 (% vol)	21.1	20.4	1 day prior (m bar)	1014
PID (ppm)	nt	nt	during (m bar)	1013
Atmos Press. (m bar)	1003	1003	1 day post (m bar)	1013

GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS

Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators						Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Temp (°C)	
BH03	3.60	4.52	nd	nd	nt	nt	nt	nt	nt	nt	Silty base
BH04	2.55	3.17	nd	nd	nt	nt	nt	nt	nt	nt	
WS01	DRY	1.96	nd	nd	nt	nt	nt	nt	nt	nt	
WS02	DRY	1.00	nd	nd	nt	nt	nt	nt	nt	nt	
WS10	DRY	0.77	nd	nd	nt	nt	nt	nt	nt	nt	

Notes
nt = not tested
nd = not detected

Data Compiled by: SB
Data Checked by: SR

WYG Environmental Planning and Transport

LANDGAS AND GROUNDWATER MONITORING RESULTS

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD

Site Name: Trinity Fields
Job No.: A110489-6-1
Client: CCBC

Date Monitored: 23/06/20
Monitoring Engineer: JD
Weather: Clear

EQUIPMENT USED			
Type	Make	Serial	Last Calibrated
Gas Analyser	**Landtec GA5000**	**G502044**	**Mar-19**
Interface Meter	**Solinst**	**122-004988-1**	**N/A**

LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS

Exploratory Hole No	Peak		Steady								
	CH_4 (% vol)	CO_2 (% vol)	CH_4 (% vol)	CO_2 (% vol)	O_2 (% vol)	BAL (%)	PID (ppm)	H_2S (ppm)	HCN (ppm)	CO (ppm)	Time
BH03	0.1	0.1	0.1	0.1	20.6	79.2	nt	<1	nt	<1	10:26:00
BH04	0.1	0.1	0.1	0.1	20.1	80.1	nt	<1	nt	<1	11:36:00
WS01	0.1	0.8	0.1	0.8	19.0	80.1	nt	1	nt	9	10:55:00
WS02	0.2	1.7	0.2	1.5	18.8	79.6	nt	<1	nt	<1	10:39:00
WS10	0.2	1.7	0.2	1.7	18.5	79.1	nt	<1	nt	1	11:52:00

LANDGAS - PHYSICAL PARAMETERS

Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks
			Peak (L/hr)	Steady (L/hr)	Peak (mbar)	Steady (mbar)	
BH03	1016	nt	0.1	0.1	0.07	0.07	
BH04	1016	nt	0.1	0.1	0.05	0.05	
WS01	1016	nt	0.2	0.2	-0.03	-0.03	
WS02	1013	nt	0.1	0.1	0.03	0.03	
WS10	1016	nt	0.1	0.1	0.01	0.01	

AMBIENT ATMOSPHERIC CONDITIONS			ATMOSPHERIC PRESSURE CONDITIONS	
Parameter	Before Monitoring	After Monitoring		
CH_4 (% vol)	0.1	0.1	3 days prior (m bar)	1016
CO_2 (% vol)	0.1	0.1	2 days prior (m bar)	1016
O_2 (% vol)	20.9	20.9	1 day prior (m bar)	1023
PID (ppm)	nt	nt	during (m bar)	1022
Atmos Press. (m bar)	1013	1016	1 day post (m bar)	1019

GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS

Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators						Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Temp (°C)	
BH03	2.80	4.44	nd	nd	56.1	384.0	329.0	7.9	7.4	17.4	
BH04	2.11	3.13	nd	nd	11.2	455.1	389.9	8.3	3.2	17.4	
WS01	1.85	1.95	nd	nd	nt	nt	nt	nt	nt	nt	
WS02	Dry	0.96	nd	nd	nt	nt	nt	nt	nt	nt	
WS10	Dry	0.77	nd	nd	nt	nt	nt	nt	nt	nt	

Notes
nt = not tested
nd = not detected

Data Compiled by: SB
Data Checked by: SR

WYG Environmental Planning and Transport

LANDGAS AND GROUNDWATER MONITORING RESULTS

5th Floor, Longcross Court, 47 Newport Road, Cardiff, CF24 0AD

Site Name: Trinity Fields
Job No.: A110489-6-1
Client: CCBC

Date Monitored: 30/06/20
Monitoring Engineer: SB
Weather: Overcast and Drizzly

EQUIPMENT USED

Type	Make	Serial	Last Calibrated
Gas Analyser	**Landtec GA5000**	**G502044**	**Mar-19**
Interface Meter	**Solinst**	**122-004988-1**	**N/A**

LANDGAS CONCENTRATIONS - INSTALLATION CONDITIONS

Exploratory Hole No	Peak		Steady								
	CH_4 (% vol)	CO_2 (% vol)	CH_4 (% vol)	CO_2 (% vol)	O_2 (% vol)	BAL (%)	PID (ppm)	H_2S (ppm)	HCN (ppm)	CO (ppm)	Time
BH03	0.1	0.7	0.1	0.7	19.4	79.8	nt	<1	nt	2	15:38:00
BH04	0.1	0.6	0.1	0.6	19.9	79.5	nt	<1	nt	2	16:04:00
WS01	0.1	0.4	0.1	0.4	20.1	79.4	nt	<1	nt	<1	15:54:00
WS02	0.2	3.9	0.2	3.9	17.7	78.2	nt	<1	nt	<1	15:18:00
WS10	0.2	3.8	0.2	3.8	14.5	81.5	nt	<1	nt	5	15:32:00

LANDGAS - PHYSICAL PARAMETERS

Exploratory Hole No	Atmos Pressure (m bar)	Atmos Temp (°C)	BH Flow		BH Pressure		Remarks
			Peak (L/hr)	Steady (L/hr)	Peak (mbar)	Steady (mbar)	
BH03	997	nt	0.1	0.1	0.34	0.12	
BH04	997	nt	0.2	0.2	-0.34	-0.26	
WS01	997	nt	0.2	0.2	0.19	0.17	
WS02	996	nt	0.3	0.3	-0.09	-0.03	
WS10	995	nt	0.2	0.2	0.19	0.14	

AMBIENT ATMOSPHERIC CONDITIONS

Parameter	Before Monitoring	After Monitoring
CH_4 (% vol)	0.3	0.1
CO_2 (% vol)	0.1	0.1
O_2 (% vol)	20.9	20.3
PID (ppm)	nt	nt
Atmos Press. (m bar)	997	997

ATMOSPHERIC PRESSURE CONDITIONS

3 days prior (m bar)	1003
2 days prior (m bar)	1009
1 day prior (m bar)	1010
during (m bar)	1006
1 day post (m bar)	1015

GROUNDWATER / NAPL - PHYSIO-CHEMICAL PARAMETERS

Exploratory Hole No	Water Surface (mbgl)	Base Depth (mbgl)	LNAPL Surface (mbgl)	DNAPL Surface (mbgl)	Water Quality Indicators						Remarks
					ORP (mV)	SPC (µs/cm)	C (µs/cm)	Ph (value)	DO (mg/L)	Temp (°C)	
BH03	2.69	4.44	nd	nd	nt	nt	nt	nt	nt	nt	
BH04	2.12	3.17	nd	nd	nt	nt	nt	nt	nt	nt	
WS01	1.86	1.96	nd	nd	nt	nt	nt	nt	nt	nt	
WS02	DRY	0.95	nd	nd	nt	nt	nt	nt	nt	nt	
WS10	0.77	0.77	nd	nd	nt	nt	nt	nt	nt	nt	

Notes
nt = not tested
nd = not detected

Data Compiled by: SB
Data Checked by: SR

APPENDIX H – CIRIA C552 RISK METHODOLOGY

The following tables are derived from CIRIA C552 and have been used to define the risk rating presented in the Qualitative Risk Assessment matrix.

Classification of consequence

Classification	Definition
Severe	Short term (acute) risk to human health likely to result in 'significant harm' as defined by the Environment Protection Act 1990, Part IIA. Short term risk of pollution (note; Water Resources Act contains no scope for considering significant pollution) of sensitive water resource. Catastrophic damage to building/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem. (Note the definitions of ecological systems within the Draft Circular on Contaminated Land DETR, 2000).
Medium	Chronic damage to human health ('significant harm', as defined In DETR, 2000). Pollution of sensitive water resources (note; Water Resources Act contains no scope for considering significant pollution). A significant change in a particular ecosystem, or an organism forming part of such an ecosystem. (Note the definitions of ecological systems within the Draft Circular on Contaminated Land DETR, 2000).
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ('significant harm', as defined In DETR, 2000). Damage to sensitive buildings/structures/services or the environment.
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc). Easily repairable effects of damage to buildings, structures and services.

Classification of probability

Classification	Definition
High likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term or there is evidence at the receptor of harm or pollution.
Likely	There is a pollutant linkage and all the elements are present and in the right place, which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period that such an event would take place, and is even less likely in the shorter term.
Unlikely	There is a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

Matrix of consequence against probability to gain a risk classification

		Consequence			
		Severe	**Medium**	**Mild**	**Minor**
Probability	**High Likelihood**	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	Likely	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	Low likelihood	Moderate Risk	Moderate/Low Risk	Low Risk	Very Low Risk
	Unlikely	Moderate/Low Risk	Low Risk	Very Low Risk	Very Low Risk