

Trinity Academy, Barnsley

Supplemental Ground Investigation

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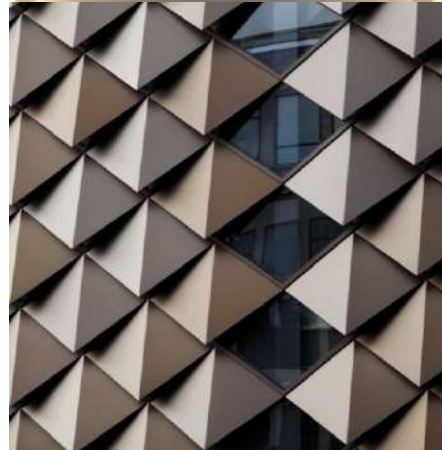
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Executive Summary

Appointment	In July 2022 Curtins were instructed by Bowmer & Kirkland to undertake a Phase 2 Ground Investigation at the former NHS Keresforth centre site in Barnsley. The site is centred on an easting and northing of 433442, 405618. This investigation addresses recommendations as presented in the Phase 1 report Watermans Geo Environmental Assessment Report (ref. 7), and Curtins Phase 2 GI Report (ref. 10). The aim of this Phase 2 GI works is to characterise the geo-technical ground conditions associated with the main school blocks and surrounding hardstanding and soft landscaping designs to support an associated planning application.
Current Site Status	The site is currently the now disused Keresforth Medical Centre, comprising of low-rise buildings with access roads, parking areas and soft landscaping. The site slopes to the east and south-east with a big difference in levels between the north-west corner of the site to the south-east corner of the site. Based on satellite imagery, the site is bounded to the north by Keresforth Close comprising of residential dwellings, to the northwest Barnsley Fire Station is opposite to the field. To the east by Joseph Locke Primary School. To the south by a sparse tree line and beyond this several residential buildings and allotments are situated with sparsely populated local shops. The site is bound to the west by the A6133 and beyond this by open fields and Greenacre School.
Summary of Curtins Previous GI for the playing field and shallow boreholes for the NHS Keresforth Centre	Limited made ground deposits were encountered which was recorded to be underlain by residual soils onto the bedrock of the Pennine Middle Coal Measures Formation with a combination of window sample boreholes for the former NHS Keresforth centre. Rotary cored and open borehole drilling were completed on the playing field area only to determine the ground conditions. Limited exceedances for a residential without home grown produce end use threshold was recorded in the playing field area only. Exceedances for isolated heavy metals of arsenic and chromium VI along with poly aromatic hydrocarbons (PAHs). For ground gas risk assessment, the concentrations were generally low until the final visit, where methane concentrations were recorded between 2.2% and 27%. Carbon dioxide was generally recorded between 0.8% and 6.4%. Due to the results of the monitoring, it was recommended that CS2 grade ground gas protection measures be incorporated as a precaution. The mining risk assessment for the playing field area only identified potential broken ground in the position of RC06 in the north-east of the playing field between 9.50m – 17.00m bgl as the core recovery was poor. The other positions completed in the field did not indicate potential broken ground or workings. However, loss of flush was prevalent across all of the rotary boreholes. A collapse feature was recorded by the coal authority in 2014 close to the northern boundary of the playing field which was remediated by the coal authority. However, it was reported ‘tunnels’ ran off in north-east, south-east and south-west directions. It was recommended that geophysical investigation techniques are used to try to target these potential features which could be followed by further ground investigation in the future. For the playing field it was recommended that geogrid be incorporated to mitigate against any potential crown hole collapses.
Fieldworks Undertaken	The ground investigation works were completed between the 1st and 16th August 2022 for the former NHS Keresforth centre. The investigation comprised 5 No. dynamic probing super heavy (DPSH) up to refusals and 5 No. rotary cored boreholes up to 30.50m bgl using geobore S wireline coring to obtain descriptions of the bedrock strata. Groundwater monitoring standpipes were installed in selected rotary boreholes only. Selected soil and rock samples were subjected to laboratory analysis and 4 No. return groundwater monitoring visits were undertaken between September and October 2022. It should be noted that ground gas monitoring and groundwater sampling are outside the scope of these ground investigation works and reporting.
Encountered Ground Conditions	The made ground deposits were proven to maximum depths ranging between 0.15m and 1.90m bgl (141.25m – 138.83m AOD) as either topsoil or asphalt over brown clayey soils in areas of soft landscaping and light yellow to cream compact sandy very angular gravel in areas of hardstanding. This was underlain

	by residual soils up to maximum depths ranging between 1.55m and 2.00m bgl (139.90m AOD in RC09 – 137.60m AOD in RC08) as a stiff to very stiff yellowish brown, brown, orange mottled grey slightly gravelly CLAY or as a stiff to very stiff brown CLAY. Lastly this was underlain by the bedrock of the Pennine Middle Coal Measures Formation (PMCM) up to 30.50m bgl. The base of the formation was not proven. This was encountered as interbedded mudstone (extremely weak to moderately weak), siltstone (weak to medium strong), sandstone (medium strong to strong) and coal with very rare ironstone. It is interpreted that the Barnsley coal seam has been encountered with likely workings identified in the position of RC09 between 8.00m and 9.60m bgl (133.40m – 131.80m AOD). Water flush was generally lost in or around where the Barnsley coal seam was encountered in all of the rotary boreholes. No visual or olfactory indication of contamination during the fieldworks.
Materials Management and Soils Reuse	Based on the geochemical testing results presented as part of previous investigations it is considered that there is no specific requirement to remove soils from site because of them presenting an unacceptable risk to human health or the environment. These principles are described in greater detail within the CL:AIRE document The Definition of Waste: Development Industry Code of Practice (Version 2). Excavated soils should be suitable for reuse at the site following appropriate waste management regulations and/or under a Materials Management Plan (MMP).
Geotechnical Assessment	The likely presence of unrecorded mine workings identified in RC09, the same coal seam in RC07 and RC08 and the geological fault line, will influence the foundation options on the development site. Despite good recovery of the coal seam in the positions of RC07 and RC08 these could have been pillars used to hold up the surrounding bedrock material. Given that the site has a geological fault and unrecorded workings adjacent to each other, this is likely to make the bedrock strata unstable over time where sizeable loads are added to the stratum and may result in ground instability as identified above and in Section 6.2. It is considered that shallow foundations would not be a viable foundation solution without treatment of the identified ground instability. To reduce the risk to the proposed structures it is recommended that piles are used to transfer the structural loads past the base of the underlying workings (Barnsley coal seam). North of the fault this is between 10.65m and 11m bgl (130.75m and 129.27m AOD). South of the fault this is between 16.00m and 19.30m bgl (124.81m and 120.10m AOD). The Watermans report (ref. 7) should also be reviewed for final depths of the Barnsley coal seam. It is not recommended to locate the toe of the piles above the zone of the worked ground or Barnsley coal seam. Prior to any piling works, grouting treatment works would need to be undertaken. The carrying capacity of the piles depends not only on their size and the ground conditions but also on their method of installation. Pile design and installation are continuously evolving processes. Therefore, it is recommended that a specialist piling contractor, with suitable experience of these ground conditions be contacted and be provided with this ground investigation report, as well as the previous reports completed for the site to determine the most cost-effective pile technique pertaining to the ground conditions identified. As noted in section 6.7 the ground levels are likely to be reducing for the sports hall and the main school building and subject to both cut and fill. The adoption of ground bearing floor slab could be considered if the cut and fill operation is undertaken and controlled under a suitable earthworks specification with appropriate geotechnical classification of proposed material with subsequent validation of their placement. Where the earthworks specification criteria cannot be met due to the ground conditions then suspended floor slabs should be adopted which can be supported off ground beams and or pile caps to minimise differential settlements. At this stage, the PMCM formation would be assessed as DS-1 and AC-1 where concrete is not in contact with the coal seams. However, where concrete will be in contact with the coal seams this should increase to DS-2 and AC-2z due to oxidisable sulphides and more acidic ground conditions.
Ground Engineering Recommendations	Overall, the site requires specific mitigation measures to be completed to make the site suitable for use. This would require grouting works to be completed beneath the proposed building footprints and a suitable distance away from these. Consideration should also be given to the hardstanding areas i.e., car parking and MUGA. This would require engineer supervision to confirm that the grouting works are being completed to the specification which should have prior approval by the coal authority. This would be followed by a mine working verification report to confirm the above.

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1.0 Introduction

1.1 Project Background

It is proposed to redevelop the former NHS Keresforth Centre site in Barnsley. To address relevant Local Authority planning conditions and or obtain design information in relation to the proposed redevelopment the site has been subject to ground investigation by Waterman Geo-Environmental and Curtins. Further to this previous ground investigation supplemental investigation was recommended and accordingly Curtins submitted proposals for additional intrusive investigation of the area of proposed buildings to the east of the development site. In July 2022 Curtins was instructed by Bowmer & Kirkland (B&K) to undertake the supplemental ground investigation to which this report refers. A site location plan is presented in Figure 1, the development site is centred on an easting and northing of 433442, 405618.

1.2 Scope of Services

As advised in Section 1.1 the investigation reported herein addresses recommendations as presented in previous ground investigation reports, notably in the Watermans Geo-Environmental Assessment Report (ref. 7), and Curtins Phase 2 GI Report (ref. 10). The aim of this additional investigation is to confirm the geo-technical ground conditions in the location of the proposed school blocks, surrounding hardstanding and soft landscaping to aid design and recommendations for stabilisation of mining legacy. The current development plans can be referred to within Appendix A1 of this report.

Specifically, the supplemental investigation is intended to confirm:

- a) Whether historical shallow (less than 30m depth) coal mine workings extend beneath the footprints of the proposed buildings, associated hardstanding and soft landscaping areas and if so, require treatment;
- b) Recommendations for the design of foundations and building ground floor slabs with particular focus on the geological features likely to affect the site; and
- c) Recommendations for the specification of sub-structure concrete.

The Curtins report (ref. 10) also included an appropriate contaminated land assessment, considering relevant contaminant/pollutant linkages in relation to human health and groundwater of the proposed sports pitch to the south-west along with the main school area. Therefore, no further assessment is provided within this report.

It is also advised that consideration of flood risk, ecology and archaeological issues are outside of the scope of this report.

1.3 References

- Waterman Infrastructure & Environment (2020) Geo-Environmental Assessment Report (ref. 7);
- Waterman Infrastructure & Environment (2020) Coal Mining Risk Assessment (ref. 8);
- Waterman Infrastructure & Environment (2021) Ground Gas Monitoring (ref. 9);
- Curtins (2022) Phase 2 Ground Investigation (Playing Field Area) (ref. 10); and
- Curtins (2022) Coal Mining Ground Movement Assessment (Playing Field Area) (ref. 11).

2.0 Summary of Previous Investigations

This section presents a summary of previous ground investigations completed at the site, as detailed in Section 1.3.

This summary specifically focuses on the findings of Curtins previous ground investigation report (ref. 10) with other reports having been used as background information.

- Waterman Infrastructure & Environment (2020) Geo-Environmental Assessment Report (ref. 7);
- Waterman Infrastructure & Environment (2020) Coal Mining Risk Assessment (ref. 8);
- Waterman Infrastructure & Environment (2021) Ground Gas Monitoring (ref. 9);
- Curtins (2022) Phase 2 Ground Investigation (Playing Field Area) (ref. 10); and
- Curtins (2022) Coal Mining Ground Movement Assessment (Playing Field Area) (ref. 11).

2.1 Current Setting

The site is currently identified as two distinct parcels of land; Keresforth Medical Centre, now disused in the north-east comprising of low rise buildings with access roads, parking areas and soft landscaping and a public open space in the south-west. The area of public open space is predominately flat and is grass covered whilst the Keresforth Medical Centre (pre-demolition) is utilised by a mix of buildings, hardstanding, and soft landscaping. The Coal Authority record the presence of a mine shaft within the public open space.

Based on satellite imagery, the site is bounded to the north by Keresforth Close comprising residential dwellings and sports fields, to the east by Joseph Locke Primary School, to the south by the A6133 Broadway, residential property, and allotments and to the west by the A6133.

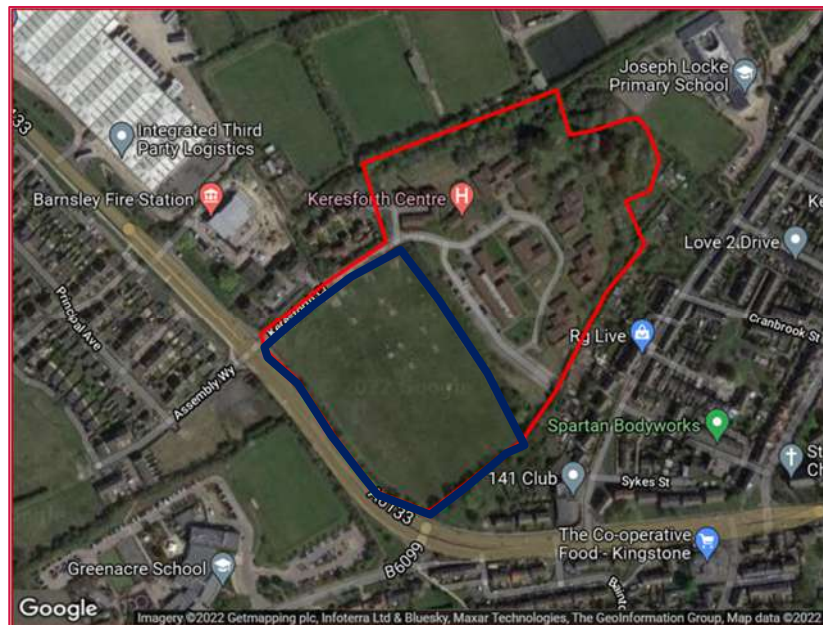


Fig 1 – Site Location Plan, site boundary shown in red for this Stage 2 ground investigation. Dark blue area is the playing field which references 10 and 11 refer too.

2.2 Previous Site Use

A review of available historical mapping information for the site (as presented within the Waterman Infrastructure & Environment Phase 1 report) (Ref. 7) has been undertaken.

The site remained undeveloped comprising arable farmland until 1978 when the Keresforth Close Medical Centre was constructed. No further notable change to site layout is recorded up to the present day. The mapping of the surrounding area recorded industrial land uses including foundries, works, mills and quarrying activities.

2.3 Ground Conditions

The ground investigation covered both the playing field and the NHS Keresforth Centre. However, the boreholes for the Keresforth Centre area to the east were shallow to assess human health risk from contaminated land and ground gas.

Made ground deposits were mainly encountered around the hardstanding areas of the former NHS Keresforth Medical Facilities location. Two of the window sample exploratory boreholes recorded made ground deposits comprising 0.10m of asphalt and underlain by 0.30 – 0.40m of beige to cream coarse, sandy GRAVEL. The gravel comprised angular to sub-angular sands, sandstones, and asphalt. The other borehole positions both in window sample and rotary core holes encountered topsoil. Topsoil was recorded as grass cover over brown soft, slightly silty CLAY with very fine grass rootlets throughout with occasional pebbles present. In exploratory hole RC01, the topsoil was noted as slightly sandy. In RC03, fragments of made ground comprising broken pottery and sandstone were common within the topsoil.

It was also noted within trial pit TP01, that the topsoil was brown soft, slightly clayey SILT possibly reworked; possibly as it was overlaying a coal authority mine shaft.

Superficial deposits were not encountered directly below the topsoil or made ground in any of the exploratory boreholes in Curtins investigation. Locally and further to the south, Watermans assessment report record surficial soils immediately underlaying made ground and or topsoil. BGS mapping Barnsley (Sheet 87, 1:50,000) records no superficial deposits on site. During the ground investigation, it was found in several locations that gravelly CLAY overlies the bedrock units; this is likely to be the residual soils and weathered bedrock of the Pennine Middle Coal Measures Formation.

The bedrock of the Pennine Middle Coal Measures Formation was encountered directly below the residual soils in all locations. The bedrock mostly comprised interbedded sandstones, mudstones, and siltstones with occasional coal seams. Due to the hardness of the bedrock, window sample exploratory boreholes were unable to penetrate past the residual soils into the bedrock. Bedrock was described as extremely weak to extremely strong thinly bedded, dark to light grey parallel laminated or lenticular bedded MUDSTONE, extremely weak to extremely strong, light grey stained orange or yellow-brown, fine to medium/coarse grained SANDSTONE, very weak to extremely strong, grey thinly laminated, laminated SILTSTONE and extremely weak and weathered, dull rarely lignitic, sub-bituminous to bituminous grey-brown to black COAL.

Possible broken ground was identified in exploratory hole RC06 between 9.50m – 17.00m bgl evidenced by poor core recoveries.

2.4 Human Health Risk Assessment

The soil organic matter (SOM) content has an influence on the volatilisation of organic contaminants (i.e., the higher the SOM, the lower the volatilisation rate and therefore inhalation exposure risk). Soil organic matter (SOM) values for the topsoil ranged from 5.47% to 16.1%. The underlying clay recorded SOM values ranging between 1.7% to 21.7%.

With consideration for a calculated geometric average, a SOM of 8.25 % was calculated for topsoil , and a SOM of 7.68% for underlying clay. For comparison against Tier 1 thresholds a conservative SOM value of 6% for 'Residential without home grown produce' end use has been adopted for both topsoil and natural clay soils, where applicable.

Assessment of environmental chemistry laboratory testing results for the Made Ground/Topsoil present on site determined isolated exceedances for metals and PAHs across the north, north-western and north-eastern extent of the public open space (playing fields) with most of the exceedances found within topsoil (RC01 at 0.20m bgl, RC02 at 0.30m bgl and RC06 at 0.15m bgl). Exceedances of chromium (VI) were encountered within exploratory hole locations RC01 at a depth of 0.20m bgl and RC02 at a depth of 0.30m bgl. There was also a slight exceedance in Arsenic encountered at RC02 at a depth of

0.30m bgl. There is notable exceedance in the PAHs, Benzo(a)pyrene and Dibenzo(ah)anthracene at RC06 at a depth of 0.15m bgl.

2.5 Ground Gas Risk Assessment

Methane (CH_4) was recorded below the instrument's detection limit during monitoring visits 1-6 in all monitoring wells. However, on the final monitoring visit, methane concentration was recorded in all monitoring positions between 2.2% - 27.0%. It was noted within position WS05 the methane concentration was 27.0% and within the deeper wells methane concentrations was noted as 7.2% and 15.9%.

Hydrogen sulphide (H_2S) was recorded at 0ppm on the first three visits across the two window sample positions (WS04 and WS05) and increased to 2ppm in both window sample wells on the fourth visit. The fifth visit recorded concentrations of 0ppm before increasing to a concentration of 1ppm during visit 6 and WS04 increasing to 2ppm in visit 7. Across the deeper wells, Hydrogen sulphide (H_2S) concentrations were consistently between 0 - 1ppm with RC06D recording a 1ppm concentration during one visit. Carbon monoxide was recorded to range between 0 – 3ppm across the seven visits. No gas flow (l/hr) was recorded in any of the boreholes across the seven visits except for RC06D where a maximum flow of 1.5 l/hr was recorded during visit four. Carbon dioxide (CO_2) was recorded in peak concentrations between 0.8% and 6.4%. A concentration of 6.4% was noted within RC06D during the fourth visit. Oxygen (O_2) was recorded during the monitoring visits to range between 11.2% and 20.0% within the installations.

Evaluation of the 'worst credible scenario' (highest hazardous gas flow rate that is realistically possible, i.e., in a single borehole) records a maximum Q_{hg} of 0.0096 l/hr for carbon dioxide. Evaluation of the 'worst credible scenario' (highest hazardous gas flow rate that is realistically possible, i.e., in a single borehole) records a maximum Q_{hg} of 0.41 l/hr for methane.

Evaluation of the 'worst possible scenario' (highest Q_{hg} across the entire dataset irrespective of location and discrete monitoring events) records a maximum Q_{hg} of 0.0096 l/hr for carbon dioxide. Evaluation of the 'worst possible scenario' (highest Q_{hg} across the entire dataset irrespective of location and discrete monitoring events) records a maximum Q_{hg} of 0.41 l/hr for methane.

In accordance with assessment by BS8485:2015+A1:2019 the GSV indicates a Characteristic Situation 2 (CS2) gas regime which does require ground gas protection measures.

2.6 Mining Risk Assessment

During the ground investigation works loss of water flush was recorded within all boreholes where mudstones and siltstones were encountered due to the fractured nature of the bedrock strata as well as where there was a presence of coal. The loss of flush was observed during the coring and subsequent open holing techniques. Coal seams were not encountered within the window sample

boreholes. Where coal was encountered, during coring in the drilling works, the coal was recorded to be fractured and retrieved as loose gravel. Within exploratory hole RC02, at depths beyond 34.00m bgl, coal encountered was recorded as intact, with no loose ground or voids being recorded at this depth. There was a notable change in the colour of flush from light grey to black during the open hole drilling within exploratory borehole RC05 indicative of coal encountered between depths of 17.00 – 18.20m bgl.

Possible broken ground may have been encountered within exploratory borehole position RC06 between depths of 9.50 – 17.00m bgl which was situated north-east of the mine shaft located by TP01. Several core runs between 9.50 – 17.00m bgl encountered a zone of core loss as well as the time for the core run being significantly reduced in comparison to previous boreholes. It is difficult to ascertain at this time if the coal seams encountered within RC01 and RC02 have been worked. The logs show a varying succession of strata and losses of flush could be due to the natural fracture state of the bedrock or voids or broken ground due to mining operations.; however, it is considered voiding is likely to be present along the northern extent of the proposed sports field.

A geological fault runs along the northern boundary of the public open field that forms part of the site area and across the access road, aligned generally east-west through the proposed development position. The geological fault that runs NE-SW north of the open field and links the Champany Hill Fault (SW of fault) and the Barebones Fault (NE of the fault). This fault splay is dipping southeast with the bedrock recorded to dip to the east or north-east. Given the age of historic mining activities at shallow depths (1924/1925 or earlier) it is anticipated that any surface subsidence associated with faulting may have already occurred.

TP01 identified the location of the coal authority recorded mine shaft. The trial pit was excavated at 5.6m by 5.4m and found the shaft had a diameter of approximately 3.50m and was situated 0.60m bgl below the residual clays. The shaft was backfilled with old colliery spoils including broken fine-grained sandstones, coal, pottery, and slag. As part of any future works the location of the mine shaft should be drilled to determine the depth of the mine shaft with appropriate treatment of the shaft and construction of a cap to the mine shaft. The shaft is recorded to have no known treatment at the time of writing.

Previous remedial works are recorded on site based on a surface hazard incident report completed by the Coal Authority in 2014. The treatment works included opening out a small crown hole situated very close to the northern boundary of the site adjacent to the entrance of the field, by 2.20m by 1.50m and excavating to a depth of 4.50m below the surface to the base of a void. It was also reported that there were three separate roadways heading in north-east, south-east and south-west directions. The area was filled and compacted in layers with 12 tonnes of clean 75-150mm limestones not exceeding 300mm to within 1.5m to the surface. Geo-textile was placed across the fill and around the exposed sides with the as-dug sandy clay spoil placed and compacted in layers not exceeding a thickness of 150mm to

the underside of the existing turf. This was overlayed by the topsoil to reinstate the surface of the pre-existing field. No remediation of the visual 'roadways' was undertaken by the Coal Authority.

It has been assessed that the sports field is likely to have localised mine workings along the southern boundary as identified on the available abandonment plans and towards the northern boundary as unrecorded workings. A separate ground movement assessment report has been produced as part of the overall reporting for the proposed sports field and recommends the use of geogrid across the playing field area to mitigate against any potential crown hole collapses, rather than grout treating the entire field. However, the collapse feature along the northern boundary is likely to require further investigation in the form of geophysical techniques to try to determine whether anomalies can be identified due to how shallow the workings are. This is likely to be followed by intrusive ground investigation works to determine the location of the shallow unrecorded workings.

It is also recommended that stabilisation works across the development area post demolition of the existing building structures (where former Keresforth Medical Facilities occupy) should be completed to determine whether coal seams have been worked and require remedial or stabilisation works.

3.0 Phase 2 Ground Investigation Scope of Works

The ground investigation (GI) works were undertaken between the 1st and 16th August 2022.

The scope of the GI was designed in general accordance with current UK guidance including Land Contamination: Risk Management (Ref.1), British Standard (BS) 10175:2011+A2:2017 (Ref.2), BS5930: 2015+A1:2020 (Ref.3), and Eurocode 7 (Ref.4). A summary of the scope and rationale are summarised in Table 3.0 below.

Table 3.0 - Scope and Rationale of Fieldwork Undertaken

Exploratory Hole Type	Exploratory Hole Reference	Exploratory Hole Depth (m bgl)	Rationale
Dynamic Probing Super Heavy (DPSH)	DCP01 – DCP05	Max 0.50 – 4.20	Undertake in-situ geotechnical testing to determine potential rockhead levels across the site. Determine geotechnical parameters.
Geobore S Wireline Rotary Cored Boreholes	RC07 – RC11	Max 30.50	Confirm ground conditions including determine presence of historic unrecorded shallow mine workings targeting coal seams in the area. Collect soil and rock samples for geotechnical analysis. Undertake in-situ geotechnical testing. Post site works groundwater monitoring. Determine geotechnical parameters.

The exploratory hole locations were surveyed by Safe Dig Surveys during the GI works. The positions are approximately recorded on Curtins drawing ref. 079532-CUR-XX-XX-D-GE-80001-P03, a copy of which is contained within Appendix A1.

3.1 Soil Logging and Sampling

Rotary Cored boreholes including the manually excavated hand inspection pit arisings were logged on site by a qualified engineer. All exploratory holes were logged in accordance with the requirements of BS5930 (Ref.3), including recording observed visual and olfactory indications of contamination. Exploratory hole logs are provided in Appendix A2.

3.2 Monitoring Well Installations

Dual groundwater monitoring installations (50mm and 19mm diameter) were installed within three of the five rotary cored boreholes. A bentonite seal was placed above and below the screened section of the borehole to minimise potential for downward migration of contaminants and the creation of a

preferential migratory pathway. A gravel surround was installed in the annulus between the sides of the borehole and the slotted sections of pipe.

The monitoring wells were primarily designed to assess groundwater levels within the Pennine Middle Coal Measures Formation (PMCM). Ground gas monitoring assessment has been completed in the existing Watermans and Curtins reporting.

A summary of the response zones is presented in Table 3.2 below.

Table 3.2 - Monitoring Well Response Zones

Borehole Reference	Response Zone(s) (m bgl)	Strata Description(s)
RC07S	2.00 – 5.00	MUDSTONE
RC07D	20.00 – 25.00	SANDSTONE into MUDSTONE
RC09S	3.00 – 6.00	SILTSTONE & MUDSTONE
RC09D	15.00 – 20.00	SANDSTONE, SILTSTONE & MUDSTONE
RC11S	2.00 – 4.00	SILTSTONE into MUDSTONE
RC11D	10.00 – 15.00	SILTSTONE & MUDSTONE

S = Shallow D = Deep

Copies of borehole logs can be referred to in Appendix A2 of this report.

3.3 Post-Investigation Monitoring

3.3.1 Groundwater Monitoring

An initial programme of 4 No. groundwater monitoring visits over two months was proposed to assess the groundwater levels at the site. The visits were completed between September and October 2022.

3.3.2 Ground Gas Monitoring & Groundwater Sampling

Ground gas monitoring and groundwater sampling are not included in the scope of the ground investigation works and reporting, as these have been assessed and completed in previous ground investigations by Watermans and Curtins.

4.0 Laboratory Analysis

Representative soil samples were selected for laboratory geotechnical analysis, based on field observations and to provide a characterisation of the made ground and natural strata encountered. Selected soil samples were transported to the nominated laboratory under the laboratory's chain of custody documentation. Geotechnical samples were taken in the form of bulk bags and, disturbed tub samples for soils. Rock samples were wrapped in cling film. The laboratory selected by Curtins for geotechnical analysis was i2 Analytical Ltd, a UKAS and MCERTS accredited laboratory.

This ground investigation has been designed to assess geotechnical ground conditions, appropriate assessment of relevant contaminant/pollutant linkages has been undertaken in the previous reports referred to in Section 1.3. Consequently, the exploratory holes were generally located in a targeted method specific to the proposed buildings primarily to obtain ground condition information and determine geotechnical design parameters.

4.1 Geotechnical Analysis

Soil samples for testing were prepared in accordance with BS1377: Part 1: 2016 and representative sub-samples were taken for testing in accordance with BS EN ISO 17892, for the respective tests where applicable. The following tests were carried out:

- 36 No. Water content
- 27 No. BRE Suite D – pH (2:5:1 extract), Sulphate as SO₄, Magnesium, Nitrate as NO₃ and Chloride (water soluble 2:1). Sulphate (as SO₄ Total) and Sulphur (Total)
- 9 No. Plasticity Index – 1 point liquid limit (inc. moisture content)

Rock samples for geotechnical testing were prepared and tested in accordance with ISRM Suggested Methods. The following tests were carried out:

- 94 No. Point Load Test (PLT)
- 5 No. Uniaxial Compressive Strength (UCS)

Copies of the geotechnical testing certificates are presented in Appendix A4.

5.0 Encountered Ground Conditions

5.1 General

A summary of the ground conditions encountered during the ground investigation works is presented below, with detailed information presented in the exploratory hole logs included in Appendix A2 and a summary of each strata presented in subsequent sections. The values specified in tables 5.2 and 5.3 should not be used for geotechnical design purposes unless specified otherwise. Geotechnical parameters for design will be provided in section 6.2.

Table 5.1 - Summary of Ground Conditions Encountered

Stratum	Depth to top of strata (m bgl) (m AOD)	Thickness (m)		Description
		Min	Max	
MADE GROUND	0.00 (141.40 – 139.40)	0.15	1.90	Encountered as either topsoil or asphalt over light yellow to cream compact sandy very angular gravel of limestone in areas of hardstanding.
RESIDUAL SOIL (Pennine Middle Coal Measures Formation)	0.15 – 1.90 (141.25 – 138.83)	0.10	1.85	The deposit was typically described as a stiff to very stiff yellowish brown, brown and orange mottled grey slightly gravelly CLAY. Gravel is fine to coarse grained and very angular of coal and mudstone lithorelicts or as a stiff to very stiff brown CLAY.
BEDROCK (Pennine Middle Coal Measures Formation)	1.55 – 2.00 (139.40 – 137.60)	28.50*	28.95*	The mudstone is typically described as an extremely weak progressing to moderately weak, grey to dark grey, rare medium strong to strong dark grey, rare moderately weak to medium strong black MUDSTONE. Completely to highly weathered, becoming slightly weathered. The siltstone is described as weak to strong rarely strong light and dark grey lenticular bedded SILTSTONE. Highly weathered to slightly weathered. The sandstones are described as a medium strong to strong rarely very strong light grey, rarely dark grey cross bedded fine grained SANDSTONE. Slightly weathered to fresh with closely to widely spaced discontinuities

* Thickness / base of deposit not proven.

5.2 Made Ground

Made ground deposits were encountered in all of the exploratory hole positions proven to maximum depths ranging between 0.15m and 1.90m bgl (141.25m – 138.83m AOD). The made ground was encountered as topsoil in the locations of RC07, RC08 and RC09 to maximum depths between 0.15m

– 0.20m. Described as grass over brown clayey topsoil. In the positions of RC10 and RC11 the made ground is encountered as asphalt up to maximum depths of 0.10m bgl. The made ground soils were proven to maximum depths ranging between 1.00m and 1.90m bgl (139.81 – 138.83m AOD). This was described as a light yellow to cream compact sandy very angular GRAVEL of limestone with the location of RC10 also recorded to have a firm light brown gravelly CLAY made ground soil. The gravel is fine to coarse grained and very angular of coal, mudstone, and sandstone lithorelicts.

Table 5.2 - Summary of Geotechnical Test Results – Made Ground Deposits

Parameter (units)	No. of tests	Minimum	Maximum	Average
SPT 'N' Value	1	-	8	-

5.3 Residual Soil & Bedrock (Pennine Middle Coal Measures Formation)

The residual soil was encountered in all rotary borehole locations directly beneath the made ground deposits. The deposits were encountered at depths ranging between 0.15m and 1.90m bgl (141.25m AOD in RC09 – 138.83m AOD in RC11). The residual soils were proven to maximum depths ranging between 1.55m and 2.00m bgl (139.90m AOD in RC09 – 137.60m AOD in RC08). The shallow residual soils were primarily encountered as a CLAY deposit and are interpreted to be the weathered surface zone of the Pennine Middle Coal Measures Formation (PMCM). The deposit was typically described as a stiff to very stiff yellowish brown, brown and orange mottled grey slightly gravelly CLAY. Gravel is fine to coarse grained and very angular of coal and mudstone lithorelicts or as a stiff to very stiff brown CLAY. This residual soil deposit thickness is likely to vary laterally across the site, particularly where the site slopes in a south-east direction. Where possible, plasticity index tests were completed on the residual soil and bedrock interface.

Plasticity testing was undertaken on several residual soil samples which recorded the clay to be of low to medium plasticity. In accordance with NHBC guidelines the clay can be described as having a worst case low volume change potential in the shallow samples. One sample at 8.00m bgl just above the worked ground zone is recorded to be of medium volume change potential. Based on published relationships, undrained shear strengths (cu) may be estimated from SPT 'N' values where full penetration was achieved, using a factor of 6.5, estimated cu values ranged between 125 kPa and 235 kPa. Taking into consideration the logging descriptions, in-situ testing, and laboratory testing, the PMCM residual soil clay is likely to range from medium strength up to very high strength. This is likely to vary laterally.

Table 5.3 - Summary of Geotechnical Test Results – Residual Soil & Bedrock Deposits

Parameter (units)	No. of tests	Minimum	Maximum	Average
Moisture Content (%) BS1377-2	35	6.4	28	11.3
pH	26	4.5	8.9	8.05
Total Sulphate (%) as SO ₄	26	0.01	0.22	0.03
Water Soluble Sulphate (mg/l)	26	3.4	266	61.8
Water Soluble Chloride (mg/l)	26	2.3	53	10
Total Sulphur (%)	26	0.005	0.872	0.073
Water Soluble Nitrate (mg/l)	26	2	2.2	2.11
Water Soluble Magnesium (mg/l)	26	2.5	46	12.7
Liquid Limit (%)	9	26	48	36
Plastic Limit (%)	9	16	25	20
Plasticity Index (%)	9	10	27	16
SPT 'N' Value – Residual Soil Stratum	4	19	100+ ⁽¹⁾	60
Undrained Shear Strength (cu) (kPa) ⁽²⁾	4	124	650	392
Coefficient of volume compressibility (Mv) (m ² /MN) ⁽³⁾	4	0.09	0.02	0.04
SPT 'N' Value – Bedrock Stratum	34	3	100+ ⁽¹⁾	91
Point Load Test Is50 (MPa) - Mudstone	51	0.06	3.26	0.82
Estimated Uniaxial Compressive Strength (UCS) (Is50*Factor) ⁽⁴⁾ (MPa) - Mudstone	51	1.2	65.2	16.4
Point Load Test Is50 (MPa) - Siltstone	24	0.06	4.56	1.3
Estimated Uniaxial Compressive Strength (UCS) (Is50*Factor) ⁽⁴⁾ (MPa) - Siltstone	24	1.2	91.2	26.3
Point Load Test Is50 (MPa) - Sandstone	18	0.54	3.76	2.12
Estimated Uniaxial Compressive Strength (UCS) (Is50*Factor) ⁽⁴⁾ (MPa) - Sandstone	18	10.8	75.2	42.4
Uniaxial Compressive Strength Test (UCS) (MPa)	5	18.5	57.3	35.4

(1) Specific SPT 'N' values are provided on the exploratory borehole logs contained in Appendix A2.

(2) cu estimated from SPT N value correlation with average Plasticity Index using a Factor of 6.5 (Stroud and Butler, 1975).

(3) mv estimated from SPT N value correlation with average Plasticity Index using a Factor of 0.57 (Stroud and Butler, 1975).

(4) Estimated uniaxial compressive strength using Is50 value multiplied by a factor of 20.

The bedrock deposits were encountered directly beneath the residual soils. The bedrock was encountered at depths ranging between 1.55m and 2.00m bgl (139.40m AOD in RC09 – 137.60m AOD in RC08). The base of the PMCM was not proven but the base of the boreholes were advanced up to 30.50m bgl (110.90m – 108.90m AOD). The deposits that were encountered were of interbedded mudstone, siltstone sandstone and coal of varying weathering grades and fracture states.

The mudstone is generally the most common of the interbedded deposits, generally the weakest and has a higher degree of weathering compared to the siltstone and sandstone. The mudstone is typically described as an extremely weak progressing to moderately weak, grey to dark grey MUDSTONE. Initially completely to highly weathered, becoming slightly weathered with extremely closely becoming closely spaced discontinuities. Fractures are generally iron stained dark purple, dark orange and orange with the orientation of the fractures generally horizontal to sub-horizontal with rare vertical fractures. Rare black plant fossil remains were present.

The siltstones are the second most common of the interbedded deposits and is generally described as a weak to medium strong light and dark grey lenticular bedded SILTSTONE. Highly weathered to slightly weathered with very closely to medium spaced discontinuities. Fractures are generally iron oxide stained light to dark orange with largely horizontal to sub-horizontal with rare vertical fractures.

The sandstones are the third most common of the interbedded deposits and are generally described as a medium strong to strong rarely very strong light grey, rarely dark grey cross bedded fine grained SANDSTONE. Slightly weathered to fresh with closely to widely spaced discontinuities. Rarely fracture planes have possible calcite minerals deposited on the fracture planes. Some of the fracture planes are also iron oxide stained.

Coal deposits were encountered throughout with distinct layers encountered that are interpreted to be the Barnsley coal seam (recorded in historical records as a 2.68m thick split seam) . The position of RC09 between 8.00 and 9.50m identified a zone of worked ground, possible void. The positions of RC07, RC08, RC10 and RC11 encountered intact coal which could have passed through potential pillars supporting the below ground unrecorded workings. In RC11 between 13.25m and 15.50m bgl above the coal seam was a residual soil / extremely weak deposit of material which was not encountered in any of the other boreholes. Further discussion with relation to the historical coal mining is discussed in section 6.4.

Numerous point load tests were undertaken across all of the different rock types to help provide estimations of the UCS values. These are shown in the table above and show a wide range of strengths. It was difficult to obtain samples to undertake full UCS tests due to the fracture spacing of the bedrock and large portions of the material being recovered as core stones in the mudstone and siltstone primarily. With the sandstone sometimes breaking up into gravel and cobble pieces, potentially breaking

up along the sand grains. SPTs were undertaken within the top 10m or where the ground conditions became unusually soft which was encountered in RC09 and RC11.

5.4 Observed Potential Contamination

During the ground investigation works no visual or olfactory evidence of contamination was identified within the boreholes.

5.5 Obstructions Encountered

No anthropogenic obstructions were encountered as part of the ground investigation works that prevented advancement of any of the exploratory holes. However, at the time of the ground investigation the buildings and associated areas hardstanding were still present. On the last monitoring visit completed on the 11th October 2022 all of the buildings have been demolished to ground level; foundations will require breaking to remove hard spots. An enabling works package is likely to be required to remove these anthropogenic features.

The underlying bedrock deposits are likely to be encountered at varying depths across the site with the topography of the land currently sloping to the south-east.

5.6 Groundwater Conditions

A summary of the groundwater levels recorded during the ground investigation works, and subsequent monitoring, is presented in Table 5.6. Full details of the water strikes recorded during progression of the investigation positions are presented on the exploratory hole logs included in Appendix A2 and full details of the water levels recorded during the monitoring visits are presented in Appendix A5.

Table 5.6 - Groundwater strikes during investigation and subsequent monitoring levels.

Exploratory Hole Location Ref.	Water Strikes During Ground Investigation		Post Investigation Monitored Water Levels	
	Strike Depth (mbgl) (m AOD)	Strata	Installation Strata	Monitored Levels (m bgl) (m AOD)
RC07S	-	-	PMCM - Mudstone	Dry
RC07D	-	-	PMCM – Sandstone & Mudstone	20.25 – 20.45 (120.02m – 119.82m AOD)
RC09S	-	-	PMCM – Siltstone & Mudstone	Dry

Exploratory Hole Location Ref.	Water Strikes During Ground Investigation		Post Investigation Monitored Water Levels	
	Strike Depth (mbgl) (m AOD)	Strata	Installation Strata	Monitored Levels (m bgl) (m AOD)
RC09D	-	-	PMCM – Primarily Sandstone with Mudstone & Siltstone present	18.60 – 19.90 (122.80m – 121.50m AOD)
RC11S	-	-	PMCM – Siltstone & Mudstone	2.15 – 2.65 (138.58m – 138.08m AOD)
RC11D	-	-	PMCM – Siltstone & Mudstone within extremely weak zone	Dry

- No groundwater not recorded to be struck during ground investigation.

During the rotary drilling groundwater flush was lost completely at certain depths in all five of the rotary boreholes. This required water to be constantly pumped from the hydrant at the site to be able to complete the works efficiently. Due to this it was not possible to record the amount of water used at each location to drill to 30.50m bgl. The depths at which flush was lost is noted in section 6.4.

The groundwater levels recorded in RC11S are unlikely to be representative of a perched shallow water table within the completely to highly weathered zone. Due to the highly fractured and iron stained nature of the material, water is likely to flow vertically as well as laterally albeit at a very slow to slow rate.

The groundwater levels recorded in RC07D and RC09D are unclear whether this would be the representative natural groundwater table. Due to the rate at which the water flush was being lost during drilling of the rotary positions it is unlikely that this would be the natural groundwater table. It is possible that this is residual flush water after the drilling works have been completed.

5.7 Aggressive Ground Conditions

The classification of the site in terms of concrete in aggressive ground is based on the guidance provided in Table C2 of the Building Research Establishment (BRE) Special Digest 1, third edition of 2005. Table 5.7 details the classifications.

Table 5.7 - Aggressive Chemical Environment for Concrete (ACEC) Site Classification

Stratum	Design Sulphate Class	ACEC Class ⁽¹⁾
Residual Soil & Bedrock (PMCM)	DS-1 where concrete not in contact with coal seams.	AC-1 where concrete not in contact with coal seams.

	DS-2 where concrete will be in contact with coal seams due to more acidic conditions and pyritic.	AC-2z where concrete will be in contact with coal seams due to more acidic and pyritic conditions.
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(1) ACEC assessment was based on the mobile groundwater condition for the scheme area.

It should be noted that the concrete classification assessment for the made ground soils was assessed in Curtins previous report (ref. 10). This investigation primarily focused on the residual soil and bedrock ground conditions.

The general deposits of mudstone, siltstone, and sandstone of the PMCM would be assessed as DS-1 and AC-1 from the completed laboratory tests. However, the coal deposits are more acidic and are more likely to contain oxidisable sulphides.

To calculate the total potential sulphate (TPS) content in the deposit, this is calculated from the following equation:

$$3 \times \text{Total Sulphur (TS \%S)} = \text{TPS}$$

To calculate the Oxidisable Sulphides (OS) content in the peat this is calculated from the following equation:

$$\text{TPS \%SO}_4 - \text{AS (Total Sulphate Content (\%SO}_4)) = \text{OS}$$

The calculation returns OS values ranging between 0.20% and 0.42% in 2 No. of the assessed coal samples. It was also assessed that the oxidisable sulphate is greater than 0.3% in 1 of the 2 No. samples of the coal indicating that aggressive ground conditions are likely to be present within the coal seam only. Due to this where concrete is likely to pass through the coal seams the concrete classification should be increased to DS-2 and AC-2z.

6.0 Engineering Assessment and Recommendations

6.1 Introduction

This section will assess the significant geotechnical issues for the proposed Trinity School development. The proposed development plan is contained within Appendix A1. The engineering assessment considers mining risks, foundation design, bearing capacity, settlement, excavations, earthworks, and hardstanding design and viability of soakaways for the site. Structural details and loadings have not yet been provided. If the proposed development changes subsequently to the issue of this report (for example change in building position) the findings of this report must be reviewed. The construction designer should satisfy themselves of the adequacy of their design and proposed approach to construction with reference to the on-going project design proposals, the ground investigation information, and their own examination of the site.

6.2 Summary of Ground Conditions

The ground conditions at the site generally comprised limited made ground overlying residual soil and bedrock deposits of the Pennine Middle Coal Measures Formation (PMCM). Groundwater conditions are generally considered to be deep and are unlikely to affect the shallow soils.

The geotechnical parameters recommended for use in the design based on the ground conditions encountered are summarised in Table 6.2 below.

Table 6.2 - Geotechnical Parameters

Parameter	Residual Soils (Clay)	PMCM - Mudstone	PMCM - Siltstone	PMCM - Sandstone
Unit Weight Above Water Table, γ (kN/m ³) ⁽¹⁾	15 – 22	-	-	-
Unit Weight Below Water Table, γ (kN/m ³) ⁽¹⁾	16 – 22	22 – 26	22 – 26	25 – 27
Effective Angle of Shearing Resistance, Φ' (°) ⁽²⁾	24 – 27	27 – 30	30 – 34	30 – 34
Undrained Shear Strength c_u (kPa) ⁽³⁾	75 – 150	-	-	-
Coefficient of volume compressibility m_v (m ² /MN) ⁽³⁾	0.05 – 0.10	-	-	-
Unconfined Compressive Strength (MN/m ²)	-	1 – 25	5 – 50	10 – 70

(1) From published sources (BS8002:2015).

(2) Estimated from the relationship between typical SPT 'N' value and angle of shearing resistance (Peck et al, 1976).

(3) Average value estimated from the correlation between SPT 'N' value and average plasticity index (Stroud and Butler, 1975).

6.3 Engineering Constraints

Presence of existing and relic services

The Principal Contractor should seek to obtain all available information on existing services from the client prior to enabling works and construction to ensure that appropriate mitigation measures are put in place during the construction phase. It is likely that services will require disconnecting and decommissioning / diversion, subject to final structural loadings / layout.

Made ground and variability of near surface deposits

Made ground was encountered across the site with the deepest occurring in the south of the site.

Given its inherent variability, the made ground should not be considered as a suitable founding stratum for the proposed buildings. However, the material could be re-used during the earthwork operations as general fill subject to further classification and use controlled by an appropriate earthworks specification and Material Management Plan (refer to CL:AIRE document The Definition of Waste: Development Industry Code of Practice).

There were no very soft silt or clay superficial deposits encountered in the near surface soils during the ground investigation. The contractor should be aware that these soils may be present on the site and, should very soft cohesive deposits be encountered they are to be removed and replaced with a suitable well compacted granular fill if impacting on buildings and hardstanding.

Weathering of the near surface bedrock deposits

From the ground investigation a weathered horizon of residual soils is encountered at depths ranging between 0.15m and 1.90m bgl (141.25m AOD in RC09 – 138.83m AOD in RC11). The residual soils were proven to maximum depths ranging between 1.55m and 2.00m bgl (139.90m AOD in RC09 – 137.60m AOD in RC08). This is based on the cohesive nature of the soils and lower undrained shear strength. Should very soft/compressible zones be encountered during the excavations for foundations these soils should be removed and replaced with a suitably compacted granular material.

Bearing resistances and foundation settlement will be subject to detailed assessment and structural design.

Obstructions and relic foundations

It is anticipated that any relic structures must be removed prior to commencement of any construction works. It should be ensured that all existing foundations associated with the former structures present within the development platform are removed in their entirety during demolition works. Existing foundations should be removed to avoid forming hard spots and backfilled in accordance with an engineering specification to avoid soft spots.

It should be noted that all information provided is approximate, for guidance only and other undiscovered obstructions may exist. Where demolition works are to be undertaken of the existing structures, it should be ensured that all obstructions within influencing depth of the proposed development are removed as required. Existing foundations should be removed to avoid forming hard spots and backfilled in accordance with an engineering specification to avoid soft spots.

Consideration should be given, in liaison with the Principal Contractor, to the re-use of former foundations/concrete obstructions via crushing under mobile plant license or other suitable permit, appropriate testing (environmental and geotechnical), screening and re-use on site as capping or general fill/fill to structures in accordance with Series 600 of the Specification for Highways Works (SHW).

6.4 Mining Legacy Risks

For reference, the following assessments are made for the area outlined in red in Figure 2 below. The dark blue area has already had ground investigation works completed to determine the risks from coal mining for the playing field specifically (ref. 10 & 11).

Based on the extent of the latest proposed development plans for the site, the Coal Authority Interactive Map Viewer records the former Keresforth NHS centre to be in a development high risk area with probable shallow coal mine workings and past shallow coal mine workings. With regard to the land within the red boundary, coal mine workings are anticipated to be present and significantly at shallow depth; the named coal seam of importance in this area is the Barnsley Coal seam.

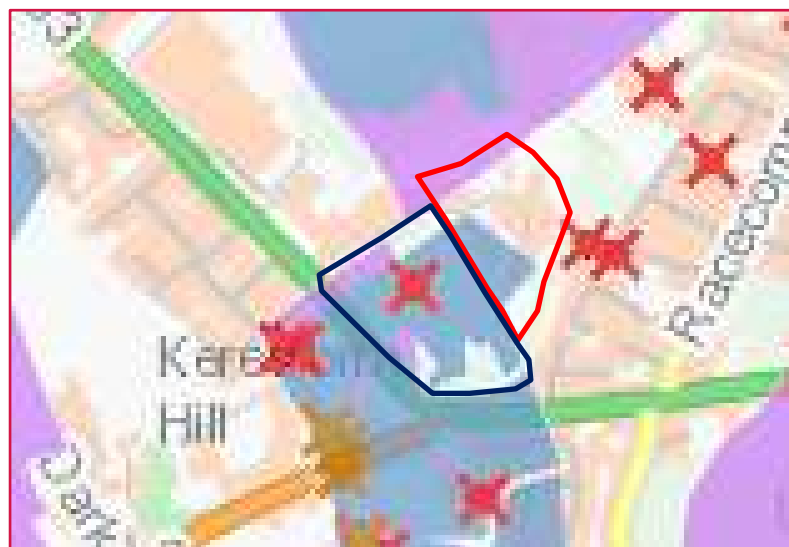


Figure 2 – Coal Authority Interactive Mapping Extract

(Red boundary line = approximate site boundary for this specific investigation. Dark blue boundary line = approximate site boundary for previous investigation of playing fields. Red cross = recorded mine entries. Purple = probable shallow coal mine workings. Blue = past shallow coal mine workings.

Records held by the coal authority indicate that the playing field to the south and south-west has underlying shallow coal mine workings. The records also indicate that these workings extend onto the area of interest for this investigation. It should be noted that there is also a geological fault which strikes approximately east to west and has a downthrow to the south, south-east which runs parallel to Keresforth Close. Figure 3 below provides an indication of the approximate location of the geological fault line. No further information is provided on this geological fault. This is highly likely to control the depths at which the Barnsley coal seam is encountered and subsequently the potential unrecorded workings.

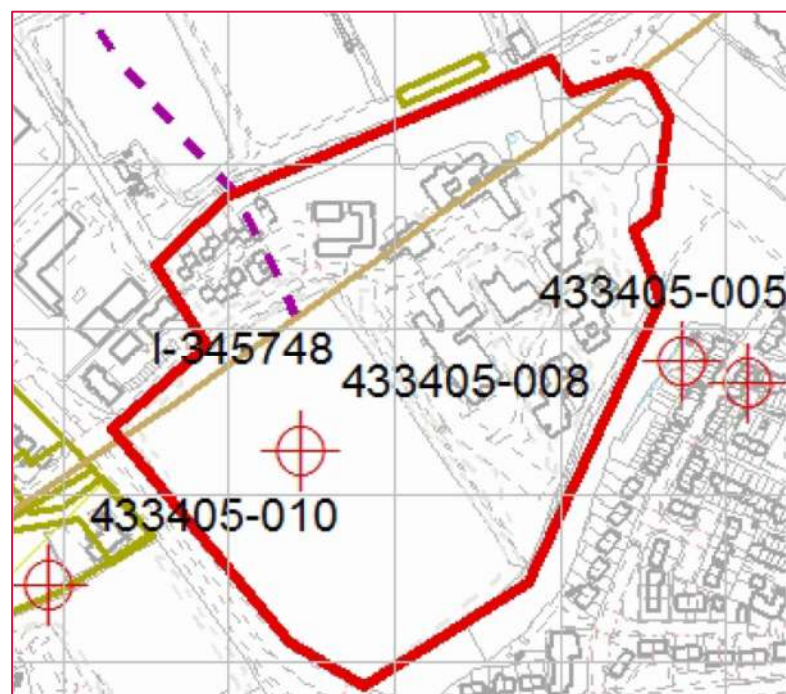


Figure 3 – Coal Authority Consultants Report extract from Watermans CMRA (ref. 8).
Light brown line = geological fault line. Dashed purple line = inferred coal seam outcrop.
Red crosshair = recorded mine shaft.

As part of this additional Phase 2 Ground Investigation the scope was designed to determine the following:

- The thickness of the made ground and superficial deposits (if present).
- The depth to rockhead of the Pennine Middle Coal Measures Formation.
- Determine the strength of the rock present and fracture state of the deposit, using rotary coring techniques.
- The presence of worked / extracted seams in the form of voids / broken ground within the shallow Pennine Middle Coal Measures Formation that is likely to influence the development ground stability.

Table 6.4 below provides a summary of the coal, ironstone seams and potentially worked ground that was encountered during the ground investigation works.

Table 6.4 – Coal, ironstone seams and potential worked ground encountered as part of the rotary borehole works.

Exploratory Hole Location	Depth of Coal Encountered (m bgl) (m AOD)	Thickness (m)	Material Description
RC07	8.98 – 9.50 (131.29m – 130.77m AOD)	2.02 (Assumed)	Extremely weak black vitreous COAL . Highly weathered with extremely closely spaced discontinuities. Water flush lost completely between 9.00m and 10.00m bgl (131.27m AOD and 130.27m AOD)
	9.50 – 10.00 (130.77m – 130.27m AOD)		AZCL – No recovery. SPT undertaken first which confirmed coal deposits.
	10.00 – 11.00 (130.27m – 129.27m AOD)		Extremely weak to very weak black COAL with rare yellow sulphur present. Highly weathered with extremely closely spaced discontinuities. Partly recovered as a gravel.
	29.87 – 30.07	0.20	Very weak black COAL . Moderately weathered with extremely closely spaced discontinuities.
RC08	2.30 – 2.50 (137.10m – 136.90m AOD)	0.20	Moderately weak orange and dark purple IRONSTONE . Highly weathered with extremely closely spaced discontinuities. Recovered as a gravel.
	17.25 – 19.30 (122.15m – 120.10m AOD)	2.05	Very weak to weak black COAL . Extremely closely spaced discontinuities. Water flush lost completely around 19.10m bgl (119.90m AOD).
RC09	8.00 – 9.60 (133.40m – 131.80m AOD)	1.60 (Assumed)	Water flush lost completely around 7.20m bgl (134.20m AOD) No recovery - Soft drilling with fragments of coal and mudstone, possible workings / VOID . Complete loss of flush from this point onwards.
	9.60 – 10.65 (131.80m – 130.75m AOD)	1.05	Black very angular GRAVEL of COAL into an extremely weak black COAL . Completely to highly weathered with extremely closely spaced discontinuities. Fractures are iron oxide stained

Exploratory Hole Location	Depth of Coal Encountered (m bgl) (m AOD)	Thickness (m)	Material Description
			orange and coal has multi-coloured sheen on the fracture surfaces.
	29.00 – 29.10 (112.40m – 112.30m AOD)	0.10	Extremely weak black pyritic COAL . Highly weathered with extremely closely spaced discontinuities.
	30.20 – 30.50 (111.20m – 110.90m AOD)	0.30 (Thickness not proven)	Weak to moderately weak black COAL . Moderately weathered with closely spaced discontinuities. Recovered as a gravel.
RC10	13.40 – 15.40 (127.41m – 125.41m AOD)	2.50 (Excluding the 0.10m thick interbed of mudstone)	13.40 – 14.00m – Very limited recovery of extremely weak black COAL . Recovered as very angular gravels. Water flush lost completely around 14.00m bgl (126.81m AOD). 14.00 – 15.40m - Weak to moderately weak black COAL . Moderately weathered with closely spaced discontinuities. Some fractures contain iron oxide staining. Recovered as a gravel.
	15.50 – 16.00 (125.31m – 124.81m AOD)		Weak to moderately weak black COAL . Moderately weathered with closely spaced discontinuities. Some fractures contain iron oxide staining. Recovered as a gravel.
RC11	13.25 – 15.50 (127.48m – 125.23m AOD)	2.25	Zone of residual soil to extremely weak crumbly material, completely to highly weathered. Material was much weaker than the above and below rock deposits. Possible fault zone? Or worked zone nearby? Water flush lost completely around 14.00m bgl (126.73m AOD).
	15.50 – 15.80 (125.23m – 124.93m AOD)	0.30	AZCL – No recovery resistance while drilling. SPT test confirmed clay onto coal from 15.50 – 15.95m bgl.
	15.80 – 16.50 (124.93m – 124.23m AOD)	0.70	Medium dense GRAVEL of very angular COAL . Gravels are extremely weak.

The above table indicates that the geological fault influences the depths at which the coal seams are encountered, and the fault is likely to be located several metres to the south than indicated on available drawings, but the strike of the fault (east to west) is likely to remain the same. The positions of RC07 and RC09 are likely to be situated north of the recorded geological fault with the possible void / worked ground in RC09 encountered at 8.00m bgl (133.40m AOD) and coal seam in RC07 at 8.98m bgl (131.29m AOD). This indicates that the seam is likely to dip to the east, north of the geological fault.

South of the geological fault the coal seams were encountered in RC08 at 17.25m bgl (122.15m AOD) in RC10 at 13.40m bgl (127.41m AOD) and RC11 at 15.50m bgl (125.23m AOD). Although in the location of RC11 an approximately 2.00m thick completely weathered residual soil to extremely weak crumbly material between 13.25m and 15.50m bgl (127.48m and 125.23m AOD) was recorded above the coal seam. This shows that the coal seam to the south of the fault is likely dipping to the east and south.

To safely found building structures above abandoned mine workings, a generally accepted guide is for a minimum thickness rock cover, equivalent to 10 x seam or void thickness (T), is required. Based on the findings of the ground investigation there is not sufficient rock cover overlying the worked ground or coal seams, given that the possible recorded worked thickness ranges from 2.00m and 2.50m thickness and historically recorded seam thickness of c2.7m for the Barnsley coal seam. Therefore, the risk from unrecorded shallow mine workings is assessed to be High for the areas both north and south of the geological fault. Without treatment of the shallow seams foundations for the proposed buildings could be impacted by:

- Excess settlement;
- Movement in the bedrock strata overlying the old workings due to their rearrangement;
- On the assumption that the mining extraction was by pillar and stall, the strata could eventually sag and collapse;
- On the assumption that the mining extraction was by pillar and stall, the pillars could punch into soft floor measures; and
- Overstressing of pillars leading to eventual collapse.

Coal seams were also encountered in RC07 at 29.87m bgl (110.40m AOD) with a thickness of 0.20m and in RC09 at 29.00m bgl (112.40m AOD) with a thickness of 0.10m and at 30.20m bgl (111.20m AOD) with a thickness of 0.30m. However, this is unlikely to be the full thickness of this seam as this corresponded with the finished depth of the rotary borehole. The location of RC08 encountered a shallow seam of Ironstone at 2.30m bgl (137.10m AOD) with a thickness of 0.20m. It is unlikely that these 4 No. seams would have been targeted for extraction and are assessed to be a Low risk to the proposed development.

At this stage of the development, both the main school building and the sports block are either positioned to cross this geological fault line or be positioned very close to the geological fault line. The previous CMRA assessed this geological fault as a Low risk due to no proposed structures present. However, given that the buildings are now to be situated on or close to the geological fault line this risk is assessed as Moderate. The ground conditions immediately surrounding the fault are likely to be weaker than the surrounding rock material resulting in reduced bearing support and potential fissures. Historically there doesn't appear to have been any reported movements of geological faults either for this site specifically or in the surrounding area. It is anticipated that any surface subsidence associated with faulting may have already occurred. Future grouting works are likely to find that the grout takes could increase towards the zone of the geological fault. The foundations will require additional reinforcement and potentially movement joints incorporating into the structure.

A grouting specification document and scope of works has already been produced for the proposed development site. Information contained within this report should also be included as part of all tender information packs specifically those associated with the proposed treatment works by grouting of shallow workings.

This report, mine working treatment specifications and other reference documents in Section 1.3 must be submitted to the Coal Authority for approval of any future treatment works relating to past mining risks. The treatment works must be completed prior to any further development works and will require a Coal Authority permit prior to treatment works commencing.

6.5 Excavations

Excavation through layers of made ground and residual soils encountered across the site should be feasible using conventional site plant. Where excavation is needed in the underlying bedrock materials of mudstone or siltstone, localised ripping out of the material is likely to be required. The dynamic cone penetration tests (DCPs) completed across the site also highlighted a potential variability in the rockhead level across the site with the shallowest refusal encountered at 0.50m bgl (140.36m AOD) in DCP04 and the deepest refusal being encountered at 4.20m bgl (135.03m AOD) in DCP02.

Based on observations on site, together with the results of in-situ and laboratory tests, it is considered that excavations to less than 1.2 m depth from current ground levels should generally stand unsupported in the short term (1-14 days). Excavated side slope angles in wet firm to stiff clay of 20 - 25 degrees is likely to be suitable increasing to 35 – 45 degrees for dry firm to stiff Clay. Side support for safety purposes should of course be provided to all excavations which appear unstable, and those more than 1.20m deep, in accordance with Health and Safety Regulations. Groundwater is unlikely to be encountered in shallow excavations for foundations or services. It is considered that groundwater inflows, if encountered, may be controlled by pumping from sumps.

6.6 Materials Management - Re-Use of Site Soils

Based on the geochemical testing results presented as part of previous investigations it is considered that there is no specific requirement to remove soils from site because of them presenting an unacceptable risk to human health or the environment.

Principles for the re-use of site won soils elsewhere on the same development site can be summarised as follows.

- i) The re-use of excavated site won soils elsewhere on the site must not create an unacceptable risk of pollution of the environment or harm to human health;
- ii) The material must be suitable for use for its intended purpose in all respects. Both its chemical and geotechnical properties have to be demonstrated to be suitable, and the relevant specification for its use must be met;
- iii) Certainty of use has to be established with reference to the needs of the proposed development; for example, a cut and fill exercise to establish level development platforms as recorded on drawings approved by the Local Authority as part of the planning process;
- iv) The cumulative volume with regard to each type of soil proposed for reuse must only be what is required for the needs of the proposed development. The volumes required must be accurately calculated from construction drawings and the re use recorded during the works so as to be tracked and easily audited.

These principles are described in greater detail within the CL:AIRE document The Definition of Waste: Development Industry Code of Practice (Version 2). This Code of Practice sets out good practice for the development industry to use when a) assessing on a site-specific basis whether excavated materials are classified as waste or not and b) determining on a site-specific basis when treated excavated waste can cease to be waste for a particular use. It describes an auditable system to demonstrate that the Code of Practice has been adhered to.

It is recommended that the adoption of the Code of Practice, which is voluntary and applies to England and Wales only, should be considered as an appropriate method of reusing site won soils on the development site within the requirements of UK waste regulation.

At this stage it is understood that a cut and fill drawing has been produced and an earthworks specification has also been produced. It is unclear whether both items are the finalised documents, or if further amendments will be required in the future which could have a bearing on the volume of materials generated.

6.7 Foundation Design

At the time of writing, it is understood that the proposed buildings are to consist of a main school building up to three storeys high (RC07 and RC08) and a sports hall which is up to one to two storeys high

(RC09). The structural loadings are unknown at present. After the most recent site visit it is understood that the scheme has changed from a timber frame construction to a steel frame construction. The locations of exploratory hole RC10 and RC11 were completed to determine the risk to the proposed MUGA pitch only.

Made ground deposits were encountered in all of the exploratory hole positions proven to maximum depths ranging between 0.15m and 1.90m bgl (141.25 – 138.83m AOD). The residual soils were proven to maximum depths ranging between 1.55m and 2.00m bgl (139.90m AOD in RC09 – 137.60m AOD in RC08). With the completely to highly weathered bedrock deposits recorded to be encountered directly beneath the residual soils.

The most recent cut and fill drawing records that the sports hall first floor level (FFL) will have a reduced dig in the range of -2.29m and -0.32m to reach a target level of 141.5m AOD. The location of the main school building has both cut and fill with changes to ground levels ranging between -0.87m and +1.16m from the current ground levels to reach a target of 141m AOD.

The likely presence of unrecorded mine workings identified in RC09, the same coal seam in RC07 and RC08 and the geological fault line, will influence the foundation options on the development site. Despite good recovery of the coal seam in the positions of RC07 and RC08 these could have been pillars used to hold up the surrounding bedrock material. Given that the site has a geological fault and unrecorded workings adjacent to each other, this is likely to make the bedrock strata unstable over time where sizeable loads are added to the stratum and may result in ground instability as identified above and in Section 6.2. It is considered that shallow foundations would not be a viable foundation solution without treatment of the identified ground instability.

To reduce the risk to the proposed structures it is recommended that piles are used to transfer the structural loads past the base of the underlying workings (Barnsley coal seam). North of the fault this is between 10.65m and 11m bgl (130.75m and 129.27m AOD). South of the fault this is between 16.00m and 19.30m bgl (124.81m and 120.10m AOD). The Watermans report (ref. 7) should also be reviewed for final depths of the Barnsley coal seam. It is not recommended to locate the toe of the piles above the zone of the worked ground or Barnsley coal seam. Prior to any piling works, grouting treatment works would need to be undertaken. The carrying capacity of the piles depends not only on their size and the ground conditions but also on their method of installation. Pile design and installation are continuously evolving processes. Therefore, it is recommended that a specialist piling contractor, with suitable experience of these ground conditions be contacted and be provided with this ground investigation report, as well as the previous reports completed for the site (Section 1.3) to determine the most cost-effective pile technique pertaining to the ground conditions identified.

Any future piling works would have to be undertaken with a Coal Authority permit as Coal Authority assets will be 'entered'. Piling methods must undertake a risk assessment of spontaneous combustion in the Barnsley coal seam, which is noted to be a higher than normal risk for spontaneous combustion

6.8 Ground Floor Slabs

As noted in section 6.7 the ground levels are likely to be reducing for the sports hall and the main school building and subject to both cut and fill. The adoption of ground bearing floor slab could be considered if the cut and fill operation is undertaken and controlled under a suitable earthworks specification with appropriate geotechnical classification of proposed material with subsequent validation of their placement.

Where the earthworks specification criteria cannot be met due to the ground conditions then suspended floor slabs should be adopted which can be supported off ground beams and or pile caps to minimise differential settlements.

6.9 Retaining Walls

It is considered unlikely that slopes within the existing natural soils and Made Ground will be suitable at angles of greater than 1 in 3 without reinforcement or shoring in temporary conditions. However, this should be further assessed if steeper slopes are anticipated.

Careful consideration should be given to the selection of appropriate material properties for the design of retaining structures (if required). This should include but not be limited to the following factors:

- Groundwater conditions relative to the location of the proposed retaining wall;
- Variation in material properties across the site;
- Use of appropriate material properties for the type of retaining structure proposed; and
- Calculation of appropriate active, passive and at rest earth pressures in accordance with current guidance.

6.10 Hardstanding Assessment

At the time of writing the cut & fill produced for the site detailed that the landscaped and hardstanding areas are proposed to have areas of cut and areas of fill. No in-situ testing to obtain CBRs was completed as the ground levels will be changing and would have no longer related to the ground conditions as they were. In-situ CBR testing should be undertaken throughout the earthworks programme to make sure that the placed materials meet the specification requirements. With final in-situ CBR testing completed at the final formation level to determine the required makeup of the hardstanding areas.

The engineering characteristics of any clayey and silty soils at shallow depth are particularly sensitive to changes in soil moisture content and will soften considerably when exposed to water. It would therefore be prudent to programme pavement construction for the dry summer months where possible. Where this is not possible, steps should therefore be taken to protect construction activities in adverse weather, for example not placing any fill until compaction plant is on site to work it and excavating grips

or temporary drainage ditches to collect run off and/or groundwater during periods of particularly heavy rain.

6.11 Soakaway Assessment

Infiltration assessment was outside the scope of works for the ground investigation works and reporting. At the time the ground investigation was scoped, it was not defined where the likely soakaway points would be for the proposed development or if the ground levels would be increasing or decreasing. Given the ground conditions that have been encountered at the site, it is unlikely that the residual soil clay material would be efficient drainage materials. Combined with the shallow coal mining risks, it is unlikely that soakaways would be viewed as a viable drainage option.

The drainage designer is to take appropriate account of the description of the site soils in the exploratory hole logs along with proposed changes in site levels. A fully designed soakaway should be constructed to test capacity in appropriate locations relevant to the discharge points, all to the specification of the drainage designer before the drainage designer confirms the drainage strategy for the site.

7.0 Conclusions & Recommendations

7.1 Conclusions

The findings of the ground investigation and recommendations are summarised below.

7.1.1 Geotechnical Assessment

The likely presence of unrecorded mine workings identified in RC09, the same coal seam in RC07 and RC08 and the geological fault line, will influence the foundation options on the development site. Despite good recovery of the coal seam in the positions of RC07 and RC08 these could have been pillars used to hold up the surrounding bedrock material. Given that the site has a geological fault and unrecorded workings adjacent to each other, this is likely to make the bedrock strata unstable over time where sizeable loads are added to the stratum and may result in ground instability as identified above and in Section 6.2. It is considered that shallow foundations would not be a viable foundation solution without treatment of the identified ground instability.

To reduce the risk to the proposed structures it is recommended that piles are used to transfer the structural loads past the base of the underlying workings (Barnsley coal seam). North of the fault this is between 10.65m and 11m bgl (130.75m and 129.27m AOD). South of the fault this is between 16.00m and 19.30m bgl (124.81m and 120.10m AOD). The Watermans report (ref. 7) should also be reviewed for final depths of the Barnsley coal seam. It is not recommended to locate the toe of the piles above the zone of the worked ground or Barnsley coal seam. Prior to any piling works, grouting treatment works would need to be undertaken. The carrying capacity of the piles depends not only on their size and the ground conditions but also on their method of installation. Pile design and installation are continuously evolving processes. Therefore, it is recommended that a specialist piling contractor, with suitable experience of these ground conditions be contacted and be provided with this ground investigation report, as well as the previous reports completed for the site to determine the most cost-effective pile technique pertaining to the ground conditions identified.

As noted in section 6.7 the ground levels are likely to be reducing for the sports hall and the main school building and subject to both cut and fill. The adoption of ground bearing floor slab could be considered if the cut and fill operation is undertaken and controlled under a suitable earthworks specification with appropriate geotechnical classification of proposed material with subsequent validation of their placement. Where the earthworks specification criteria cannot be met due to the ground conditions then suspended floor slabs should be adopted which can be supported off ground beams and or pile caps to minimise differential settlements.

At this stage, the PMCM formation would be assessed as DS-1 and AC-1 where concrete is not in contact with the coal seams. However, where concrete will be in contact with the coal seams this should increase to DS-2 and AC-2z due to oxidisable sulphides and more acidic ground conditions.

7.1.2 Additional Considerations

Where a bespoke earthworks specification is required, this should be produced for the site and will require additional ground investigation works and geotechnical testing to confirm that the shallow soils would be suitable. Demolition works of the NHS Keresforth centre buildings are ongoing and will require breaking out and removal of the foundations to remove any hard spots.

7.2 Recommendations

Based on the findings of the ground investigation, the following recommendations are made:

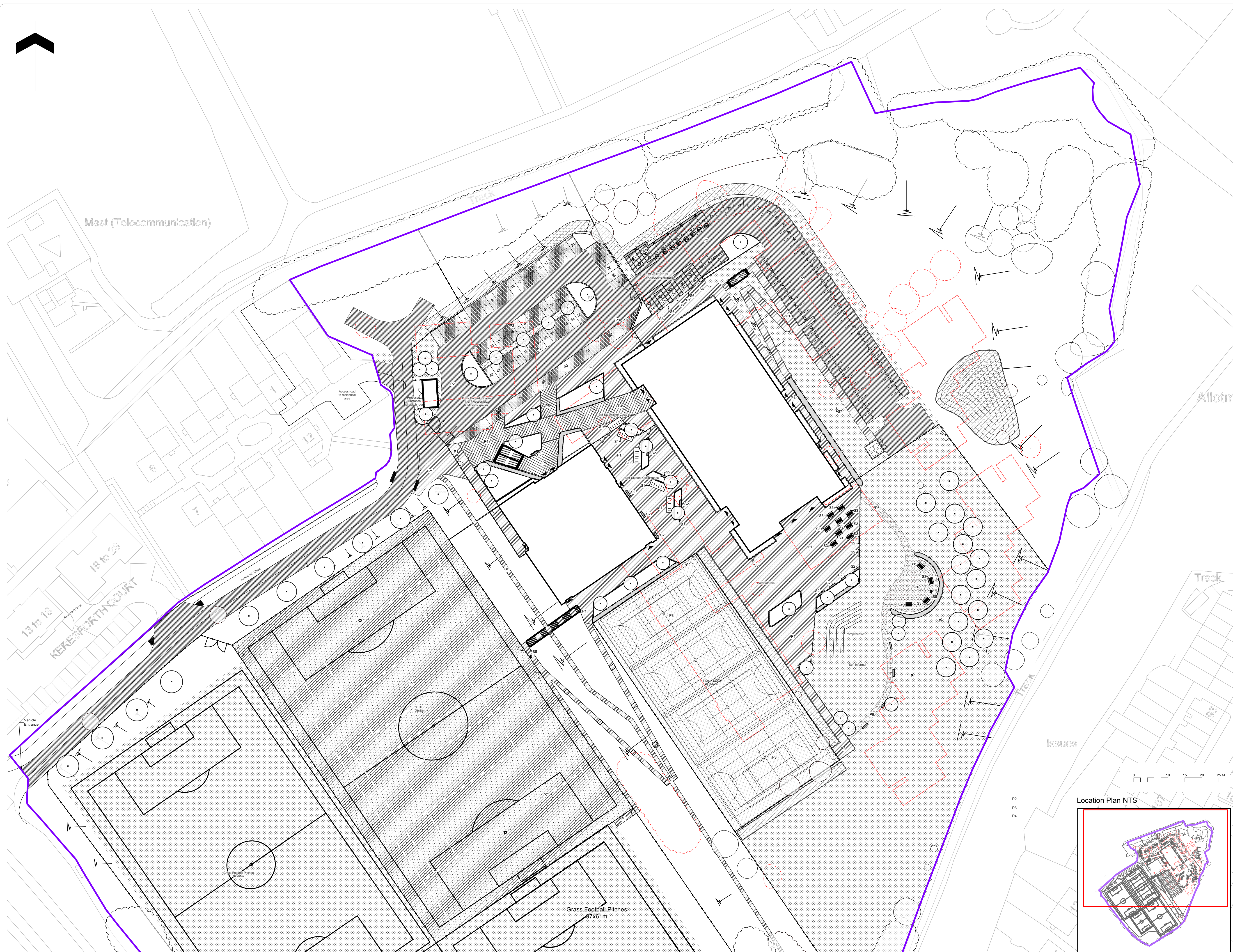
- 1) Grouting treatment works will be required to be completed beneath the proposed building footprints and a suitable distance away from the building footprints. Consideration should also be given to grouting the hardstanding areas of the car parking and MUGA areas. This work would require to be completed under a coal authority permit.
- 2) Engineer attendance would be required throughout the grouting treatment works to confirm that the treatment works are completed to the approved grouting specification and scope of works documents. On completion of the grouting works this would be followed by a Mining Verification Report to confirm that the grouting specification and scope of works have been implemented.
- 3) To avoid future surface instability associated with the unrecorded mine workings, piles should be used to transfer loads past the mine workings and Barnsley coal seam. This work would require a coal authority permit. This should be completed after the grouting treatment works.
- 4) For the use of a ground bearing floor slab the cut and fill operation should be undertaken and controlled under a suitable earthworks specification with appropriate geotechnical classification of proposed material with subsequent validation of their placement. This would require additional geotechnical testing and finalised cut and fill plans to be able to progress.
- 5) Once the final formation levels are in place, in-situ CBR testing should be completed to determine the CBR values to design hardstanding areas.

8.0 References

- 1 Land Contamination: Risk Management (2019) (ref: <https://www.gov.uk/guidance/land-contamination-how-to-manage-the-risks>) (formerly Environment Agency (2004) Model Procedures for the management of land Contamination Contaminated Land Report 11 (CLR11)).
- 2 British Standards Institution (2011) *Investigation of Potentially Contaminated Sites* (report no. BS10175:2011+A2:2017).
- 3 British Standards Institution BSI (2010) *Code of Practice for Site Investigations* (report no. BS5930:2015+A1:2020).
- 4 British Standards Institution (2006) *Eurocode 7: Geotechnical Design* (report no. BS EN 1997).
- 5 CIRIA C758 (2019) *Abandoned Mine Workings Manual*
- 6 British Geological Society (BGS) *Solid and Drift Editions* (2012) 1:50,000 mapping, Sheet No. 087 (Barnsley).
- 7 Waterman Infrastructure & Environment (2020) *Geo-Environmental Assessment Report for Trinity Academy, Barnsley* (report no. WIE7125-100-R-8.1.3-Geoenv)
- 8 Waterman Infrastructure & Environment (2020) *Coal Mining Risk Assessment for Trinity Academy, Barnsley* (report no. WIE7125-100-R-7.1.3-CMRA)
- 9 Waterman Infrastructure & Environment (2021) *Ground Gas Monitoring – Trinity Academy, Barnsley – Temporary School* (letter no. WIE17125-100-R-14.1.2-GGM)
- 10 Curtins (2022) *Phase 2 Ground Investigation* (Report no. 079532-CUR-XX-XX-T-GE-00002-P01_Phase 2 GI)
- 11 Curtins (2022) *Coal Mining Ground Movement Assessment* (Report no. 079532.301-CUR-XX-XX-T-GE-00003-P01).

Appendix A1 – Drawings

- Proposed Development Plans
- Curtins drawing reference: 079532-CUR-XX-XX-D-GE-80001-P03_EHLP



Note
Do not scale from this drawing for the purposes of construction or setting out.

KEY

- Contract Boundary
- Indicative design only, to be delivered by others
- Existing Tree
- Existing Tree To Be Removed
- Existing Building To Be Removed
- Proposed Building
- Planting**
 - Proposed Tree
 - Grass Seed
 - Meadow Swale Planting 3m width
 - Proposed Pond Refer to Engineers details
 - Planting
 - Planting Hedge
- Paving**
 - Pedestrian Macadam Paving
 - Vehicular Macadam Paving
 - Drop off/pick up vehicular Parking Paving
 - Herringbone Block Paving Colour: Bracken
 - Herringbone Block Paving Colour: Slate
 - Resin Bound Gravel
 - Synthetic Turf Pitch
 - MUGA
- Fencing and Structures**
 - Proposed Timber Knee Rail
 - Proposed Fencing
 - Proposed Gate
 - Proposed Steps
- Furniture**
 - Proposed Electrical Vehicle charging point
 - Cycle Shelter
 - Proposed Bench
 - Picnic bench seating
 - Door Protection hoop
 - External Litter bin

ID	RISK	MITIGATION	DATE MITIGATED
RESIDUAL PROJECT RISKS			

DATE	REV	DESCRIPTION OF REVISION	DRAWN BY	APPROVED BY
07/09/2022	P04	Drop off Spaces increased to 62	PH	LA
16/03/2022	P03	Issued for Final CPs	PH	
16/03/2022	P02	Issued for Planning	PH	

REVISIONS

STATUS

S2 - FINAL CPs

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CLIENT:

BOWMER + KIRKLAND

PROJECT TITLE:

**TRINITY ACADEMY ST EDWARDS
BARNSELEY**

DRAWING TITLE:

General Arrangement 1 of 2

DRAWING SCALE:
1:500

DRAWN BY:
PH

DRAWN DATE:
17/09/2021

PAPER SIZE:
A1

APPROVED BY:
RA

ALA PROJECT CODE:
ALA696

DRAWING NUMBER:
FS0954-ALA-XX--ZZ-DR-L-0003S2

STATUS:
P04

REVISION:

Note

1. Do not scale from this drawing
2. To be read in conjunction with Project Risk Register REF: XXX
3. To be read in conjunction with all other Landscape Architect's drawings

KEY

- Contract Boundary
- Indicative design only, to be delivered by others
- Existing Tree
- Existing Tree To Be Removed
- Existing Building To Be Removed
- Proposed Building
- Planting**
 - Proposed Tree
 - Grass Seed
 - Meadow Swale Planting 3m width
 - Proposed Pond Refer to Engineers details
 - Planting
 - Planting Hedge
- Paving**
 - Pedestrian Macadam Paving
 - Vehicular Macadam Paving
 - Drop off/pick up vehicular Parking Paving
 - Herringbone Block Paving Colour: Bracken
 - Herringbone Block Paving Colour: Slate
 - Resin Bound Gravel
 - Synthetic Turf Pitch
 - MUGA
- Fencing and Structures**
 - Proposed Timber Knee Rail
 - Proposed Fencing
 - Proposed Gate
 - Proposed Steps
- Furniture**
 - Proposed Electrical Vehicle charging point
- S1 Cycle Shelter
- S2 Proposed Bench
- S3 Picnic bench seating
- S4 Door Protection hoop
- S5 External Litter bin

ID	RISK	MITIGATION	DATE MITIGATED
RESIDUAL PROJECT RISKS			

DATE	REV	DESCRIPTION OF REVISION	DRAWN BY	APPROVED BY
16/03/2022	P03	Issued for Final CPs	PH	
16/03/2022	P02	Issued for Planning	PH	
16/02/2022	P01	Issued for Draft CPs	PH	LA

REVISIONS

STATUS
S2 - FINAL CPs

ares
LANDSCAPE ARCHITECTS

CLINT:
BOWMER + KIRKLAND

PROJECT TITLE:
TRINITY ACADEMY ST EDWARDS BARNSELY

DRAWING TITLE:
General Arrangement 2 of 2

DRAWING SCALE:
1:500

PAPER SIZE:
A1

DRAWN BY:
PH

APPROVED BY:
RA

DRAWN DATE:
17/09/2021

ALA PROJECT CODE:
ALA696

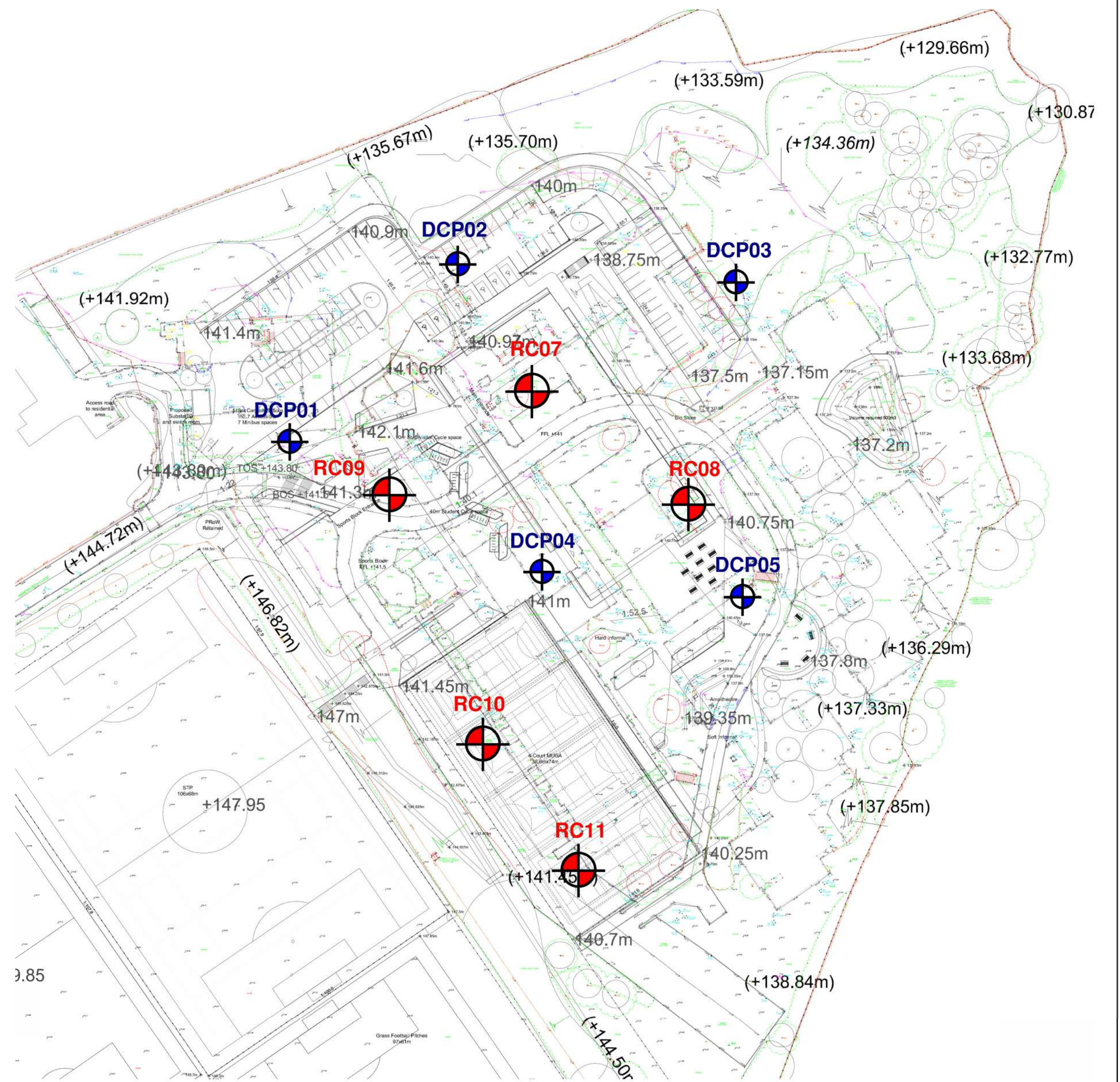
DRAWING NUMBER:
FS0954-ALA-XX-ZZ-DR-L-0004S2

STATUS:
P03

REVISION:
P03

Location Plan NTS





GENERAL NOTES:

Appendix A2 – Exploratory Hole Logs

		Probe Log		Borehole No. DCP01	
				Sheet 1 of 1	
Project Name: Trinity Academy - Stage 2 GI		Project No. 079532.304	Co-ords: 433375.21 - 405646.37	Hole Type DCP	
Location: Barnsley		Level: 142.30		Scale 1:25	
Client: Bowmer & Kirkland		Dates: 01/08/2022 - 01/08/2022		Logged By RS	

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
1	8				
	14				
	17				
	22				
	20				
	13				
	10				
	13				
	7				
	8				
2	8				
	8				
	10				
	12				
	12				
	15				
	15				
	14				
	15				
	10				
3	12				
	15				
	18				
	18				
	17				
	25				
	50				
4					
5					

Remarks Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. TheCompleted until refusal of 50 blows encountered.	Fall Height	Cone Base Diameter	
	Hammer Wt	Final Depth	2.80
	Probe Type	Log Scale	1:25
			

		Probe Log		Borehole No. DCP02		
				Sheet 1 of 1		
Project Name: Trinity Academy - Stage 2 GI		Project No. 079532.304	Co-ords: 433416.31 - 405691.62	Hole Type DCP		
Location: Barnsley		Level: 139.23		Scale 1:25		
Client: Bowmer & Kirkland		Dates: 01/08/2022 - 01/08/2022		Logged By RS		
Depth (m)	Blows/100mm				Torque (Nm)	
	10	20	30	40		
1						
2						
3						
4						
5						
Remarks		Fall Height		Cone Base Diameter		
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Completed until refusal of 50 blows encountered.		Hammer Wt		Final Depth 4.20		
		Probe Type		Log Scale 1:25		

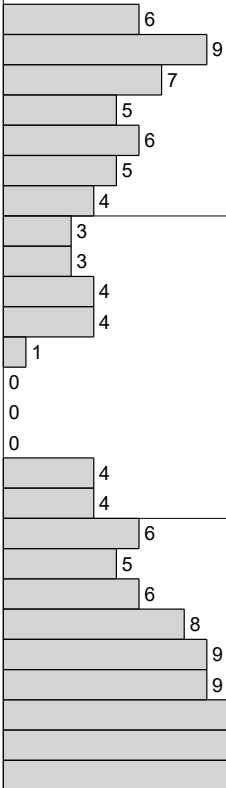


		Probe Log		Borehole No. DCP03	
Project Name: Trinity Academy - Stage 2 GI		Project No. 079532.304	Co-ords: 433485.62 - 405683.88	Sheet 1 of 1	
Location: Barnsley		Level: 137.21		Hole Type DCP	
Client: Bowmer & Kirkland		Dates: 01/08/2022 - 01/08/2022		Scale 1:25	
Client: Bowmer & Kirkland		Dates: 01/08/2022 - 01/08/2022		Logged By RS	

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
1	7				
	6				
	5				
	7				
	6				
	4				
	4				
	4				
	4				
	5				
	4				
	6				
	10				
2			29		
					50
3					
4					
5					

Remarks Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Completed until refusal of 50 blows encountered.	Fall Height	Cone Base Diameter	
	Hammer Wt	Final Depth	2.10
	Probe Type	Log Scale	1:25
			

		Probe Log		Borehole No. DCP04	
		Sheet 1 of 1			
Project Name: Trinity Academy - Stage 2 GI		Project No. 079532.304	Co-ords: 433435.49 - 405616.36	Hole Type DCP	
Location: Barnsley		Level: 140.86	Scale 1:25		
Client: Bowmer & Kirkland		Dates: 01/08/2022 - 01/08/2022	Logged By RS		
Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
1					50
2					
3					
4					
5					
Remarks		Fall Height	Cone Base Diameter		
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Completed until refusal of 50 blows encountered.		Hammer Wt	Final Depth 0.50		
		Probe Type	Log Scale 1:25		

		Probe Log		Borehole No. DCP05 Sheet 1 of 1	
Project Name: Trinity Academy - Stage 2 GI		Project No. 079532.304	Co-ords: 433484.29 - 405608.72		Hole Type DCP
Location: Barnsley		Level: 139.17		Scale 1:25	
Client: Bowmer & Kirkland		Dates: 01/08/2022 - 01/08/2022		Logged By RS	
Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
1					
2					
3					
4					
5					
Remarks		Fall Height		Cone Base Diameter	
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Completed until refusal of 50 blows encountered.		Hammer Wt		Final Depth 2.90	
		Probe Type		Log Scale 1:25	
					

								Rotary Core Log		Borehole No. RC07 Sheet 1 of 8	
Project Name: Trinity Academy - Stage 2 GI				Project No. 079532.304		Co-ords: 433434.22 - 405658.27		Hole Type RC			
Location: Barnsley				Level: 140.27		Scale 1:20		Logged By RS			
Client: Bowmer & Kirkland				Dates: 01/08/2022 - 05/08/2022							
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							0.20	140.07		MADE GROUND: Grass over brown clay topsoil.	1 2 3 4
										Stiff to very stiff brown and orange, mottled grey slightly gravelly CLAY. Gravel is fine to coarse grained and very angular of coal and mudstone lithorelicts.	
		1.20 - 1.65	D NI				1.20	139.07		Stiff dark brown CLAY with some rootlets. <i>SPT 'N' @ 1.20 - 1.65m bgl - 4, 20 / 32, 22, 15, 17 = 86</i>	
			NI				1.45	138.82			
		1.20 - 2.00		100	44	25	1.55	138.72		Stiff yellowish brown slightly gravelly CLAY. Gravel is fine to coarse grained and very angular of mudstone lithorelicts.	
		1.80 - 1.89	50+ C							Extremely weak to very weak grey mottled orange MUDSTONE. Highly weathered with extremely closely spaced discontinuities. Fracture planes are stained by iron oxide as a dark orange to black colouring.	
		2.00 - 2.45	D				2.00	138.27		Extremely weak grey MUDSTONE. Highly weathered with extremely closely spaced discontinuities. Fracture planes are iron oxide stained orange and dark purple. <i>SPT 'N' @ 2.00 - 2.45m bgl - 12, 13 / 74, 26 for 10mm = 100 for 85mm</i>	
		2.29 - 2.37	50+ C								
			NI								
		2.00 - 3.50		97	27	0					
			50+								
			50+								
	3.50 - 3.95	D NI				3.50	136.77		Stiff grey slightly gravelly CLAY. Gravel is fine to coarse grained and very angular of mudstone lithorelicts. (Likely disturbed by SPT test). <i>SPT 'N' @ 3.50 - 3.95m bgl - 25 for 75mm / 100 for 65mm</i>		
		0				3.60	136.67		Weak grey MUDSTONE. Highly weathered to moderately weathered with very closely to closely spaced discontinuities. Fracture planes are iron oxide stained orange, dark purple and black.		
Continued on next sheet											

Remarks

Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 9.00m to 10.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

								Rotary Core Log		Borehole No. RC07 Sheet 2 of 8	
Project Name: Trinity Academy - Stage 2 GI				Project No. 079532.304		Co-ords: 433434.22 - 405658.27		Hole Type RC			
Location: Barnsley				Level: 140.27		Scale 1:20		Logged By RS			
Client: Bowmer & Kirkland				Dates: 01/08/2022 - 05/08/2022							
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		3.50 - 5.00	25 C	100	93	16	5.00	135.27		Weak grey MUDSTONE. Moderately weathered with extremely close to very closely spaced discontinuities. Fractures are iron oxide stained light to dark orange which are horizontal to vertical. <i>SPT 'N' @ 5.00 - 5.45m bgl - 25 for 75mm / 100 for 40mm</i>	5
		5.00 - 5.45	4 D								
		5.00 - 6.50	13 NI	100	47	29					
		6.32 - 6.50	50+ C								
		6.50 - 6.95	1 D NR				6.50	133.77	Moderately weak light and dark grey thinly laminated, lenticular bedded SILTSTONE. Moderately weathered with closely spaced discontinuities. AZCL - No recovery, resistance while drilling with grey flush. SPT disturbance likely. <i>SPT 'N' @ 6.50 - 6.95m bgl - 25 for 75mm / 100 for 25mm</i>	6	
		6.50 - 6.95					6.60	133.67			
		6.50 - 8.00	25	93	79	0					
		7.50 - 7.60	10 C								
		8.00 - 8.45	D				8.00	132.27	Moderately weak light and dark grey thinly laminated, lenticular bedded SILTSTONE. Moderately weathered with closely spaced discontinuities. Fracture planes are iron oxide stained orange and dark purple.	7	
									Continued on next sheet	8	

Remarks

Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 9.00m to 10.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

								Rotary Core Log		Borehole No. RC07 Sheet 3 of 8		
Project Name: Trinity Academy - Stage 2 GI				Project No. 079532.304		Co-ords: 433434.22 - 405658.27		Hole Type RC				
Location: Barnsley				Level: 140.27		Scale 1:20		Logged By RS				
Client: Bowmer & Kirkland				Dates: 01/08/2022 - 05/08/2022								
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		8.33 - 8.42	NI							Weak to moderately weak grey MUDSTONE. Moderately weathered with extremely closely spaced fractures. <i>SPT 'N' @ 8.00 - 8.45m bgl - 25 for 75mm / 100 for 60mm</i>		
			C									
		23										
			8.00 - 9.50		100	53	0	8.75	131.52	Extremely weak to very weak dark grey MUDSTONE. Highly weathered.		
			0									
		9.00 - 9.10	D									
									8.98	131.29		Extremely weak black vitreous COAL. Highly weathered with extremely closely spaced discontinuities.
			NI									
			50+									
			9.50 - 9.95					9.50	130.77	AZCL - No recovery, resistance while drilling with black flush. SPT disturbance likely. <i>SPT 'N' @ 9.50 - 9.95m bgl - 25 for 75mm / 21, 22, 26, 31 = 100 for 300mm</i>		
			NI									
		D										
										Extremely weak to very weak black COAL with rare yellow sulphur present. Highly weathered with extremely closely spaced discontinuities. Partly recovered as a gravel.		
	NR											
9.50 - 11.00		67	7	0	10.00	130.27						
										AZCL - No recovery, resistance while drilling with black flush. SPT disturbance likely with coal recovered in test. <i>SPT 'N' @ 11.00 - 11.45m bgl - 25 for 75mm / 100 for 55mm</i>		
	50+											
11.00 - 11.45	D											
										Very weak to weak grey MUDSTONE. Highly weathered with closely to medium spaced discontinuities.		
	NR											
		11.00 - 12.50		70	63	23	11.45	128.82	Moderately weak grey MUDSTONE. Moderately weathered with closely spaced discontinuities. Fractures are sub-horizontal to vertical with rare black plant fossils.			
	4											
							11.85	128.42				

Continued on next sheet

9
10
11
12

Remarks
 Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 9.00m to 10.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

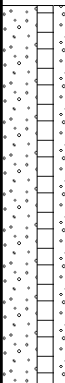


							Rotary Core Log			Borehole No. RC07 Sheet 5 of 8	
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433434.22 - 405658.27		Hole Type RC
Location: Barnsley							Level: 140.27		Scale 1:20		
Client: Bowmer & Kirkland							Dates: 01/08/2022 - 05/08/2022		Logged By RS		
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
1		16.27 - 16.39	15								
		15.50 - 17.00	4	100	14	14	16.50	123.77		Moderately weak grey MUDSTONE. Moderately to slightly weathered with closely spaced discontinuities.	17
			1				17.00	123.27		Moderately weak to medium strong grey MUDSTONE. Slightly weathered with one vertical clean discontinuity.	
							17.39	122.88		Medium strong light and dark grey thinly laminated lenticular bedded SILTSTONE. Slightly weathered with medium spaced discontinuities.	18
		17.00 - 18.50	6	100	97	49					
		18.20 - 18.50	0				18.20	122.07		Strong grey fine grained SANDSTONE. Fresh with no discernible discontinuities.	
			NR				18.50	121.77		AZCL - No recovery, resistance while drilling with grey flush.	
							18.70	121.57		Strong to very strong light grey fine grained SANDSTONE. Slightly weathered with vertical clean discontinuities. Fragmented recovery.	19
		19.26 - 20.06	12 C	87	2	0					
			NI								
						20.00	120.27		Continued on next sheet		20

Remarks
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 9.00m to 10.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

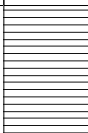
							Rotary Core Log			Borehole No. RC07 Sheet 6 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433434.22 - 405658.27		Hole Type RC	
Location: Barnsley							Level: 140.27		Scale 1:20		Logged By RS	
Client: Bowmer & Kirkland							Dates: 01/08/2022 - 05/08/2022					
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		20.25 - 20.35	C							Strong light grey very thinly bedded fine grained SANDSTONE. Slightly weathered. Largely recovered as core stones and gravels.	21	
		20.00 - 21.50	NI	90	5	0						
		21.60 - 21.80	C 6				21.50	118.77		Weak to moderately weak grey MUDSTONE. Highly to moderately weathered with closely spaced discontinuities.	22	
		21.50 - 23.00	NI 3 6 10	100	68	33	22.42 22.50	117.85 117.77				
		23.00 - 24.50 23.57 - 23.71	11 C	100	70	35	23.00	117.27		Moderately weak dark grey thinly laminated MUDSTONE. Slightly weathered with closely spaced vertical to sub-horizontal discontinuities.	23	
	Continued on next sheet											24

Remarks
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 9.00m to 10.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

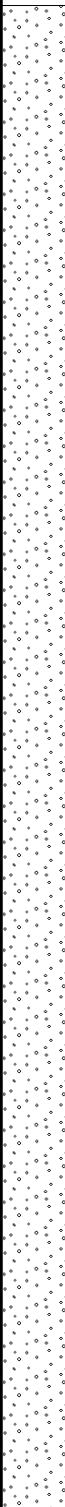
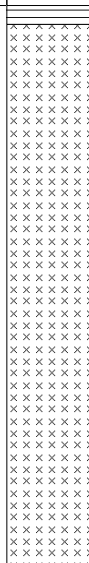
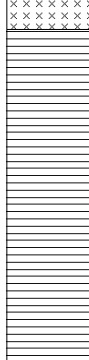
								Rotary Core Log		Borehole No. RC07 Sheet 7 of 8	
Project Name: Trinity Academy - Stage 2 GI				Project No. 079532.304		Co-ords: 433434.22 - 405658.27		Hole Type RC			
Location: Barnsley				Level: 140.27		Scale 1:20		Logged By RS			
Client: Bowmer & Kirkland				Dates: 01/08/2022 - 05/08/2022							
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
			7								
			NR				24.50	115.77		AZCL - No recovery, resistance while drilling.	
							24.62	115.65		Moderately weak dark grey MUDSTONE. Moderately weathered with very closely to closely spaced vertical to horizontal, clean discontinuities.	25
		25.15 - 25.25	18 C								
		24.50 - 26.00		92	27	0					
			5								
							26.00	114.27		Moderately weak grey MUDSTONE. Slightly weathered with closely spaced horizontal to vertical discontinuities.	26
		26.44 - 26.57	8 C								
		26.00 - 27.50		100	32	23					
			NI								27
		0									
						27.50	112.77		Medium strong to strong dark grey MUDSTONE. Slightly weathered with very close to closely spaced discontinuities.		
			5								
			NI								
Continued on next sheet											28

Remarks
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 9.00m to 10.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.



							Rotary Core Log			Borehole No. RC07 Sheet 8 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433434.22 - 405658.27		Hole Type RC	
Location: Barnsley							Level: 140.27		Scale 1:20		Logged By RS	
Client: Bowmer & Kirkland							Dates: 01/08/2022 - 05/08/2022					
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		28.05 - 28.14	C				28.35	111.92		Moderately weak to medium strong black carbonaceous MUDSTONE. Slightly weathered with closely spaced discontinuities.		
		4										
		27.50 - 29.00	7									
		NI										
				4				29.00	111.27		AZCL - No recovery, resistance while drilling.	29
		NR										
		NI										
		29.00 - 30.50	3	75	42	15	29.37	110.90				
				NI				29.87	110.40		Very weak black COAL. Moderately weathered with extremely closely spaced discontinuities.	30
		30.24 - 30.37	C 2				30.07	110.20				
								30.50	109.77		----- End of borehole at 30.50 m -----	
											31	
											32	
Remarks Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 9.00m to 10.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.												
												

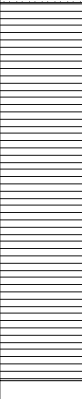


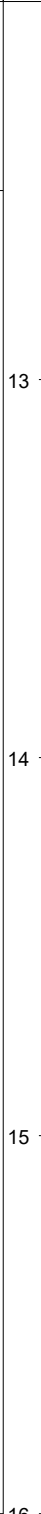
								Rotary Core Log		Borehole No. RC08 Sheet 2 of 8	
Project Name: Trinity Academy - Stage 2 GI				Project No. 079532.304		Co-ords: 433472.60 - 405633.16		Hole Type RC			
Location: Barnsley				Level: 139.40		Scale 1:20		Logged By RS & LP			
Client: Bowmer & Kirkland				Dates: 01/08/2022 - 03/08/2022							
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		3.50 - 5.00	NI	100	16	10	4.05	135.35		Weak grey SILTSTONE with thin laminations. Highly weathered with extremely closed spaced discontinuities. Fractures are stained brown. Recovered as a gravel.	5
		5.00 - 5.45	D								
			NI							Weak grey MUDSTONE with thin dark laminations. Highly weathered with closely spaced discontinuities. Fractures are iron oxide stained brown and orange.	6
		5.00 - 6.50		100	56	23	5.55	133.85			
		6.25 - 6.45	C								
		6.50 - 6.95	D				6.50	132.90		Moderately weak blueish grey SILTSTONE with thin dark laminations. Moderately weathered with medium spaced discontinuities. SPT 'N' @ 6.50 - 6.95m bgl - 14, 11 for 5mm / 63, 37 for 15mm = 100 for 90mm	7
		6.50 - 8.00	1								
										Moderately weak blueish grey MUDSTONE. Moderately weathered with closely spaced discontinuities. Fractures are stained brown with some dark grey.	8
		7.85 - 8.00	C				7.35	132.05			
		8.00 - 8.45	D				8.00	131.40			
Continued on next sheet											

Remarks

Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 19.10m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

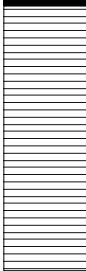


							Rotary Core Log				Borehole No. RC08 Sheet 3 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433472.60 - 405633.16			Hole Type RC	
Location: Barnsley							Level: 139.40			Scale 1:20			
Client: Bowmer & Kirkland							Dates: 01/08/2022 - 03/08/2022			Logged By RS & LP			
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description			
				TCR	SCR	RQD							
		8.25 - 8.50	C							Moderately weak grey SILTSTONE with thin dark laminations. Moderately weathered with closely to medium spaced discontinuities. <i>SPT 'N' @ 8.00 - 8.45m bgl - 25 for 70mm / 100 for 60mm</i>			
			2										
		8.00 - 9.50		87	56	39	9.00	130.40					
			1										
		9.50 - 9.95	D				9.50	129.90					
		9.90 - 10.30	C										
		9.50 - 11.00	3	97	53	9							
		11.00 - 12.50	0				11.00	128.40		Moderately weak dark grey MUDSTONE. Moderately to slightly weathered with no discernible discontinuities.			
		NI											
	11.85 - 12.00	C											
Continued on next sheet												12	
Remarks Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was costantly feeding mudpuppy. Water flush lost completely around 19.10m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.													

							Rotary Core Log			Borehole No. RC08 Sheet 4 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433472.60 - 405633.16		Hole Type RC	
Location: Barnsley							Level: 139.40		Scale 1:20		Logged By RS & LP	
Client: Bowmer & Kirkland							Dates: 01/08/2022 - 03/08/2022					
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
			0				12.50	126.90		Moderately weak dark grey MUDSTONE. Slightly weathered with no discernible discontinuities.		
		13.08 - 13.32	C									
		12.50 - 14.00	0	97	84	57						
		14.30 - 14.53	C									
		14.00 - 15.50	0	100	95	62						
		15.55 - 15.92	C									
Continued on next sheet												

Remarks
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 19.10m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.



							Rotary Core Log			Borehole No. RC08 Sheet 5 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433472.60 - 405633.16		Hole Type RC	
Location: Barnsley							Level: 139.40		Scale 1:20		Logged By RS & LP	
Client: Bowmer & Kirkland							Dates: 01/08/2022 - 03/08/2022					
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		15.50 - 17.00	0	100	81	78					17	
			0				17.25	122.15				
		17.00 - 18.50	50+	100	60	0				Very weak to weak black COAL. Extremely closely spaced discontinuities.	18	
		18.00 - 18.25	C									
			50+								19	
		18.50 - 20.00 19.30 - 19.60	C	93	51	19	19.30	120.10		Very weak to weak light grey MUDSTONE. Highly weathered with no discernible discontinuities.		
			0				20.00	119.40		Continued on next sheet	20	

Remarks
 Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 19.10m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

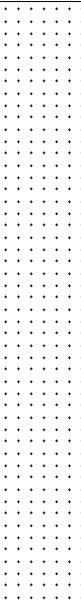
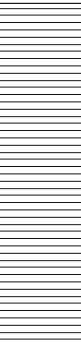


							Rotary Core Log			Borehole No. RC08 Sheet 6 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433472.60 - 405633.16		Hole Type RC	
Location: Barnsley							Level: 139.40		Scale 1:20		Logged By RS & LP	
Client: Bowmer & Kirkland							Dates: 01/08/2022 - 03/08/2022					
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		20.00 - 21.50	1	100	18	7	20.50	118.90		Moderately weak light to dark grey MUDSTONE. Slightly weathered with closely spaced discontinuities. Minerals deposited on fractures planes, potentially calcite.	21	
			NI							Very weak to weak dark grey MUDSTONE. Moderately weathered with very closely spaced discontinuities. Recovered as a gravel.		
			0									Moderately weak dark grey MUDSTONE. Slightly weathered with no discernible discontinuities.
			50+							Very weak to weak dark grey MUDSTONE. Moderately weathered with extremely closely spaced discontinuities.		
		21.10 - 21.35	C	21.10	118.30		Medium strong to strong grey fine grained SANDSTONE. Slightly weathered with closely spaced discontinuities. Minerals deposited on fracture planes, potentially calcite.					
			2									
		21.50 - 23.00	0	100	33	21	22.25	117.15		Moderately weak dark grey MUDSTONE. Moderately weathered with no discernible discontinuities.		22
			1							Medium strong to strong light to dark grey fine grained SANDSTONE. Slightly weathered with closely to medium spaced discontinuities.		
			NI									
			1									
		23.00 - 24.50	0	100	78	65	23.00	116.40		Medium strong to strong light to dark grey MUDSTONE. Slightly weathered with no discernible discontinuities.		23
			15							Moderately weak dark grey MUDSTONE. Moderately to slightly weathered with extremely closely spaced discontinuities.		
	Strong light to dark grey fine grained SANDSTONE. Fresh to slightly weathered with no discernible discontinuities.											
Continued on next sheet											24	

Remarks
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 19.10m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

							Rotary Core Log			Borehole No. RC08 Sheet 7 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433472.60 - 405633.16		Hole Type RC	
Location: Barnsley							Level: 139.40		Scale 1:20			
Client: Bowmer & Kirkland							Dates: 01/08/2022 - 03/08/2022		Logged By RS & LP			
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		24.05 - 24.33	C				24.50	114.90		Strong to very strong light to dark grey SANDSTONE. Fresh with no discernible discontinuities. Portions were recovered as a gravel.	25	
			0									
		24.50 - 24.57	C									
		24.50 - 26.00	0	82	36	27						
		26.26 - 26.39	C									
		26.00 - 27.50	0	100	43	43					27	
		27.74 - 27.85	6									
Continued on next sheet											28	
Remarks Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 19.10m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.												



							Rotary Core Log			Borehole No. RC08 Sheet 8 of 8				
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433472.60 - 405633.16		Hole Type RC			
Location: Barnsley							Level: 139.40		Scale 1:20		Logged By RS & LP			
Client: Bowmer & Kirkland							Dates: 01/08/2022 - 03/08/2022							
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description				
				TCR	SCR	RQD								
		27.50 - 29.00	NI	100	56	7	29.60	109.80			29			
			1											
		29.60 - 29.72 29.00 - 30.50	0	87	39	26							Moderately weak to medium strong blueish grey MUDSTONE. Slightly weathered with no discernible discontinuities.	30
			0											
						30.50	108.90		End of borehole at 30.50 m	31				
Remarks Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 19.10m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.														



								Rotary Core Log		Borehole No. RC09 Sheet 1 of 8	
Project Name: Trinity Academy - Stage 2 GI				Project No. 079532.304		Co-ords: 433403.65 - 405635.76		Hole Type RC			
Location: Barnsley				Level: 141.40		Scale 1:20		Logged By RS			
Client: Bowmer & Kirkland				Dates: 04/08/2022 - 09/08/2022							
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
							0.15	141.25		MADE GROUND: Grass over brown clayey topsoil.	1
										Stiff to very stiff brown and orange mottled grey gravelly CLAY. Gravel is fine to coarse grained and very angular of coal and mudstone lithorelicts.	
		1.50 - 1.95	D				1.50	139.90		Very stiff CLAY to extremely weak dark grey MUDSTONE. Completely to highly weathered with very closely spaced discontinuities. Fractures are iron oxide stained dark orange. SPT 'N' @ 1.50 - 1.95m bgl - 10, 15 for 50mm / 31, 63, 6 for 5mm = 100 for 155mm	2
		1.50 - 2.00	50+	100	26	0					
		1.95 - 2.00	C				2.00	139.40		AZCL - No recovery, resistance while drilling with grey flush. Likely SPT disturbance.	2
		2.00 - 2.45	D NR				2.12	139.28		SPT 'N' @ 2.00 - 2.45m bgl - 18, 7 for 5mm / 100 for 60mm Very weak grey SILTSTONE. Highly weathered with very closely spaced discontinuities. Fractures are iron oxide stained dark orange and are vertical to sub-horizontal. Largely recovered as a gravel.	
		2.00 - 3.50	NI	92	9	0					3
		3.23 - 3.36	C								
		3.50 - 3.95	D				3.50	137.90		Weak to moderately weak grey SILTSTONE. Highly to moderately weathered with very close to closely spaced discontinuities. Fractures are iron oxide stained dark orange. SPT 'N' @ 3.50 - 3.95m bgl - 5, 20 / 74, 26 for 10mm = 100 for 85mm	
			NI								
											4
Continued on next sheet											

Remarks
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 7.20m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

							Rotary Core Log			Borehole No. RC09 Sheet 2 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433403.65 - 405635.76		Hole Type RC	
Location: Barnsley							Level: 141.40		Scale 1:20		Logged By RS	
Client: Bowmer & Kirkland							Dates: 04/08/2022 - 09/08/2022					
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		4.05 - 4.25	C							Weak grey MUDSTONE. Highly weathered with very closely spaced discontinuities. Fractures are iron oxide stained dark orange.	5	
		7										
		3.50 - 5.00		100	73	47	4.50	136.90				
		10										
		5.00 - 5.45	D NR				5.00	136.40				
		NI					5.10	136.30				
		5.00 - 6.50		93	63	15						
		6.00 - 6.13	18 C									
		6.50 - 6.95	D NR				6.50	134.90				
		NI					6.70	134.70				
		7.03 - 7.23	C 3									
		6.50 - 8.00	NI	87	47	13						
1												
10												
8.00 - 8.45	NI D				7.90	133.50						
					8.00	133.40		Very stiff CLAY to extremely weak grey MUDSTONE. Completely to highly weathered. Partly recovered as gravel and material crumbles easily.	8			

Continued on next sheet

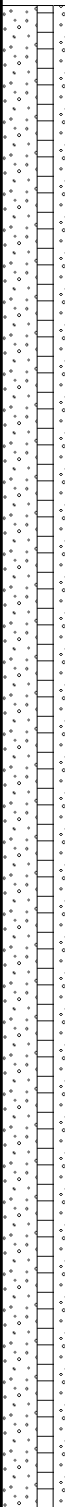
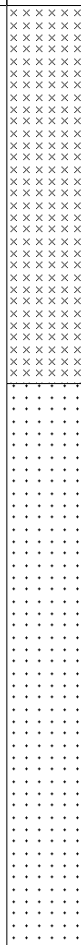
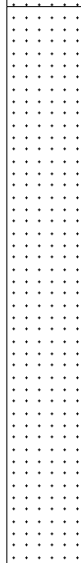
Remarks
 Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 7.20m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

Rotary Core Log										Borehole No. RC09 Sheet 3 of 8	
Project Name: Trinity Academy - Stage 2 GI					Project No. 079532.304		Co-ords: 433403.65 - 405635.76		Hole Type RC		
Location: Barnsley					Level: 141.40		Scale 1:20		Logged By RS		
Client: Bowmer & Kirkland					Dates: 04/08/2022 - 09/08/2022						
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
		8.00 - 9.50	NR	0	0	0				No recovery - Soft drilling with fragments of coal and mudstone, possible workings. Complete loss of flush from this point onwards. <i>SPT 'N' @ 8.00 - 8.45m bgl - 4, 4 / 3, 2, 1, 2 = 8</i>	9
		9.50 - 9.95	D NR				9.50	131.90		AZCL - No recovery, resistance while drilling. SPT test confirmed coal present between 9.50 - 9.95m bgl. <i>SPT 'N' @ 9.50 - 9.95m bgl - 1, 0 / 0, 1, 1, 1 = 3</i>	
			NI				9.60	131.80		Black very angular GRAVEL of COAL.	10
		10.50 - 11.00	D	93	27	20	10.25	131.15		Extremely weak black COAL. Completely to highly weathered with extremely closely spaced discontinuities. Fractures are iron oxide stained orange and coal has a multicoloured sheen on the fracture surfaces.	
			50+								
		10.64 - 11.00	C				10.65	130.75		Very weak light grey slightly sandy MUDSTONE. Highly weathered with black plant leaf fossils throughout.	
			0								
		11.00 - 11.45	D				11.00	130.40		Extremely weak to very weak grey MUDSTONE. Highly weathered with very closely spaced discontinuities. <i>SPT 'N' @ 11.00 - 11.45m bgl - 4, 10 / 19, 30, 51 for 10mm = 100 for 160mm</i>	11
			NI								
		11.47 - 11.58	G	98	22	0					
			NI				11.65	129.75		Medium strong grey MUDSTONE. Slightly weathered with possible burrow fossil feature and pyrite crystals. Partly recovered as a gravel.	
							11.90	129.50		Extremely weak grey MUDSTONE. Completely to highly weathered with extremely closely to very closely spaced discontinuities. Recovered as a gravel.	12
Continued on next sheet											

Remarks
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 7.20m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

								Rotary Core Log		Borehole No. RC09 Sheet 4 of 8										
Project Name: Trinity Academy - Stage 2 GI				Project No. 079532.304		Co-ords: 433403.65 - 405635.76		Hole Type RC												
Location: Barnsley				Level: 141.40		Scale 1:20		Logged By RS												
Client: Bowmer & Kirkland				Dates: 04/08/2022 - 09/08/2022																
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description										
				TCR	SCR	RQD														
		12.50 - 14.00 13.33 - 13.50	NI	100	83	31	12.50	128.90			13									
			1				12.63	128.77				Very weak to weak grey MUDSTONE. Highly to moderately weathered with closely spaced discontinuities.								
			3				12.77	128.63				Moderately weak grey faintly lenticular bedded SILTSTONE. Moderately to slightly weathered with closely spaced discontinuities.								
			NI				13.12	128.28				Extremely weak to very weak grey MUDSTONE. Highly weathered with very closely spaced discontinuities.								
			7				13.50	127.90				Strong grey cross bedded fine grained SANDSTONE. Fresh with close to medium spaced discontinuities.								
			6				13.80	127.60				Very weak grey MUDSTONE. Highly weathered with very closely spaced discontinuities. Recovered as a gravel.								
			NI				14.00	127.40				Moderately weak grey SILTSTONE. Moderately weathered with closely spaced discontinuities.								
			3				14.10	127.30				Moderately weak to medium strong light and dark grey lenticular bedded SILTSTONE. Moderately weathered with closely spaced discontinuities.								
			1				14.40	127.00				Very weak dark grey MUDSTONE. Highly weathered with very closely spaced discontinuities. Recovered as a gravel.								
			NI									Medium strong light and dark grey fine grained SANDSTONE. Fresh with closely to medium spaced discontinuities.								
			C 3									Very thin seam of black coal. Is not present on entire circumference of core.								
			30				15.20	126.20				Very weak dark grey MUDSTONE. Highly to moderately weathered with very closely spaced discontinuities.								
			3				15.50	125.90				Medium strong light and dark grey fine grained SANDSTONE. Fresh with closely to medium spaced discontinuities.								
							15.80	125.60				Weak to moderately weak light and dark grey lenticular bedded SILTSTONE. Moderately weathered with very closely spaced discontinuities.								
			Continued on next sheet											16						

Remarks
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 7.20m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

							Rotary Core Log			Borehole No. RC09 Sheet 5 of 8	
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433403.65 - 405635.76		Hole Type RC
Location: Barnsley							Level: 141.40		Scale 1:20		
Client: Bowmer & Kirkland							Dates: 04/08/2022 - 09/08/2022		Logged By RS		
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		16.45 - 16.50 15.50 - 17.00	NI C 11	100	40	0	17.00	124.40			17
		17.00 - 18.50	10	100	50	33					
		18.23 - 18.30	C				18.50	122.90			19
		18.50 - 20.00	1	100	0	0					
			NI								
	19.80 - 20.00	C 2				20.00	121.40			20	
Continued on next sheet											

Remarks
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 7.20m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.



							Rotary Core Log			Borehole No. RC09 Sheet 6 of 8												
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433403.65 - 405635.76		Hole Type RC											
Location: Barnsley							Level: 141.40		Scale 1:20		Logged By RS											
Client: Bowmer & Kirkland							Dates: 04/08/2022 - 09/08/2022															
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description												
				TCR	SCR	RQD																
		20.00 - 21.50	NI	100	8	0	21.35	120.05		Medium strong to strong grey fine grained SANDSTONE. Slightly weathered with very closely to closely spaced discontinuities. Partly recovered as a gravel.	21											
		3																				
		NI																				
		21.40 - 21.50	7											Weak dark grey MUDSTONE. Moderately weathered with very closely spaced discontinuities.								
		22.00 - 22.10	22											Moderately weak dark grey MUDSTONE. Moderately weathered with closely spaced discontinuities.								
		21.50 - 23.00		100	14	7				21.50		119.90			22							
		7																				
		23.44 - 23.53 23.00 - 24.50	C 16																			
		Continued on next sheet														24						

Remarks
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 7.20m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

							Rotary Core Log			Borehole No. RC09 Sheet 7 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433403.65 - 405635.76		Hole Type RC	
Location: Barnsley							Level: 141.40		Scale 1:20			
Client: Bowmer & Kirkland							Dates: 04/08/2022 - 09/08/2022		Logged By RS			
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
			7				24.50	116.90				
		24.50 - 26.00	2	100	23	0				Moderately weak to medium strong initially dark grey becoming grey MUDSTONE. Moderately weathered with very close to closely spaced discontinuities. Partly recovered as a gravel.		
			NI									
			1									
			NI									
		25.77 - 25.86	C5									
		26.00 - 27.50	8	100	33	0				Very weak to weak dark grey MUDSTONE. Highly weathered with extremely closely spaced discontinuities.		
			50+									
			C									
		27.05 - 27.12	50+									
						27.50	113.90		AZCL - No recovery, resistance while drilling. Issue with new length of geobore casing, something stuck in middle blocking water flow.			
Continued on next sheet												

Remarks

Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 7.20m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

							Rotary Core Log			Borehole No. RC09 Sheet 8 of 8	
Project Name: Trinity Academy - Stage 2 GI				Project No. 079532.304		Co-ords: 433403.65 - 405635.76			Hole Type RC		
Location: Barnsley				Level: 141.40			Scale 1:20		Logged By RS		
Client: Bowmer & Kirkland				Dates: 04/08/2022 - 09/08/2022							
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		27.50 - 29.00	NR	17	13	0	28.75 29.00 29.10 30.20 30.50	112.65 112.40 112.30 111.20 110.90		Very weak to weak dark grey MUDSTONE. Highly weathered with very closely spaced discontinuities. Extremely weak black pyritic COAL. Highly weathered with extremely closely spaced discontinuities. Extremely weak to very weak dark grey to black carbonaceous MUDSTONE. Highly weathered with very closely to closely spaced fractures. High proportion of black leaf fossils present. Weak to moderately weak black COAL. Moderately weathered with closely spaced discontinuities. Recovered as a gravel.	29 <

							Rotary Core Log			Borehole No. RC10 Sheet 1 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433417.47 - 405584.16		Hole Type RC	
Location: Barnsley							Level: 140.81		Scale 1:20			
Client: Bowmer & Kirkland							Dates: 08/08/2022 - 11/08/2022		Logged By RS			
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
							0.10	140.71		MADE GROUND: Black asphalt.		1
										MADE GROUND: Light yellow to cream compact sandy very angular GRAVEL of limestone.		
							0.50	140.31		MADE GROUND: Firm light brown gravelly CLAY. Gravel is fine to coarse grained and very angular of coal, mudstone and sandstone lithorelicts.		
							1.00	139.81		Very stiff CLAY to extremely weak grey MUDSTONE. Completely weathered.		
		1.20 - 1.65	D							SPT 'N' @ 1.20 - 1.65m bgl - 3, 4 / 5, 8, 12, 11 = 36		
			NI									
		1.20 - 2.00		100	69	0	1.65	139.16				
		1.70 - 1.80	C							Extremely weak greenish grey MUDSTONE. Completely weathered with extremely closely spaced discontinuities. Fractures are iron oxide stained dark orange and dark purple that are horizontal to vertical.		
			50+									
		2.00 - 2.45	D				2.00	138.81		Extremely weak dark grey lenticular bedded MUDSTONE. Completely to highly weathered with very closely spaced discontinuities. Fractures are iron oxide stained dark orange.		
			NI							SPT 'N' @ 2.00 - 2.45m bgl - 10, 11 / 26, 42, 32 for 75mm = 100 for 225mm		
			4				2.50	138.31				
		2.00 - 3.50		100	23	0			Medium strong light grey cross bedded SANDSTONE. Moderately weathered with closely spaced discontinuities. Fractures are iron oxide stained light to dark orange penetrating up to 50mm into the centre of cores which are vertical. Rare honeycomb weathering features.			
		3.00 - 3.13	12									
		3.50 - 3.95	D						SPT 'N' @ 3.50 - 3.95m bgl - 25 for 75mm / 100 for 45mm			
			NI									
			7									
Continued on next sheet												4
Remarks												
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was costantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.												



							Rotary Core Log			Borehole No. RC10 Sheet 4 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433417.47 - 405584.16		Hole Type RC	
Location: Barnsley							Level: 140.81		Scale 1:20		Logged By RS	
Client: Bowmer & Kirkland							Dates: 08/08/2022 - 11/08/2022					
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		12.10 - 12.40	C									
		13.22 - 13.40	7				12.50	128.31		Moderately weak to medium strong grey MUDSTONE. Slightly weathered with closely spaced discontinuities.	13	
			CF	60	53	7	13.10	127.71		Very weak dark grey carbonaceous MUDSTONE. Highly weathered with closely spaced discontinuities.		
			NI				13.40	127.41		Very limited recovery of extremely weak black COAL. Recovered as very angular gravels. Complete loss of flush at 14.00m bgl.		
		14.40 - 14.50	C				14.00	126.81		Extremely weak black COAL. Highly weathered with extremely closely spaced discontinuities. Recovered as a fine to coarse grained and very angular gravel.	14	
		14.00 - 15.50	NI	100	7	0					15	
			0				15.40	125.41		Very weak grey to dark grey MUDSTONE. Highly weathered.		
			NI				15.50	125.31		Weak to moderately weak black COAL. Moderately weathered with closely spaced discontinuities. Some fractures contain iron oxide staining. Recovered as a gravel.		
							16.00	124.81			16	
	Continued on next sheet											

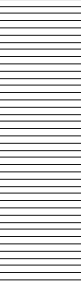
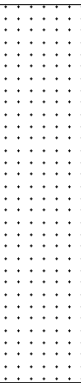
Remarks
 Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.



							Rotary Core Log			Borehole No. RC10 Sheet 5 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433417.47 - 405584.16		Hole Type RC	
Location: Barnsley							Level: 140.81		Scale 1:20		Logged By RS	
Client: Bowmer & Kirkland							Dates: 08/08/2022 - 11/08/2022					
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		16.13 - 16.18	C							Moderately weak to medium strong light grey MUDSTONE. Moderately weathered with closely spaced discontinuities.		
		15.50 - 17.00	15	100	19	0						
		17.47 - 17.72	NR	93	86	46	17.00	123.81		AZCL - No recovery, resistance while drilling.	17	
	1		17.10				123.71		Moderately weak light and dark grey MUDSTONE. Moderately weathered with closely spaced discontinuities.			
	NI											
	3											
			2				17.47	123.34		Moderately weak to medium strong light and dark grey lenticular bedded SILTSTONE. Slightly weathered with closely to medium spaced discontinuities.		
		17.00 - 18.50	4				17.86	122.95		Moderately weak to medium strong dark grey MUDSTONE. Moderately weathered with closely spaced discontinuities.	18	
			3				18.10	122.71		Medium strong light and dark grey lenticular bedded SILTSTONE. Moderately weathered with closely spaced discontinuities.		
		18.40 - 18.48	C 1				18.40	122.41		Moderately weak to medium strong dark grey MUDSTONE. Moderately weathered with closely spaced discontinuities.		
		18.76 - 19.06	NR				18.50	122.31		AZCL - No recovery, resistance while drilling.		
	C						18.60	122.21		Medium strong light and dark grey faintly lenticular bedded SILTSTONE. Slightly weathered with closely to medium spaced discontinuities.	19	
8												
		18.50 - 20.00	2	93	83	45						
Continued on next sheet											20	

Remarks
 Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

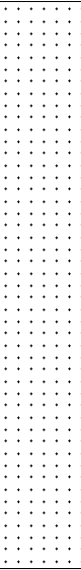
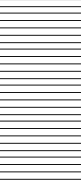
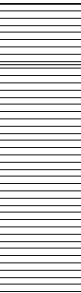
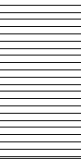


							Rotary Core Log			Borehole No. RC10 Sheet 6 of 8					
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433417.47 - 405584.16		Hole Type RC				
Location: Barnsley							Level: 140.81		Scale 1:20						
Client: Bowmer & Kirkland							Dates: 08/08/2022 - 11/08/2022		Logged By RS						
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description					
				TCR	SCR	RQD									
		20.00 - 21.50	0	100	77	70	21.50	119.31			21				
			1												
			2												
		21.35 - 21.50	C 4	100	96	89			22.25			118.56		Moderately weak to medium strong dark grey MUDSTONE. Slightly weathered to fresh with closely to medium spaced discontinuities.	22
		22.00 - 22.18	C 3												
		21.50 - 23.00	1												
		22.65 - 22.85	C 2												
		23.00 - 24.50	7	100	73	9			23.00			117.81		Strong to very strong light grey cross bedded fine grained SANDSTONE. Fresh with closely spaced discontinuities. 1 No. vertical fracture contains <1mm thick veining and crystals, possibly of calcite.	23
		Continued on next sheet											24		

Remarks

Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.



							Rotary Core Log			Borehole No. RC10 Sheet 7 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433417.47 - 405584.16		Hole Type RC	
Location: Barnsley							Level: 140.81		Scale 1:20		Logged By RS	
Client: Bowmer & Kirkland							Dates: 08/08/2022 - 11/08/2022					
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		24.23 - 24.40	G								25	
		24.73 - 24.85	C									
		25.24 - 25.50	C	100	27	20	25.50	115.31		Black and grey lenticular bedding.		
			6							Medium strong dark grey MUDSTONE. Moderately to slightly weathered with very close to close discontinuities.		
			4				26.00	114.81		Medium strong dark grey MUDSTONE. Moderately to slightly weathered with close discontinuities.		
		26.00 - 27.50	1	100	87	59	26.70	114.11		Medium strong black carbonaceous MUDSTONE. Moderately to slightly weathered with closely spaced discontinuities.		
		26.90 - 27.00	C				26.86	113.95		Medium strong to strong dark grey MUDSTONE. Slightly weathered with closely to medium spaced discontinuities.		
			4									
			NR				27.50	113.31		AZCL - No recovery, resistance while drilling.		
							27.55	113.26		Moderately weak to medium strong dark grey MUDSTONE. Moderately weathered with very close to closely spaced discontinuities.		
		27.93 - 28.07	C								28	

Continued on next sheet

Remarks
 Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.



							Rotary Core Log			Borehole No. RC10 Sheet 8 of 8						
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433417.47 - 405584.16		Hole Type RC					
Location: Barnsley							Level: 140.81		Scale 1:20		Logged By RS					
Client: Bowmer & Kirkland							Dates: 08/08/2022 - 11/08/2022									
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description						
				TCR	SCR	RQD										
		27.50 - 29.00	15	97	73	35	29.00	111.81		Medium strong dark grey MUDSTONE. Moderately to slightly weathered with closely spaced discontinuities.	29					
			4													
		29.50 - 29.66	12	100	70	37						30.50	110.31		End of borehole at 30.50 m	30
		29.00 - 30.50	5													
Remarks Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.																
																

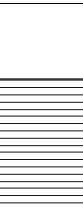
								Rotary Core Log		Borehole No. RC11 Sheet 1 of 8		
Project Name: Trinity Academy - Stage 2 GI				Project No. 079532.304		Co-ords: 433438.55 - 405552.90		Hole Type RC				
Location: Barnsley				Level: 140.73		Scale 1:20		Logged By RS				
Client: Bowmer & Kirkland				Dates: 10/08/2022 - 16/08/2022								
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
							0.10	140.63	 	MADE GROUND: Black asphalt.		
										MADE GROUND: Light yellow to cream compact sandy very angular GRAVEL of limestone.		
		1.50 - 1.95	D									SPT 'N' @ 1.50 - 1.95m bgl - 1, 2 / 2, 2, 2 = 8
		1.50 - 2.00	NI	100	6	0						
		1.90 - 2.00	C				1.90	138.83				
		2.00 - 2.45	NI D NR				2.00	138.73		Very stiff CLAY to extremely weak greenish grey MUDSTONE. Completely weathered with iron oxide staining.		
		2.18 - 2.27	C				2.10	138.63		AZCL - No recovery, resistance while drilling with grey flush. Likely SPT disturbance. SPT 'N' @ 2.00 - 2.45m bgl - 6, 14 / 74, 26 for 5mm = 100 for 80mm		
			16				2.50	138.23		Extremely weak to very weak light and dark grey lenticular bedded SILTSTONE. Highly weathered with extremely closely to very closely spaced discontinuities. Fractures are iron oxide stained dark orange to dark purple.		
	2.00 - 3.50		93	17	0				Extremely weak dark grey MUDSTONE. Completely to highly weathered with extremely closely spaced discontinuities. Fractures are iron oxide stained dark orange to dark purple.			
	3.10 - 3.20	50+ C										
	3.50 - 3.95	D								SPT 'N' @ 3.50 - 3.95m bgl - 7, 14 / 27, 31, 34, 5 for 5mm = 100 for 230mm		
		NI										
		10										
Continued on next sheet											4	

Remarks

Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

							Rotary Core Log			Borehole No. RC11 Sheet 2 of 8	
Project Name: Trinity Academy - Stage 2 GI				Project No. 079532.304		Co-ords: 433438.55 - 405552.90			Hole Type RC		
Location: Barnsley				Level: 140.73			Scale 1:20				
Client: Bowmer & Kirkland				Dates: 10/08/2022 - 16/08/2022			Logged By RS				
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description	
				TCR	SCR	RQD					
		4.15 - 4.26	C 6	100	30	0	4.10	136.63		Weak grey fine grained SANDSTONE. Highly weathered with very closely spaced discontinuities. Fractures are iron oxide stained dark orange to black and are vertical to horizontal.	5
		3.50 - 5.00	NI				4.50	136.23		Very weak to weak grey MUDSTONE. Highly weathered with very closely spaced discontinuities. Fractures are iron oxide stained dark orange to dark purple.	
		4.85 - 4.94	6				4.81	135.92		Medium strong to strong light grey fine grained SANDSTONE. Moderately to slightly weathered with closely spaced discontinuities. Vertical iron oxide stain penetrating up to 3mm into corestones, not along a fracture plane.	
		5.00 - 5.45	D	100	3	0	5.00	135.73		Medium strong light grey fine grained SANDSTONE. Highly to moderately weathered with extremely to very closely spaced discontinuities. Fractures are iron oxide stained dark orange to dark purple penetrating up to 20mm into core stones. Recovered as small corestones and gravels. <i>SPT 'N' @ 5.00 - 5.45m bgl - 4, 8 / 72, 28 for 5mm = 100 for 80mm</i>	6
		5.00 - 6.50	NI				5.80	134.93		Moderately weak to medium strong light and dark grey lenticular bedded SILTSTONE. Moderately weathered with very closely spaced discontinuities. Fractures are faintly iron oxide stained light orange. Recovered as small corestones and gravels.	
		6.25 - 6.32	C				6.43	134.30		Moderately weak dark grey MUDSTONE. Moderately weathered with fine grained leaf fossil debris.	
		6.50 - 6.95	D NR	95	60	24	6.50	134.23		AZCL - No recovery, resistance while drilling with grey flush. Likely SPT disturbance. <i>SPT 'N' @ 6.50 - 6.95m bgl - 11, 14 for 10mm / 54, 46 for 30mm = 100 for 105mm</i>	7
		6.50 - 8.00	12				7.10	133.63		Moderately weak grey MUDSTONE. Moderately weathered with very closely to closely spaced discontinuities.	
		7.70 - 7.80	7				7.70	133.03		Medium strong light and dark grey lenticular bedded SILTSTONE. Moderately weathered with closely spaced discontinuities. <i>Strong clay ironstone present.</i>	
		8.00 - 8.45	C 3				8.00	132.73		Moderately weak to medium strong grey MUDSTONE. Moderately weathered with closely spaced discontinuities.	8
			D								
Remarks Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.											



							Rotary Core Log				Borehole No. RC11 Sheet 3 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433438.55 - 405552.90			Hole Type RC	
Location: Barnsley							Level: 140.73			Scale 1:20			
Client: Bowmer & Kirkland							Dates: 10/08/2022 - 16/08/2022			Logged By RS			
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description			
				TCR	SCR	RQD							
		8.00 - 9.50	NR	87	54	16	8.20	132.53		AZCL - No recovery, resistance while drilling with grey flush. Likely SPT disturbance. SPT 'N' @ 8.00 - 8.45m bgl - 12, 13 for 65mm / 38, 62 for 30mm = 100 for 105mm			
			NI							Moderately weak grey MUDSTONE. Moderately weathered with very closely spaced discontinuities. Recovered as gravels.			
			CH							Medium strong to strong light and dark grey lenticular bedded SILTSTONE. Moderately to slightly weathered with closely to medium spaced discontinuities. Fractures are iron oxide stained dark orange.			
										DNR	AZCL - No recovery, resistance while drilling with grey flush. Likely SPT disturbance. SPT 'N' @ 9.50 - 9.95m bgl - 2, 5 / 4, 2, 6, 88 for 60mm = 100 for 285mm		
											NI	Medium strong to strong grey faintly lenticular bedded SILTSTONE. Slightly weathered with closely to medium spaced discontinuities. Fractures are iron oxide stained brownish orange and are vertical to horizontal.	
												9.50 - 11.00	97
		9											
		C											
			11.00 - 12.50	11	100	80	44						
Continued on next sheet													
Remarks Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was costantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.													



							Rotary Core Log			Borehole No. RC11 Sheet 4 of 8			
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433438.55 - 405552.90		Hole Type RC		
Location: Barnsley							Level: 140.73		Scale 1:20		Logged By RS		
Client: Bowmer & Kirkland							Dates: 10/08/2022 - 16/08/2022						
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description			
				TCR	SCR	RQD							
		12.23 - 12.40	1				12.10	128.63		Weak to moderately weak dark grey MUDSTONE. Highly to moderately weathered with very closely to closely spaced discontinuities. Fractures are iron oxide stained orange, dark orange and dark purple.	13		
			C 10										
		12.72 - 12.91	C				12.50	128.23		Medium strong grey lenticular bedded SILTSTONE. Moderately weathered with closely to medium spaced discontinuities. Fractures are iron oxide stained dark orange and dark purple.			
			4										
		12.50 - 14.00	10		100	72	38	13.25	127.48			Extremely weak locally increasing to medium strong dark greenish grey to grey lenticular bedded SILTSTONE. Completely weathered locally moderately weathered with very closely to closely spaced discontinuities. Fractures are stained greenish colour and material is much weaker at the fracture planes with staining penetrating up to 50mm into cores. Vertical to horizontal.	
													NI
		14.49 - 14.63	NR					14.00	126.73			AZCL - No recovery, softer drilling but still had resistance.	14
			NI										
			C 1										
		14.00 - 15.50	NI		100	13	9	14.62	126.11			Very stiff CLAY to extremely weak grey MUDSTONE. Completely weathered. Largely recovered as a gravel with clay. Gravels range from extremely weak to medium strong in strength. Previous fractures are iron oxide stained dark orange.	15
		15.50 - 15.95	D					15.50	125.23			AZCL - No recovery, resistance while drilling. SPT test confirmed clay onto coal from 15.50m to 15.95m bgl. SPT 'N' @ 15.50 - 15.95m bgl - 1, 2 / 3, 3, 3, 4 = 13	16
NR													
						15.80	124.93		Medium dense GRAVEL of very angular coal. Gravels are extremely weak.				
Continued on next sheet													

Remarks

Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

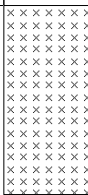
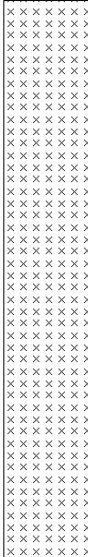
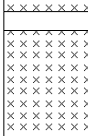
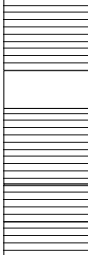
								Rotary Core Log		Borehole No. RC11 Sheet 5 of 8		
Project Name: Trinity Academy - Stage 2 GI				Project No. 079532.304		Co-ords: 433438.55 - 405552.90		Hole Type RC				
Location: Barnsley				Level: 140.73		Scale 1:20		Logged By RS				
Client: Bowmer & Kirkland				Dates: 10/08/2022 - 16/08/2022								
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		16.50 - 16.70	NI	87	37	0	16.50	124.23		Becomes heavily iron oxide stained which binds some of the gravel of coal together.		
			C							Extremely weak light and dark grey MUDSTONE. Completely to highly weathered with no discernible discontinuities. Fossil plant leaf remains common.		
			0									
			NR									
		17.50 - 17.69	C	87	59	33	17.00	123.73				
			14									
		17.00 - 18.50	NR				18.50	122.23				
			C									
		18.67 - 18.84	3				18.57	122.16				
			NI									
18.50 - 20.00	0	95	75	17	18.92	121.81						
	NI										Moderately weak to medium strong grey MUDSTONE. Moderately weathered with very closely to closely spaced discontinuities.	
			3									
Continued on next sheet											20	

Remarks
Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

							Rotary Core Log		Borehole No. RC11 Sheet 6 of 8			
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433438.55 - 405552.90		Hole Type RC	
Location: Barnsley							Level: 140.73		Scale 1:20			
Client: Bowmer & Kirkland							Dates: 10/08/2022 - 16/08/2022		Logged By RS			
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		20.00 - 21.50	1	100	48	20	20.10	120.63		Medium strong to strong light and dark grey lenticular bedded SILTSTONE. Slightly weathered with closely spaced discontinuities.	21	
			3				20.30	120.43				
		21.14 - 21.50	11	100	48	20	21.20	119.53		Medium strong to strong grey MUDSTONE. Slightly weathered with very closely to closely spaced discontinuities.		
			C									
		21.50 - 23.00	1	100	93	49	21.50	119.23		Strong light and dark grey lenticular bedded SILTSTONE. Fresh to slightly weathered with medium spaced discontinuities containing fossil plant leaf remains.		22
			C									
		22.36 - 22.45	12	100	93	49	23.00	117.73		Strong light and dark grey lenticular bedded SILTSTONE. Slightly weathered with closely to medium spaced discontinuities containing fossil plant leaf remains.		
			3									
		23.00 - 24.50	3	100	93	87				Strong light and dark grey lenticular bedded SILTSTONE. Fresh with closely to medium spaced discontinuities containing fossil plant leaf remains.		23
Continued on next sheet											24	

Remarks
 Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.



							Rotary Core Log			Borehole No. RC11 Sheet 7 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433438.55 - 405552.90		Hole Type RC	
Location: Barnsley							Level: 140.73		Scale 1:20		Logged By RS	
Client: Bowmer & Kirkland							Dates: 10/08/2022 - 16/08/2022					
Well	Water Strikes	Depth (m)	Type / FI	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		24.29 - 24.50	2 C				24.50	116.23				
		24.50 - 24.81	C									
		24.50 - 26.00	2	100	97	93				Strong light and dark grey lenticular bedded SILTSTONE. Slightly weathered with closely to widely spaced discontinuities containing fossil plant leaf remains.	25	
			2									
		26.00 - 27.50 26.84 - 27.00	NR	97	76	49	26.00 26.05 26.34	114.73 114.68 114.39		AZCL - No recovery, resistance while drilling. Medium strong to strong light to dark grey lenticular bedded SILTSTONE. Slightly weathered with very closely to medium spaced discontinuities.	26	
			NI									
			0									
			3									
		27.50 - 27.80		NR						Medium strong to strong dark grey arenaceous MUDSTONE. Moderately weathered with closely spaced discontinuities.	27	
				C								
			0									
			1									
		27.60 - 27.80	NR				27.50 27.60 27.80 27.90	113.23 113.13 112.93 112.83		AZCL - No recovery, resistance while drilling. Medium strong to strong dark grey arenaceous MUDSTONE. Moderately weathered with closely spaced discontinuities. Moderately weak to medium strong black carbonaceous MUDSTONE. Moderately weathered with very closely to closely spaced discontinuities. Medium strong dark grey MUDSTONE. Moderately weathered with very closely to closely spaced discontinuities.	28	
			C									
			0									
	1											

Continued on next sheet

Remarks

Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was costantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.

AGS

							Rotary Core Log			Borehole No. RC11 Sheet 8 of 8		
Project Name: Trinity Academy - Stage 2 GI							Project No. 079532.304		Co-ords: 433438.55 - 405552.90		Hole Type RC	
Location: Barnsley							Level: 140.73		Scale 1:20		Logged By RS	
Client: Bowmer & Kirkland							Dates: 10/08/2022 - 16/08/2022					
Well	Water Strikes	Depth (m)	Type / Fl	Coring			Depth (m)	Level (m)	Legend	Stratum Description		
				TCR	SCR	RQD						
		27.50 - 29.00	3	93	53	29					29	
			3									
		29.20 - 29.35	NR C									
		29.00 - 30.50	10	87	76	10						
			5				30.50	110.23		End of borehole at 30.50 m	31	
Remarks Position cleared with CAT scanner, prior to completion of hand excavated trial pit up to where ground became hard to hand dig. Rotary geobore S wireline drilling with use of a mudpuppy to recirculate where possible. Hydrant was constantly feeding mudpuppy. Water flush lost completely around 14.00m bgl. This did not return up to 30.50m bgl. 6 inch casing up to 1.50m bgl. Geobore casing up to 30.50m bgl.												

Appendix A3 – Geotechnical Laboratory Testing Results

- Geotechnical Analysis Results
 - I2 Analytical Ltd Certificate No: 22-78998-1
 - I2 Analytical Ltd Certificate No: 22- 78997-1
 - I2 Analytical Ltd Certificate No: 22- 78992-1

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Analytical Report Number : 22-78998

Project / Site name:	Trinity - Stage 2 GI	Samples received on:	16/08/2022
Your job number:	B079532.304	Samples instructed on/ Analysis started on:	19/08/2022
Your order number:	EBBI1126	Analysis completed by:	31/08/2022
Report Issue Number:	1	Report issued on:	31/08/2022
Samples Analysed:	3 soil samples		


Signed:

Adam Fenwick
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 22-78998
 Project / Site name: Trinity - Stage 2 GI
 Your Order No: EBB1126

Lab Sample Number				2395074	2395075	2395076
Sample Reference				RC07	RC07	RC09
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				9.50-9.95	11.000-11.45	10.25-10.35
Date Sampled				03/08/2022	03/08/2022	05/08/2022
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	18	6.3	5.5
Total mass of sample received	kg	0.001	NONE	0.2	0.2	0.2

General Inorganics

Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	6.4	-	6.7
Total Organic Carbon (TOC) - Manual	%	0.1	MCERTS	-	11	-
Loss on Ignition @ 450oC	%	0.2	MCERTS	45	77.2	89.2

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 22-78998

Project / Site name: Trinity - Stage 2 GI

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2395074	RC07	None Supplied	9.50-9.95	Black loam and clay with gravel and vegetation.
2395075	RC07	None Supplied	11.000-11.45	Black loam and clay with gravel and vegetation.
2395076	RC09	None Supplied	10.25-10.35	Black loam and clay with gravel and vegetation.

Analytical Report Number : 22-78998

Project / Site name: Trinity - Stage 2 GI

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In house method.	L047-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Total organic carbon in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L023-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.



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Analytical Report Number : 22-78997

Project / Site name:	Trinity - Stage 2 GI	Samples received on:	16/08/2022
Your job number:	B079532.304	Samples instructed on/ Analysis started on:	19/08/2022
Your order number:	EBBI1126	Analysis completed by:	05/09/2022
Report Issue Number:	1	Report issued on:	06/09/2022
Samples Analysed:	27 soil samples		

Signed:

Adam Fenwick
Technical Reviewer
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils - 4 weeks from reporting
leachates - 2 weeks from reporting
waters - 2 weeks from reporting
asbestos - 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 22-78997
 Project / Site name: Trinity - Stage 2 GI
 Your Order No: EBB11126

Lab Sample Number				2395047	2395048	2395049	2395050	2395051
Sample Reference				RC07	RC07	RC07	RC07	RC07
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				2.00-2.45	5.00-5.45	6.50-6.95	8.00-8.45	9.00-9.10
Date Sampled				01/08/2022	02/08/2022	02/08/2022	02/08/2022	03/08/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	10	7.9	6.5	9.9	1.1
Total mass of sample received	kg	0.001	NONE	0.2	0.2	0.2	0.6	0.4

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.2	8.3	8.0	8.2	7.9
Total Sulphate as SO ₄	%	0.005	MCERTS	< 0.005	0.013	0.016	0.053	0.02
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.016	0.047	0.053	0.27	0.017
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	15.6	47.1	52.9	266	17
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	3.3	3.5	5.6	9	8.2
Total Sulphur	%	0.005	MCERTS	< 0.005	0.024	0.03	0.872	0.049
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	16	41	26	92	7.6
Magnesium (leachate equivalent)	mg/l	2.5	NONE	8	20	13	46	3.8

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-78997
 Project / Site name: Trinity - Stage 2 GI
 Your Order No: EBBI1126

Lab Sample Number				2395052	2395053	2395054	2395055	2395056
Sample Reference				RC08	RC08	RC08	RC08	RC08
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.50-1.95	3.50-3.95	5.00-5.45	6.50-6.95	8.00-8.45
Date Sampled				01/08/2022	02/08/2022	02/08/2022	02/08/2022	02/08/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	9	7	5.9	12
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4	0.4

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.8	7.7	8.4	8.5	8.6
Total Sulphate as SO ₄	%	0.005	MCERTS	0.014	0.008	0.049	0.016	0.015
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.014	0.022	0.19	0.05	0.042
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	13.5	22	192	50.1	42.3
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	2.9	2.3	4.8	9.9	8.1
Total Sulphur	%	0.005	MCERTS	0.013	0.007	0.067	0.024	0.033
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	2.2	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	< 5.0	28	25	33	16
Magnesium (leachate equivalent)	mg/l	2.5	NONE	< 2.5	14	13	17	7.7

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-78997
 Project / Site name: Trinity - Stage 2 GI
 Your Order No: EBBI1126

Lab Sample Number				2395057	2395058	2395059	2395060	2395061
Sample Reference				RC08	RC09	RC09	RC09	RC09
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				9.50-9.95	2.00-2.45	5.00-5.45	6.50-6.95	9.50-9.95
Date Sampled				02/08/2022	04/08/2022	04/08/2022	05/08/2022	05/08/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	6.9	11	8	5.4	18
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4	0.4

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.6	8.5	8.6	8.2	4.5
Total Sulphate as SO ₄	%	0.005	MCERTS	0.011	0.01	0.014	0.013	0.22
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.035	0.026	0.039	0.023	0.073
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	35.2	26.4	39.1	22.5	73.1
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	5	2.5	23	18	20
Total Sulphur	%	0.005	MCERTS	0.024	0.015	0.018	0.015	0.144
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	19	9.1	29	23	31
Magnesium (leachate equivalent)	mg/l	2.5	NONE	9.5	4.5	15	11	15

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-78997
 Project / Site name: Trinity - Stage 2 GI
 Your Order No: EBBI1126

Lab Sample Number				2395062	2395063	2395064	2395065	2395066
Sample Reference				RC09	RC10	RC10	RC10	RC10
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				11.00-11.45	1.20-1.65	5.00-5.45	6.50-6.95	8.00-8.45
Date Sampled				05/08/2022	08/08/2022	08/08/2022	08/08/2022	08/08/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	6.4	6.3	10	5.1	9.5
Total mass of sample received	kg	0.001	NONE	0.4	0.2	0.2	0.2	0.2

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	7.5	8.4	8.9	8.3	7.2
Total Sulphate as SO ₄	%	0.005	MCERTS	0.03	< 0.005	0.013	0.015	0.015
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.13	0.0034	0.054	0.073	0.066
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	128	3.4	53.7	73.3	65.8
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	6.3	4.3	8.2	22	11
Total Sulphur	%	0.005	MCERTS	0.102	< 0.005	0.042	0.026	0.026
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	32	< 5.0	5.3	23	26
Magnesium (leachate equivalent)	mg/l	2.5	NONE	16	< 2.5	2.7	12	13

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-78997
 Project / Site name: Trinity - Stage 2 GI
 Your Order No: EBBI1126

Lab Sample Number				2395067	2395068	2395069	2395070	2395071
Sample Reference				RC10	RC10	RC11	RC11	RC11
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				9.50-9.95	14.40-14.50	1.50-1.95	5.00-5.45	6.50-6.95
Date Sampled				08/08/2022	08/08/2022	10/08/2022	11/08/2022	11/08/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	3.4	7.9	12	11	7.4
Total mass of sample received	kg	0.001	NONE	0.2	0.2	0.2	0.2	0.2

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.6	6.1	7.4	8.5	8.7
Total Sulphate as SO ₄	%	0.005	MCERTS	0.009	0.057	0.008	0.009	0.012
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.027	0.053	0.019	0.024	0.035
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	27.2	53.2	19.3	24.2	34.7
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	12	21	53	26	5.8
Total Sulphur	%	0.005	MCERTS	0.021	0.16	< 0.005	0.008	0.031
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	20	45	45	27	27
Magnesium (leachate equivalent)	mg/l	2.5	NONE	9.7	23	22	13	14

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 22-78997
 Project / Site name: Trinity - Stage 2 GI
 Your Order No: EBB11126

Lab Sample Number				2395072	2395073
Sample Reference				RC11	RC11
Sample Number				None Supplied	None Supplied
Depth (m)				8.00-8.45	9.50-9.95
Date Sampled				11/08/2022	11/08/2022
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	7.9	6.5
Total mass of sample received	kg	0.001	NONE	0.2	0.2

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.6	8.6
Total Sulphate as SO ₄	%	0.005	MCERTS	0.015	0.029
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.079	0.15
Water Soluble SO ₄ 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	78.5	152
Water Soluble Chloride (2:1) (leachate equivalent)	mg/l	0.5	MCERTS	16	3.2
Total Sulphur	%	0.005	MCERTS	0.069	0.026
Water Soluble Nitrate (2:1) as N (leachate equivalent)	mg/l	2	NONE	< 2.0	< 2.0

Heavy Metals / Metalloids

Magnesium (water soluble)	mg/kg	5	NONE	24	23
Magnesium (leachate equivalent)	mg/l	2.5	NONE	12	11

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 22-78997
Project / Site name: Trinity - Stage 2 GI

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2395047	RC07	None Supplied	2.00-2.45	Brown clay and sand.
2395048	RC07	None Supplied	5.00-5.45	Brown clay and sand.
2395049	RC07	None Supplied	6.50-6.95	Brown clay and sand.
2395050	RC07	None Supplied	8.00-8.45	Light grey clay and sand.
2395051	RC07	None Supplied	9.00-9.10	Non Soil
2395052	RC08	None Supplied	1.50-1.95	Brown clay and sand with gravel.
2395053	RC08	None Supplied	3.50-3.95	Brown clay and sand.
2395054	RC08	None Supplied	5.00-5.45	Brown clay and sand.
2395055	RC08	None Supplied	6.50-6.95	Brown clay and sand.
2395056	RC08	None Supplied	8.00-8.45	Brown clay and sand.
2395057	RC08	None Supplied	9.50-9.95	Light grey clay and sand.
2395058	RC09	None Supplied	2.00-2.45	Light grey clay and sand.
2395059	RC09	None Supplied	5.00-5.45	Light grey clay and sand.
2395060	RC09	None Supplied	6.50-6.95	Grey clay with gravel.
2395061	RC09	None Supplied	9.50-9.95	Black clay with gravel.
2395062	RC09	None Supplied	11.00-11.45	Grey clay with gravel.
2395063	RC10	None Supplied	1.20-1.65	Light brown clay with gravel.
2395064	RC10	None Supplied	5.00-5.45	Grey clay with gravel.
2395065	RC10	None Supplied	6.50-6.95	Grey clay with gravel.
2395066	RC10	None Supplied	8.00-8.45	Grey clay with gravel.
2395067	RC10	None Supplied	9.50-9.95	Grey clay with gravel.
2395068	RC10	None Supplied	14.40-14.50	Black clay with gravel.
2395069	RC11	None Supplied	1.50-1.95	Light brown clay with gravel.
2395070	RC11	None Supplied	5.00-5.45	Light brown clay with gravel.
2395071	RC11	None Supplied	6.50-6.95	Light brown sand with gravel.
2395072	RC11	None Supplied	8.00-8.45	Grey clay with gravel.
2395073	RC11	None Supplied	9.50-9.95	Grey clay with gravel.

Analytical Report Number : 22-78997
Project / Site name: Trinity - Stage 2 GI

Water matrix abbreviations:

Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Magnesium, water soluble, in soil	Determination of water soluble magnesium by extraction with water followed by ICP-OES.	In-house method based on TRL 447	L038-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphate in soil as %	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Total Sulphur in soil as %	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Water Soluble Nitrate (2:1) as N in soil	Determination of nitrate by reaction with sodium salicylate and colorimetry.	In-house method based on Examination of Water and Wastewater & Polish Standard Method PN-82/C-04579.08, 2:1 extraction.	L078-PL	W	NONE
Chloride, water soluble, in soil	Determination of Chloride colorimetrically by discrete analyser.	In house method.	L082-PL	D	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.

For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.

Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 01/08/2022

Date Received: 16/08/2022

Date Tested: 29/08/2022

Sampled By: Not Given

Test Results:

Laboratory Reference: 2394889

Hole No.: RC07

Sample Reference: Not Given

Sample Description: Brown sandy CLAY

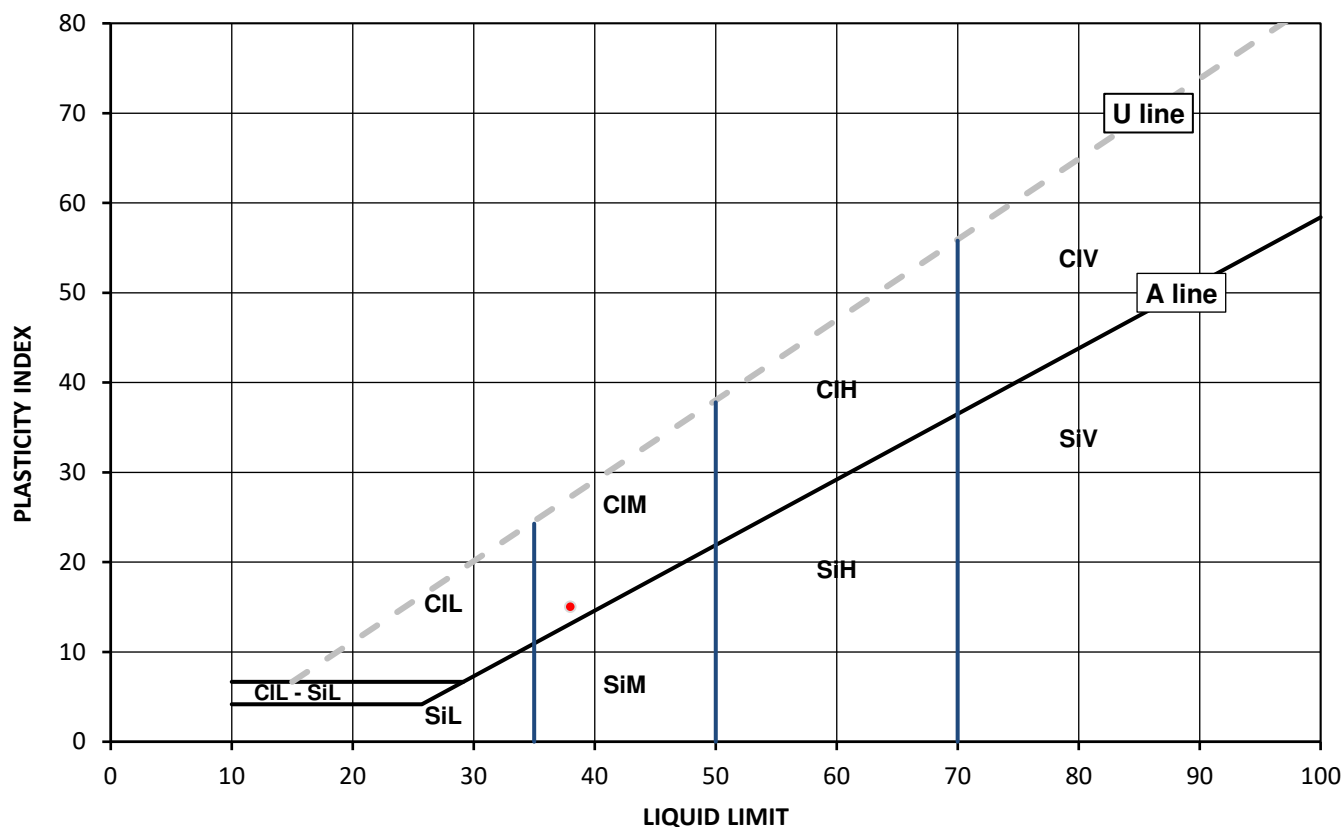
Depth Top [m]: 1.20

Depth Base [m]: 1.65

Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
8.7	38	23	15	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 01/08/2022

Date Received: 16/08/2022

Date Tested: 29/08/2022

Sampled By: Not Given

Test Results:

Laboratory Reference: 2394915

Hole No.: RC08

Sample Reference: Not Given

Sample Description: Brown very sandy CLAY

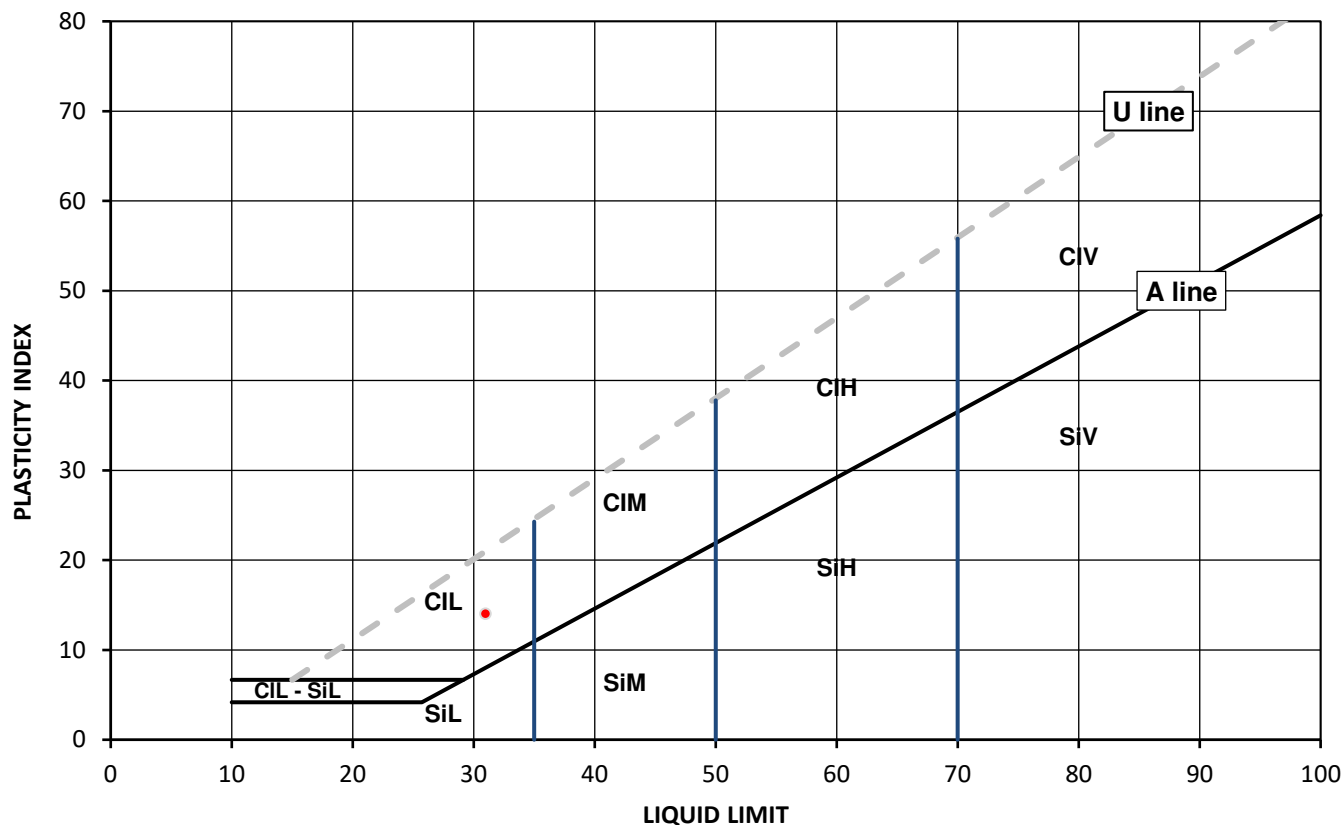
Depth Top [m]: 2.00

Depth Base [m]: 2.45

Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
11	31	17	14	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS
Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B079532.304
Job Number: 22-78992
Date Sampled: 04/08/2022
Date Received: 16/08/2022
Date Tested: 29/08/2022
Sampled By: Not Given

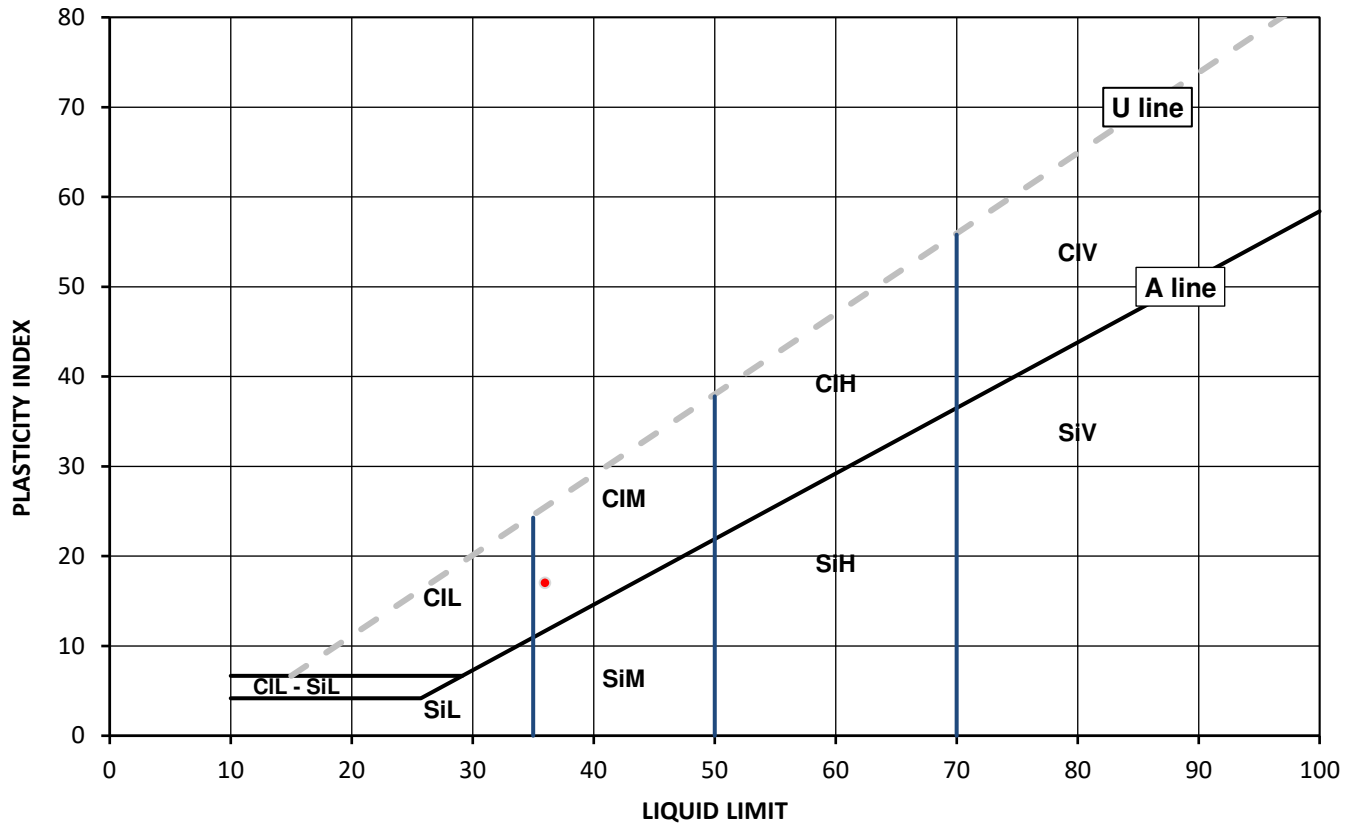
Test Results:

Laboratory Reference: 2394941
Hole No.: RC09
Sample Reference: Not Given
Sample Description: Grey sandy CLAY

Depth Top [m]: 1.50
Depth Base [m]: 1.95
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
9.1	36	19	17	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Siewior

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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B079532.304
Job Number: 22-78992
Date Sampled: 04/08/2022
Date Received: 16/08/2022
Date Tested: 29/08/2022
Sampled By: Not Given

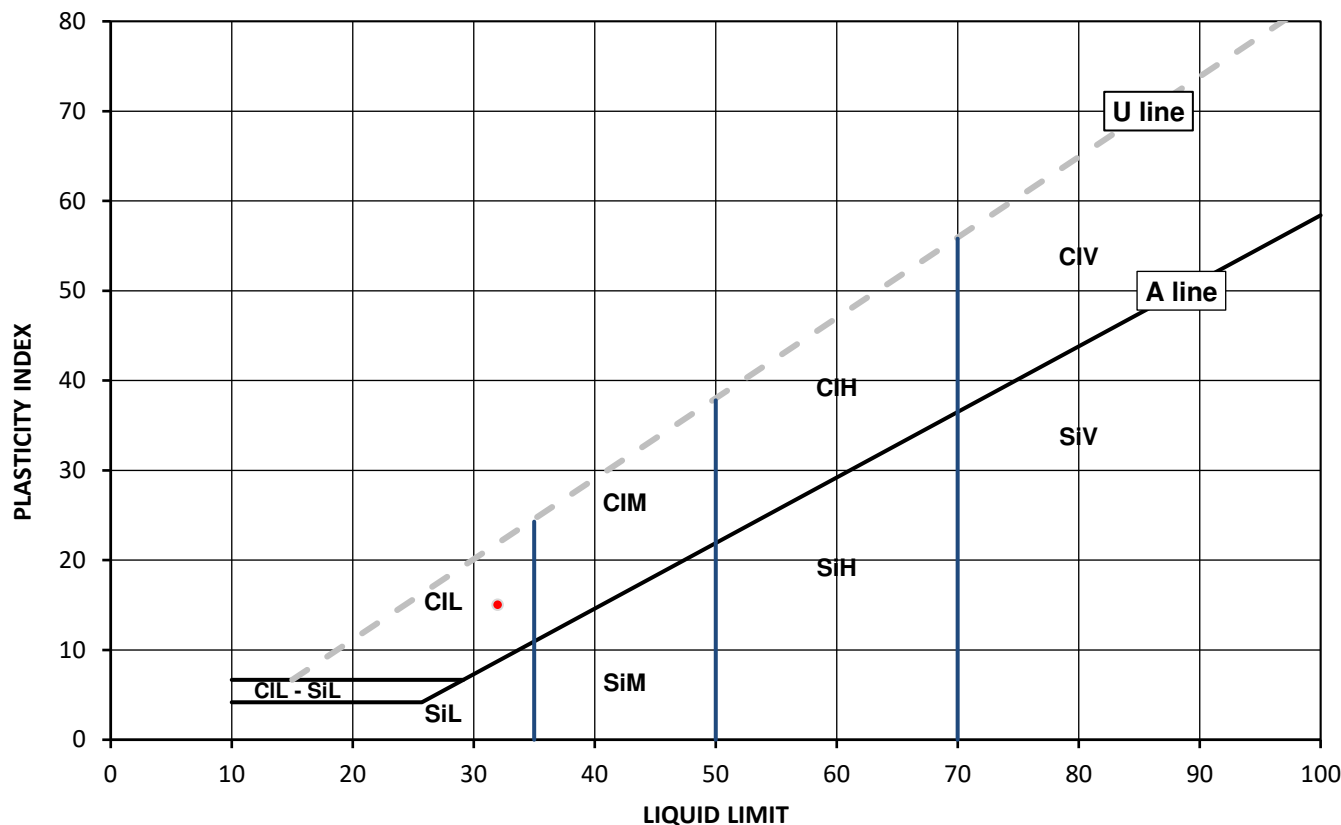
Test Results:

Laboratory Reference: 2394945
Hole No.: RC09
Sample Reference: Not Given
Sample Description: Grey very sandy CLAY

Depth Top [m]: 3.50
Depth Base [m]: 3.95
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
10	32	17	15	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B079532.304
Job Number: 22-78992
Date Sampled: 05/08/2022
Date Received: 16/08/2022
Date Tested: 29/08/2022
Sampled By: Not Given

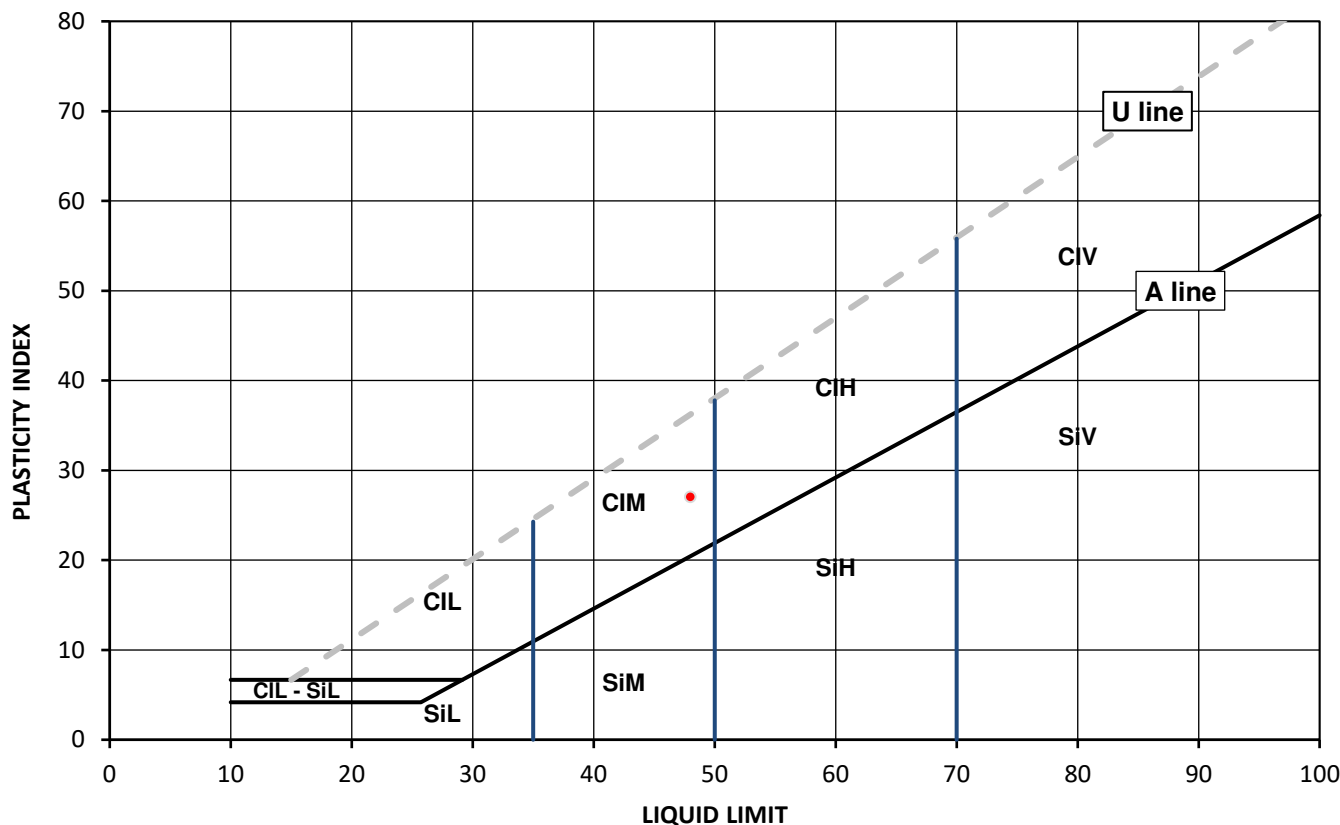
Test Results:

Laboratory Reference: 2394951
Hole No.: RC09
Sample Reference: Not Given
Sample Description: Grey slightly sandy CLAY

Depth Top [m]: 8.00
Depth Base [m]: 8.45
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
9.4	48	21	27	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B079532.304
Job Number: 22-78992
Date Sampled: 08/08/2022
Date Received: 16/08/2022
Date Tested: 29/08/2022
Sampled By: Not Given

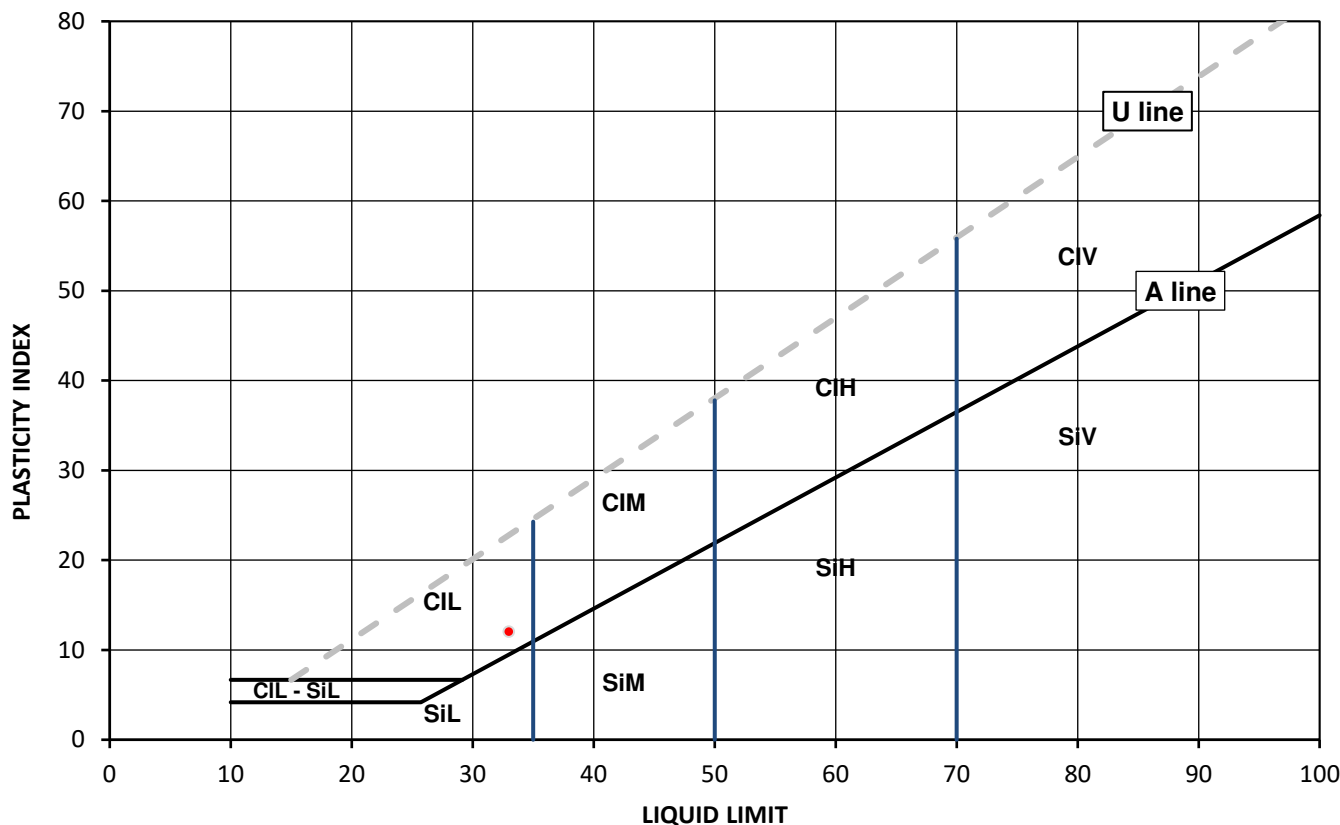
Test Results:

Laboratory Reference: 2394968
Hole No.: RC10
Sample Reference: Not Given
Sample Description: Greyish brown very sandy CLAY

Depth Top [m]: 2.00
Depth Base [m]: 2.45
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
9.9	33	21	12	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B079532.304
Job Number: 22-78992
Date Sampled: 10/08/2022
Date Received: 16/08/2022
Date Tested: 29/08/2022
Sampled By: Not Given

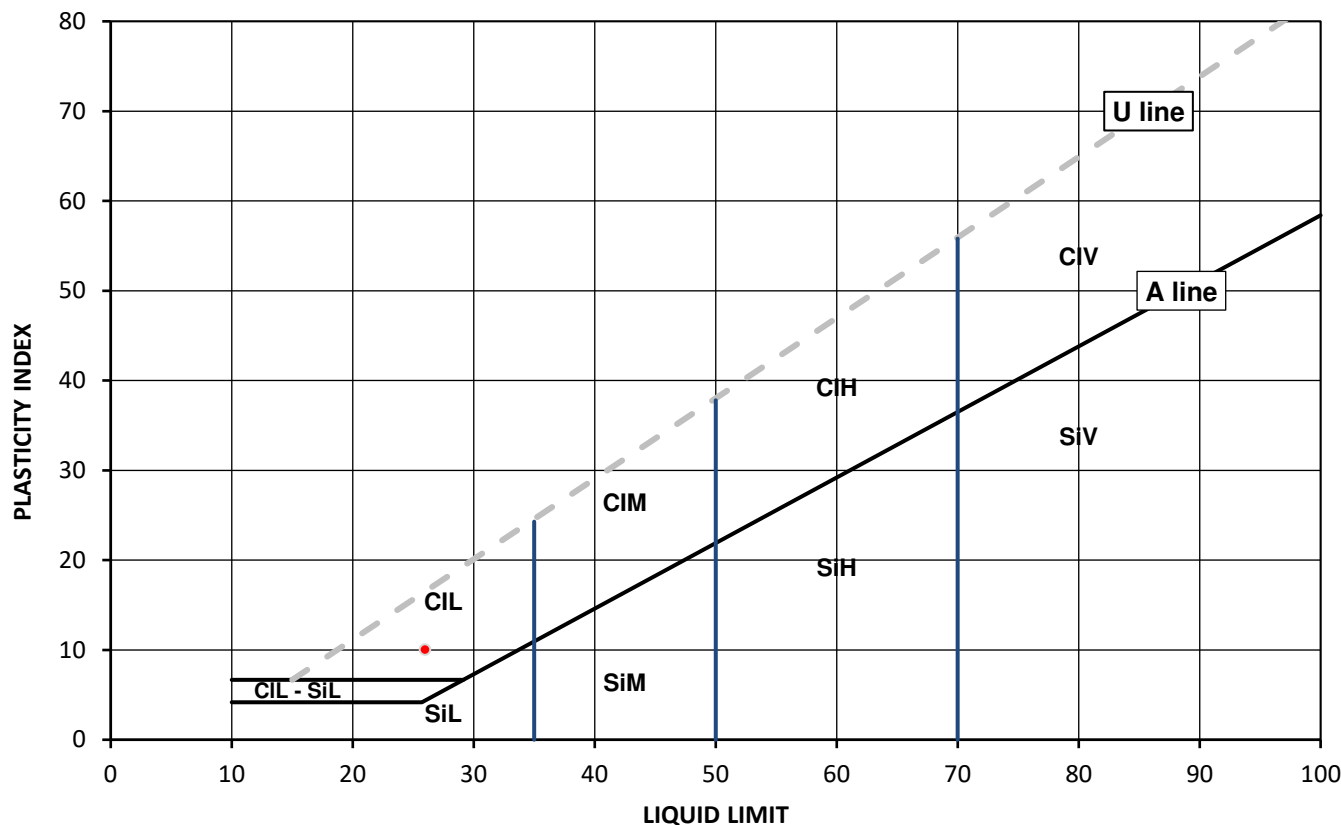
Test Results:

Laboratory Reference: 2394997
Hole No.: RC11
Sample Reference: Not Given
Sample Description: Brownish grey very sandy CLAY

Depth Top [m]: 2.00
Depth Base [m]: 2.45
Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
12	26	16	10	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 11/08/2022

Date Received: 16/08/2022

Date Tested: 29/08/2022

Sampled By: Not Given

Test Results:

Laboratory Reference: 2395000
Hole No.: RC11
Sample Reference: Not Given
Sample Description: Greyish brown sandy CLAY

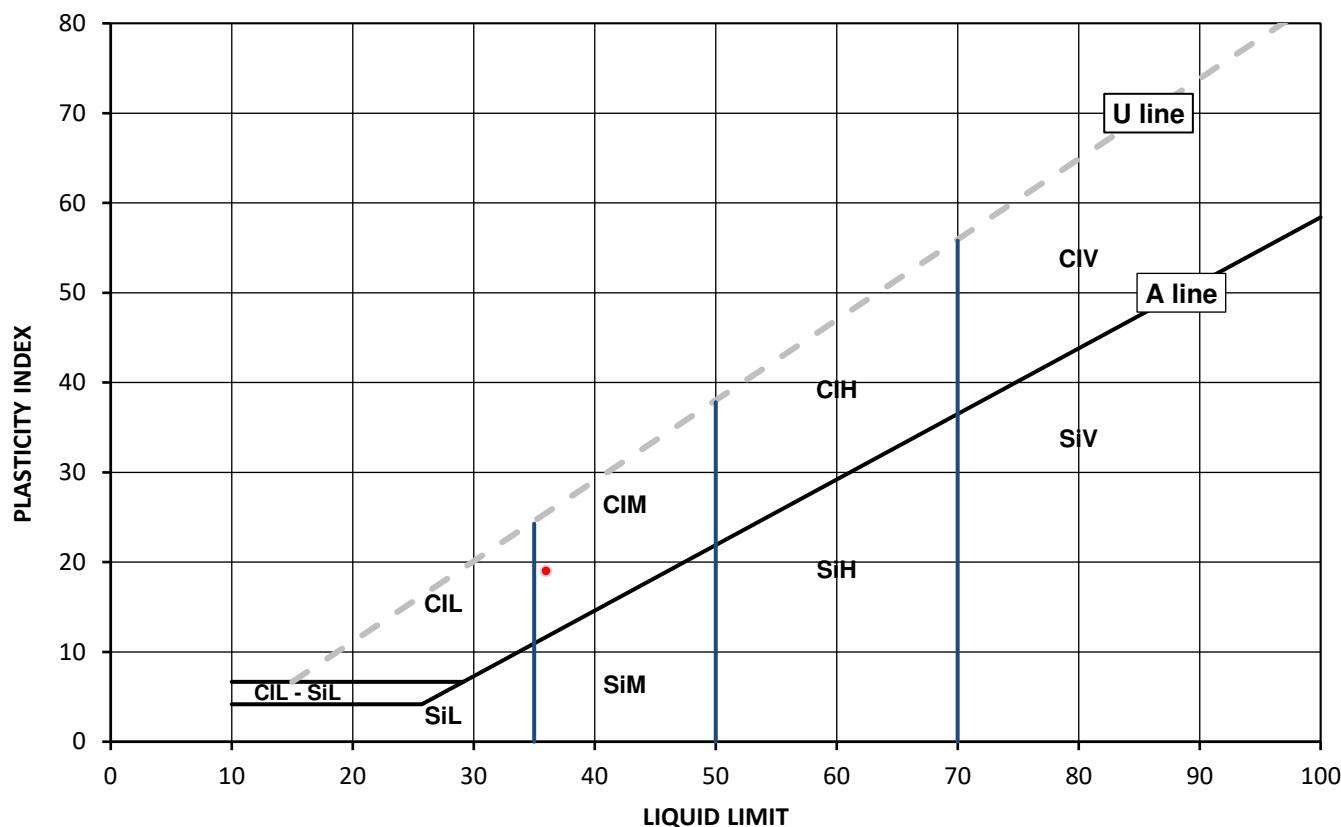
Depth Top [m]: 3.50

Depth Base [m]: 3.95

Sample Type: D

Sample Preparation: Tested in natural condition

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
12	36	17	19	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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TEST CERTIFICATE

DETERMINATION OF LIQUID AND PLASTIC LIMITS

Tested in Accordance with: BS 1377-2:1990: Clause 4.4 and 5

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: B079532.304
Job Number: 22-78992
Date Sampled: 12/08/2022
Date Received: 16/08/2022
Date Tested: 05/09/2022
Sampled By: Not Given

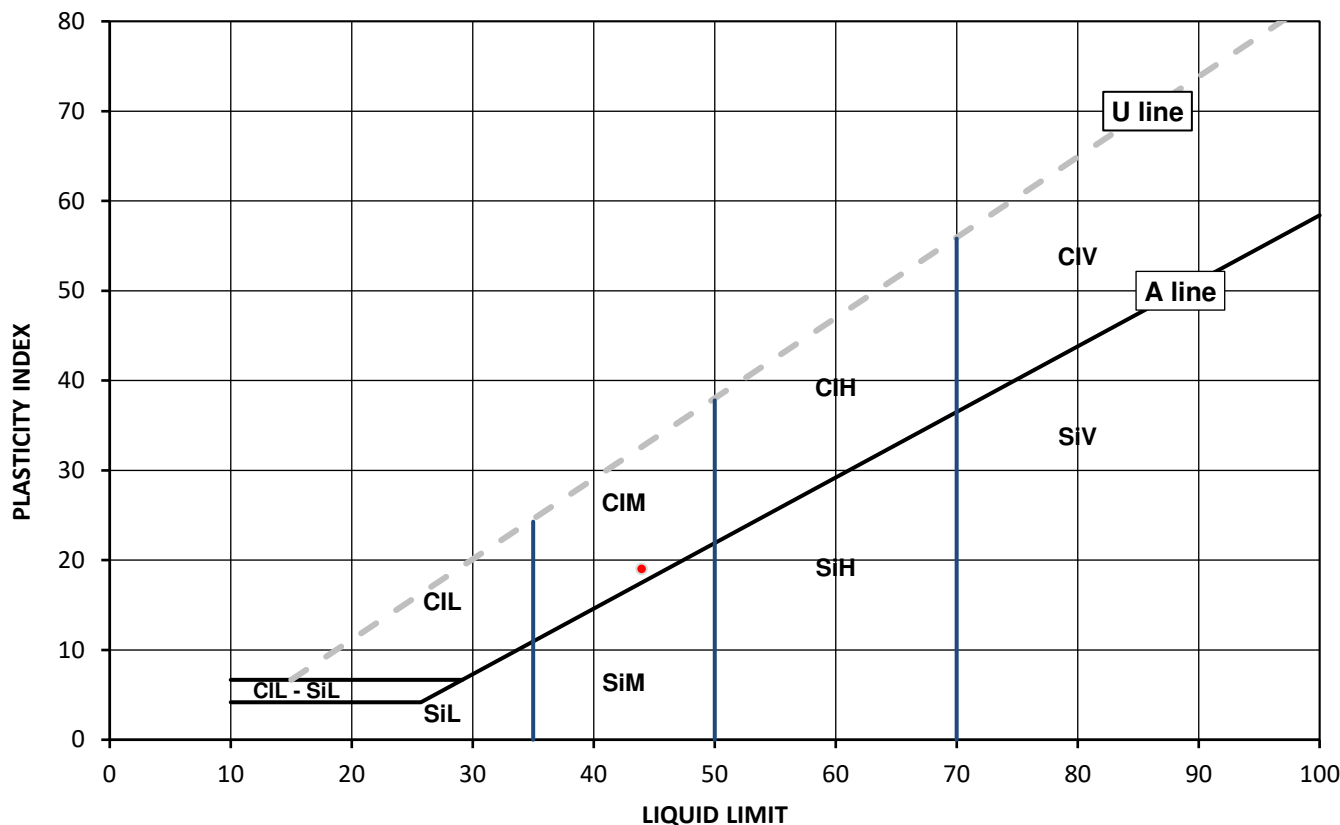
Test Results:

Laboratory Reference: 2395014
Hole No.: RC11
Sample Reference: Not Given
Sample Description: Black and grey sandy CLAY with fragments of coal

Depth Top [m]: 15.50
Depth Base [m]: 15.95
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Water Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
18	44	25	19	52



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Water Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:



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SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



4041

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:
Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
1990: Clause 8.2

Client Reference: B079532.304
Job Number: 22-78992
Date Sampled: 01/08 - 03/08/2022
Date Received: 16/08/2022
Date Tested: 29/08/2022
Sampled By: Not Given

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2394889	RC07	Not Given	1.20	1.65	D	Brown sandy CLAY	Atterberg 1 Point	8.7		100	38	23	15						
2394891	RC07	Not Given	2.00	2.45	D	Brownish grey slightly sandy CLAY		12											
2394894	RC07	Not Given	5.00	5.45	D	Brownish grey slightly sandy CLAY		12											
2394896	RC07	Not Given	6.50	6.95	D	Brownish grey slightly sandy CLAY		8.9											
2394898	RC07	Not Given	8.00	8.45	D	Greyish brown slightly sandy CLAY		12											
2394900	RC07	Not Given	9.00	9.10	D	Black COAL		8.5											
2394914	RC08	Not Given	1.50	1.95	D	Brown slightly gravelly slightly sandy CLAY		23											
2394915	RC08	Not Given	2.00	2.45	D	Brown very sandy CLAY	Atterberg 1 Point	11		100	31	17	14						
2394918	RC08	Not Given	3.50	3.95	D	Brownish grey slightly sandy CLAY		13											
2394920	RC08	Not Given	5.00	5.45	D	Brownish grey slightly sandy CLAY		9.8											

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Monika Siewior

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SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



4041

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:
Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
1990: Clause 8.2

Client Reference: B079532.304
Job Number: 22-78992
Date Sampled: 02/08 - 05/08/2022
Date Received: 16/08/2022
Date Tested: 29/08 - 05/09/2022
Sampled By: Not Given

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2394922	RC08	Not Given	6.50	6.95	D	Greyish brown slightly sandy CLAY		7.7											
2394924	RC08	Not Given	8.00	8.45	D	Greyish brown slightly sandy CLAY with sandstone		8.9											
2394926	RC08	Not Given	9.50	9.95	D	Greyish brown slightly sandy CLAY		9.9											
2394941	RC09	Not Given	1.50	1.95	D	Grey sandy CLAY	Atterberg 1 Point	9.1		100	36	19	17						
2394943	RC09	Not Given	2.00	2.45	D	Brownish grey slightly sandy CLAY		12											
2394945	RC09	Not Given	3.50	3.95	D	Grey very sandy CLAY	Atterberg 1 Point	10		100	32	17	15						
2394947	RC09	Not Given	5.00	5.45	D	Greyish brown slightly sandy CLAY		9.7											
2394949	RC09	Not Given	6.50	6.95	D	Greyish brown slightly sandy CLAY		6.9											
2394951	RC09	Not Given	8.00	8.45	D	Grey slightly sandy CLAY	Atterberg 1 Point	9.4		100	48	21	27						
2394952	RC09	Not Given	9.50	9.95	D	Black to grey CLAY with coal		28											

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

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Reporting Specialist
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SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



4041

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:
Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
1990: Clause 8.2

Client Reference: B079532.304
Job Number: 22-78992
Date Sampled: 05/08 - 10/08/2022
Date Received: 16/08/2022
Date Tested: 29/08 - 05/09/2022
Sampled By: Not Given

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2394954	RC09	Not Given	11.00	11.45	D	Greyish brown slightly sandy CLAY		9.6											
2394966	RC10	Not Given	1.20	1.65	D	Brownish grey slightly sandy CLAY		8.9											
2394968	RC10	Not Given	2.00	2.45	D	Greyish brown very sandy CLAY	Atterberg 1 Point	9.9		100	33	21	12						
2394971	RC10	Not Given	5.00	5.45	D	Greyish brown slightly sandy CLAY		12											
2394973	RC10	Not Given	6.50	6.95	D	Greyish brown slightly sandy CLAY		8.2											
2394975	RC10	Not Given	8.00	8.45	D	Greyish brown slightly sandy CLAY		14											
2394977	RC10	Not Given	9.50	9.95	D	Greyish brown slightly sandy CLAY		6.4											
2394981	RC10	Not Given	14.40	14.50	D	Black COAL		13											
2394995	RC11	Not Given	1.50	1.95	D	Brown slightly gravelly slightly sandy CLAY		13											
2394997	RC11	Not Given	2.00	2.45	D	Brownish grey very sandy CLAY	Atterberg 1 Point	12		100	26	16	10						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

SUMMARY OF CLASSIFICATION TEST RESULTS

Tested in Accordance with:

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



4041

Client: Curtins
Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Water Content by BS 1377-2:1990: Clause 3.2; Atterberg by BS 1377-2: 1990:
Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2:
1990: Clause 8.2

Client Reference: B079532.304
Job Number: 22-78992
Date Sampled: 11/08 - 12/08/2022
Date Received: 16/08/2022
Date Tested: 29/08 - 05/09/2022
Sampled By: Not Given

Contact: Rob Swinnerton
Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Water Content BS 1377-2 [W] %	Water Content BS EN ISO 17892-1 [W] %	Atterberg				Density			Total Porosity# %		
		Reference	Depth Top m	Depth Base m	Type					% Passing 425um %	WL %	Wp %	Ip %	bulk Mg/m3	dry Mg/m3	PD Mg/m3			
2395000	RC11	Not Given	3.50	3.95	D	Greyish brown sandy CLAY	Atterberg 1 Point	12		100	36	17	19						
2395003	RC11	Not Given	5.00	5.45	D	Brownish grey GRAVEL with sandstone		12											
2395005	RC11	Not Given	6.50	6.95	D	Greyish brown slightly sandy CLAY		11											
2395007	RC11	Not Given	8.00	8.45	D	Greyish brown slightly sandy CLAY		11											
2395009	RC11	Not Given	9.50	9.95	D	Greyish brown slightly sandy CLAY		7.2											
2395014	RC11	Not Given	15.50	15.95	D	Black and grey sandy CLAY with fragments of coal	Atterberg 1 Point	18		52	44	25	19						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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Client: Curtins

Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton

Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 01/08 - 03/08/2022

Date Received: 16/08/2022

Date Tested: 29/08/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2394889	RC07	Not Given	1.20	1.65	D	Brown sandy CLAY		8.7	Sample was quartered, oven dried at 108.9 °C			
2394891	RC07	Not Given	2.00	2.45	D	Brownish grey slightly sandy CLAY		12	Sample was quartered, oven dried at 106 °C			
2394894	RC07	Not Given	5.00	5.45	D	Brownish grey slightly sandy CLAY		12	Sample was quartered, oven dried at 106 °C			
2394896	RC07	Not Given	6.50	6.95	D	Brownish grey slightly sandy CLAY		8.9	Sample was quartered, oven dried at 106 °C			
2394898	RC07	Not Given	8.00	8.45	D	Greyish brown slightly sandy CLAY		12	Sample was quartered, oven dried at 106 °C			
2394900	RC07	Not Given	9.00	9.10	D	Black COAL		8.5	Sample was quartered, oven dried at 106 °C			
2394914	RC08	Not Given	1.50	1.95	D	Brown slightly gravelly slightly sandy CLAY		23	Sample was quartered, oven dried at 106 °C			
2394915	RC08	Not Given	2.00	2.45	D	Brown very sandy CLAY		11	Sample was quartered, oven dried at 108.9 °C			
2394918	RC08	Not Given	3.50	3.95	D	Brownish grey slightly sandy CLAY		13	Sample was quartered, oven dried at 106 °C			
2394920	RC08	Not Given	5.00	5.45	D	Brownish grey slightly sandy CLAY		9.8	Sample was quartered, oven dried at 106 °C			

Comments:

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Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 02/08 - 05/08/2022

Date Received: 16/08/2022

Date Tested: 29/08/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2394922	RC08	Not Given	6.50	6.95	D	Greyish brown slightly sandy CLAY		7.7	Sample was quartered, oven dried at 106 °C			
2394924	RC08	Not Given	8.00	8.45	D	Greyish brown slightly sandy CLAY with sandstone		8.9	Sample was quartered, oven dried at 106 °C			
2394926	RC08	Not Given	9.50	9.95	D	Greyish brown slightly sandy CLAY		9.9	Sample was quartered, oven dried at 106 °C			
2394941	RC09	Not Given	1.50	1.95	D	Grey sandy CLAY		9.1	Sample was quartered, oven dried at 108.9 °C			
2394943	RC09	Not Given	2.00	2.45	D	Brownish grey slightly sandy CLAY		12	Sample was quartered, oven dried at 106 °C			
2394945	RC09	Not Given	3.50	3.95	D	Grey very sandy CLAY		10	Sample was quartered, oven dried at 108.9 °C			
2394947	RC09	Not Given	5.00	5.45	D	Greyish brown slightly sandy CLAY		9.7	Sample was quartered, oven dried at 106 °C			
2394949	RC09	Not Given	6.50	6.95	D	Greyish brown slightly sandy CLAY		6.9	Sample was quartered, oven dried at 106 °C			
2394951	RC09	Not Given	8.00	8.45	D	Grey slightly sandy CLAY		9.4	Sample was whole tested, oven dried at 108.9 °C			
2394952	RC09	Not Given	9.50	9.95	D	Black to grey CLAY with coal		28	Sample was quartered, oven dried at 106 °C			

Comments:

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Contact: Rob Swinnerton
 Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
 Unit 8 Harrowden Road
 Brackmills Industrial Estate
 Northampton NN4 7EB



Environmental Science

Client Reference: B079532.304
 Job Number: 22-78992
 Date Sampled: 05/08 - 10/08/2022
 Date Received: 16/08/2022
 Date Tested: 29/08/2022
 Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC %	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2394954	RC09	Not Given	11.00	11.45	D	Greyish brown slightly sandy CLAY		9.6	Sample was quartered, oven dried at 106 °C			
2394966	RC10	Not Given	1.20	1.65	D	Brownish grey slightly sandy CLAY		8.9	Sample was quartered, oven dried at 106 °C			
2394968	RC10	Not Given	2.00	2.45	D	Greyish brown very sandy CLAY		9.9	Sample was quartered, oven dried at 106 °C			
2394971	RC10	Not Given	5.00	5.45	D	Greyish brown slightly sandy CLAY		12	Sample was quartered, oven dried at 106 °C			
2394973	RC10	Not Given	6.50	6.95	D	Greyish brown slightly sandy CLAY		8.2	Sample was quartered, oven dried at 106 °C			
2394975	RC10	Not Given	8.00	8.45	D	Greyish brown slightly sandy CLAY		14	Sample was quartered, oven dried at 106 °C			
2394977	RC10	Not Given	9.50	9.95	D	Greyish brown slightly sandy CLAY		6.4	Sample was quartered, oven dried at 106 °C			
2394981	RC10	Not Given	14.40	14.50	D	Black COAL		13	Sample was quartered, oven dried at 106 °C			
2394995	RC11	Not Given	1.50	1.95	D	Brown slightly gravelly slightly sandy CLAY		13	Sample was quartered, oven dried at 106 °C			
2394997	RC11	Not Given	2.00	2.45	D	Brownish grey very sandy CLAY		12	Sample was quartered, oven dried at 106 °C			

Comments:

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SUMMARY REPORT

DETERMINATION OF WATER CONTENT

Tested in Accordance with: BS 1377-2: 1990: Clause 3.2

i2 Analytical Ltd
 Unit 8 Harrowden Road
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 Northampton NN4 7EB



Environmental Science

Client Reference: B079532.304
 Job Number: 22-78992
 Date Sampled: 11/08 - 12/08/2022
 Date Received: 16/08/2022
 Date Tested: 29/08 - 05/09/2022
 Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	WC	Sample preparation / Oven temperature at the time of testing			
		Reference	Depth Top m	Depth Base m	Type							
2395000	RC11	Not Given	3.50	3.95	D	Greyish brown sandy CLAY		12	Sample was quartered, oven dried at 106 °C			
2395003	RC11	Not Given	5.00	5.45	D	Brownish grey GRAVEL with sandstone		12	Sample was quartered, oven dried at 106 °C			
2395005	RC11	Not Given	6.50	6.95	D	Greyish brown slightly sandy CLAY		11	Sample was quartered, oven dried at 106 °C			
2395007	RC11	Not Given	8.00	8.45	D	Greyish brown slightly sandy CLAY		11	Sample was quartered, oven dried at 106 °C			
2395009	RC11	Not Given	9.50	9.95	D	Greyish brown slightly sandy CLAY		7.2	Sample was quartered, oven dried at 106 °C			
2395014	RC11	Not Given	15.50	15.95	D	Black and grey sandy CLAY with fragments of coal		18	Sample was quartered, oven dried at 109 °C			

Comments:

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Contact: Rob Swinnerton

Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF POINT LOAD STRENGTH**

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 01/08 - 03/08/2022

Date Received: 16/08/2022

Date Tested: 07/09/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2394890	RC07	Not Given	1.80	1.89	C	Brown mottled grey SILTSTONE	WC = 7.0%	1	D	U	YES	64.2	100.1	10.0	89.0	3.1	94.4	0.35	0.46
2394892	RC07	Not Given	2.29	2.37	C	Brown mottled grey SILTSTONE	WC = 4.4%	1	A	P	YES	-	100.3	32.0	27.0	1.9	58.7	0.55	0.59
2394893	RC07	Not Given	4.50	4.67	C	Brown mottled grey SILTSTONE	WC = 3.1%	1	A	U	YES	-	100.4	46.0	40.0	2.5	71.5	0.48	0.56
2394895	RC07	Not Given	6.32	6.50	C	Brown mottled grey SILTSTONE	WC = 4.1%	1	D	U	YES	54.8	100.1	100.0	93.0	2.2	96.5	0.23	0.31
2394897	RC07	Not Given	7.50	7.60	C	Grey SILTSTONE	WC = 2.4%	1	D	U	YES	55.7	100.5	100.0	98.0	0.8	99.3	0.08	0.11
2394899	RC07	Not Given	8.33	8.42	C	Grey SILTSTONE	WC = 2.6%	1	A	U	YES	-	100.5	86.0	74.0	3.9	97.3	0.41	0.55
2394901	RC07	Not Given	12.13	12.30	C	Yellowish brown mottled grey SILTSTONE	WC = 1.9%	1	D	U	YES	78.2	100.6	100.0	94.0	2.7	97.2	0.28	0.38
2394902	RC07	Not Given	13.18	13.29	C	Yellowish brown mottled grey SILTSTONE	WC = 2.6%	1	D	U	YES	53.2	100.8	100.0	91.0	5.3	95.8	0.58	0.77
2394903	RC07	Not Given	15.17	15.36	C	Grey SILTSTONE	WC = 2.5%	1	D	U	YES	71.5	100.2	100.0	96.0	4.1	98.1	0.43	0.58
2394904	RC07	Not Given	16.27	16.39	C	Grey SILTSTONE	WC = 2.2%	1	I	U	YES	57.4	100.3	81.0	79.0	11.3	100.4	1.12	1.53

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

Signed:

Monika Siewior

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Reporting Specialist
for and on behalf of i2 Analytical Ltd

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Birmingham, B1 2JS

Contact: Rob Swinnerton

Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF POINT LOAD STRENGTH**

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 01/08 - 05/08/2022

Date Received: 16/08/2022

Date Tested: 07/09/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2394906	RC07	Not Given	19.25	19.35	C	Grey SILTSTONE	WC = 2.0%	1	I	U	YES	43.5	91.6	71.0	60.0	14.2	83.7	2.03	2.56
2394907	RC07	Not Given	20.25	20.35	C	Grey SILTSTONE	WC = 2.7%	1	A	U	YES	-	100.6	92.0	83.0	9.1	103.1	0.86	1.19
2394908	RC07	Not Given	21.60	21.80	C	Grey SILTSTONE	WC = 1.9%	1	D	U	YES	61.2	100.4	101.0	98.0	4.6	99.2	0.47	0.64
2394909	RC07	Not Given	23.57	23.71	C	Dark grey SILTSTONE	WC = 3.0%	1	D	U	YES	74.6	100.1	100.0	98.0	3.5	99.0	0.35	0.48
2394910	RC07	Not Given	25.15	25.25	C	Dark grey MUDSTONE	WC = 3.9%	1	D	U	YES	51.4	100.1	100.0	95.0	5.4	97.5	0.57	0.77
2394911	RC07	Not Given	26.44	26.57	C	Dark grey MUDSTONE	WC = 8.6%	1	A	U	YES	-	101.9	47.0	36.0	5.0	68.3	1.06	1.22
2394912	RC07	Not Given	28.05	28.14	C	Yellowish brown SILTSTONE	WC = 3.0%	1	D	U	YES	51.2	100.1	100.0	94.0	3.1	97.0	0.32	0.44
2394913	RC07	Not Given	30.24	30.37	C	Dark grey SILTSTONE	WC = 3.7%	1	D	U	YES	68.4	100.1	100.0	91.0	1.2	95.4	0.13	0.17
2394916	RC08	Not Given	1.80	2.00	C	Brown silty CLAY	WC = 13.8%	1	A	U	YES	-	100.1	47.0	39.0	4.3	70.5	0.86	1.00
2394917	RC08	Not Given	2.50	2.70	C	Dark grey MUDSTONE	WC = 4.5%	1	D	U	YES	54.2	100.4	100.0	96.0	2.6	98.2	0.26	0.36

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

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Site Address: Trinity - Stage 2 GI

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SUMMARY REPORT**DETERMINATION OF POINT LOAD STRENGTH**

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 02/08/2022

Date Received: 16/08/2022

Date Tested: 08/09/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2394919	RC08	Not Given	3.90	4.00	C	Orangish brown SHALE	WC = 8.3%	1	A	P	YES	-	101.6	60.0	29.0	0.7	61.3	0.17	0.19
2394921	RC08	Not Given	6.25	6.45	C	Grey SILTSTONE	WC = 2.2%	1	A	P	YES	-	100.9	76.0	32.0	12.0	64.1	2.92	3.26
2394923	RC08	Not Given	7.85	8.00	C	Grey SILTSTONE	WC = 2.6%	1	A	U	YES	-	100.1	50.0	23.0	3.9	54.1	1.33	1.38
2394925	RC08	Not Given	8.25	8.50	C	Grey SILTSTONE	WC = 1.7%	1	D	U	YES	81.0	100.1	100.0	94.0	2.2	97.0	0.23	0.31
2394927	RC08	Not Given	9.90	10.30	C	Mottled grey SILTSTONE	WC = 4.2%	1	I	U	YES	48.7	100.2	45.0	41.0	2.5	72.3	0.47	0.55
2394928	RC08	Not Given	11.85	12.00	C	Grey SILTSTONE	WC = 1.5%	1	D	U	YES	89.2	97.6	97.0	94.0	6.9	95.8	0.75	1.00
2394929	RC08	Not Given	13.08	13.32	C	Grey SILTSTONE	WC = 2.2%	1	D	U	YES	53.0	98.0	43.0	97.0	4.3	97.5	0.45	0.61
2394930	RC08	Not Given	14.30	14.53	C	Grey SILTSTONE	WC = 2.6%	1	D	U	YES	76.2	99.4	99.0	96.0	1.5	97.7	0.15	0.21
2394931	RC08	Not Given	15.55	15.92	C	Brown silty CLAY	WC = 3.2%	1	D	U	YES	44.1	100.1	100.0	97.0	3.1	98.5	0.31	0.43
2394932	RC08	Not Given	18.00	18.25	C	Black COAL	WC = 7.1%	1	D	U	YES	94.6	101.7	101.0	98.0	0.5	99.8	0.05	0.07

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

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Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF POINT LOAD STRENGTH**

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 02/08 - 04/08/2022

Date Received: 16/08/2022

Date Tested: 08/09/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2394933	RC08	Not Given	19.30	19.60	C	Brownish grey silty CLAY	WC = 14.3%	1	D	U	YES	36.2	68.5	36.0	30.0	0.5	45.3	0.22	0.21
2394934	RC08	Not Given	21.10	21.35	C	Grey SILTSTONE	WC = 40.5%	1	D	U	YES	137.0	100.5	87.0	82.0	28.7	90.8	3.48	4.56
2394935	RC08	Not Given	22.62	22.76	C	Grey SILTSTONE	WC = 1.2%	1	D	U	YES	68.9	102.1	101.0	94.0	23.1	98.0	2.41	3.26
2394936	RC08	Not Given	24.05	24.33	C	Grey SILTSTONE	WC = 1.2%	1	A	U	YES	-	99.5	97.0	74.0	20.9	96.8	2.22	2.99
2394937	RC08	Not Given	24.50	24.57	C	Grey SILTSTONE	WC = 1.2%	1	A	U	YES	-	100.1	78.0	70.0	9.5	94.4	1.07	1.42
2394938	RC08	Not Given	26.26	26.39	C	Light grey SILTSTONE	WC = 1.0%	1	I	U	YES	78.8	98.0	42.0	90.0	22.3	106.0	1.98	2.78
2394939	RC08	Not Given	27.74	27.85	C	Light grey SILTSTONE	WC = 2.7%	1	D	U	YES	72.0	101.3	102.0	98.0	3.9	99.7	0.39	0.54
2394940	RC08	Not Given	29.60	29.72	C	Grey SILTSTONE	WC = 2.9%	1	A	U	YES	-	99.6	56.0	36.0	5.9	67.6	1.28	1.47
2394942	RC09	Not Given	1.95	2.00	C	Grey SILTSTONE	WC = 5.9%	1	I	U	YES	37.3	73.1	34.0	25.0	1.4	48.2	0.60	0.59
2394944	RC09	Not Given	3.23	3.36	C	Grey SILTSTONE	WC = 3.3%	1	A	U	YES	-	101.2	39.0	21.0	2.9	52.0	1.07	1.09

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

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4041

Client: Curtins

Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton

Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF POINT LOAD STRENGTH**

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 08/08 - 08/08/2022

Date Received: 16/08/2022

Date Tested: 08/09/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2394946	RC09	Not Given	4.05	4.25	C	Grey SILTSTONE	WC = 4.4%	1	A	U	YES	-	100.2	47.0	28.0	3.7	59.8	1.04	1.12
2394948	RC09	Not Given	6.00	6.13	C	Grey SILTSTONE	WC = 3.1%	1	A	U	YES	-	100.4	70.0	64.0	3.1	90.5	0.37	0.49
2394950	RC09	Not Given	7.03	7.23	C	Grey SILTSTONE	WC = 3.4%	1	D	U	YES	63.6	100.9	101.0	99.0	0.5	99.9	0.05	0.06
2394953	RC09	Not Given	10.64	11.00	C	Brown silty CLAY	WC = 15.8%	1	I	U	YES	42.4	89.1	33.0	24.0	0.3	52.2	0.09	0.09
2394956	RC09	Not Given	13.33	13.50	C	Grey SILTSTONE	WC = 0.6%	1	D	U	YES	100.1	101.5	101.0	99.0	19.5	100.2	1.94	2.65
2394957	RC09	Not Given	14.72	15.00	C	Brownish grey silty CLAY	WC = 3.7%	1	A	U	YES	-	101.2	82.0	76.0	5.2	99.0	0.53	0.71
2394958	RC09	Not Given	18.23	18.30	C	Grey SILTSTONE	WC = 3.2%	1	I	U	YES	42.5	92.6	78.0	76.0	15.9	94.7	1.77	2.36
2394959	RC09	Not Given	19.80	20.00	C	Grey SILTSTONE	WC = 2.8%	1	I	U	YES	60.4	121.4	74.0	71.0	13.4	104.8	1.22	1.70
2394960	RC09	Not Given	21.40	21.50	C	Brown silty CLAY	WC = 21.3%	1	A	U	YES	-	101.1	45.0	37.0	0.8	69.0	0.16	0.18
2394961	RC09	Not Given	22.00	22.10	C	Grey SILTSTONE	WC = 4.7%	1	D	U	YES	73.2	100.2	100.0	95.0	2.1	97.6	0.22	0.30

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
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Monika Siewior

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Reporting Specialist
for and on behalf of i2 Analytical Ltd

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Client: Curtins

Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton

Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF POINT LOAD STRENGTH**

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 08/08 - 09/08/2022

Date Received: 16/08/2022

Date Tested: 08/09/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2394962	RC09	Not Given	23.44	23.53	C	Grey SILTSTONE	WC = 2.2%	1	A	U	YES	-	101.2	42.0	37.0	4.8	69.0	1.00	1.15
2394963	RC09	Not Given	25.77	25.86	C	Grey SILTSTONE	WC = 1.9%	1	A	U	YES	-	101.2	52.0	47.0	7.7	77.8	1.26	1.54
2394964	RC09	Not Given	27.05	27.12	C	Grey SILTSTONE	WC = 1.8%	1	A	U	YES	-	102.0	101.0	97.0	2.5	112.2	0.19	0.28
2394965	RC09	Not Given	29.60	29.70	C	Brown silty CLAY	WC = 14.3%	1	A	U	YES	-	101.0	50.0	51.0	0.6	81.0	0.09	0.11
2394967	RC10	Not Given	1.70	1.80	C	Brown silty CLAY	WC = 14.2%	1	A	U	YES	-	100.6	41.0	36.0	0.6	67.9	0.12	0.14
2394969	RC10	Not Given	3.00	3.13	C	Grey SANDSTONE	WC = 4.8%	1	D	U	YES	64.2	102.5	101.0	95.0	6.7	98.7	0.69	0.93
2394970	RC10	Not Given	4.33	4.40	C	Grey SANDSTONE	WC = 5.6%	1	A	U	YES	-	101.2	59.0	54.0	2.8	83.4	0.40	0.51
2394972	RC10	Not Given	5.90	5.95	C	Grey SILTSTONE	WC = 3.3%	1	A	U	YES	-	101.2	59.0	45.0	3.0	76.1	0.52	0.63
2394974	RC10	Not Given	7.32	7.45	C	Grey SILTSTONE	WC = 2.6%	1	D	U	YES	61.0	100.6	100.0	94.0	4.3	97.3	0.45	0.61
2394976	RC10	Not Given	9.36	9.50	C	Grey SILTSTONE	WC = 2.5%	1	A	U	YES	-	100.7	78.0	52.0	10.9	81.6	1.63	2.03

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
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Comments:

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4041

Client: Curtins

Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton

Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF POINT LOAD STRENGTH**

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 09/08 - 10/08/2022

Date Received: 16/08/2022

Date Tested: 08/09/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2394978	RC10	Not Given	10.00	10.15	C	Grey SILTSTONE	WC = 2.5%	1	A	U	YES	-	100.3	63.0	46.0	15.5	76.6	2.63	3.19
2394980	RC10	Not Given	13.22	13.40	C	Dark grey MUDSTONE	WC = 5.5%	1	A	U	YES	-	99.0	57.0	44.0	0.6	74.5	0.10	0.12
2394982	RC10	Not Given	16.13	16.18	C	Grey SILTSTONE	WC = 1.3%	1	A	U	YES	-	100.5	58.0	53.0	2.8	82.3	0.41	0.52
2394983	RC10	Not Given	17.47	17.72	C	Grey SILTSTONE	WC = 1.9%	1	A	U	YES	-	100.7	56.0	39.0	14.1	70.7	2.82	3.30
2394984	RC10	Not Given	18.40	18.48	C	Grey SILTSTONE	WC = 1.7%	1	A	U	YES	-	100.3	47.0	35.0	5.3	66.8	1.19	1.35
2394986	RC10	Not Given	21.35	21.50	C	Grey SILTSTONE	WC = 1.2%	1	I	U	YES	52.1	100.6	68.0	64.0	3.0	90.5	0.36	0.47
2394987	RC10	Not Given	22.00	22.18	C	Grey SILTSTONE	WC = 1.7%	1	D	U	YES	63.8	100.2	100.9	94.0	5.4	97.1	0.57	0.77
2394988	RC10	Not Given	22.65	22.85	C	Grey SILTSTONE	WC = 2.1%	1	D	U	YES	63.0	100.6	100.0	95.0	16.5	97.8	1.73	2.33
2394989	RC10	Not Given	24.23	24.40	C	Grey SILTSTONE	WC = 3.4%	1	I	U	YES	63.3	100.6	67.0	60.0	21.4	87.7	2.78	3.58
2394990	RC10	Not Given	24.73	24.85	C	Grey SILTSTONE	WC = 1.5%	1	I	U	YES	64.2	100.9	78.0	73.0	10.2	96.8	1.09	1.46

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
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4041

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Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton

Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF POINT LOAD STRENGTH**

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 10/08 - 11/08/2022

Date Received: 16/08/2022

Date Tested: 08/09/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2394991	RC10	Not Given	25.24	25.29	C	Grey SILTSTONE	WC = 3.4%	1	A	U	YES	-	100.2	51.0	29.0	12.8	60.8	3.45	3.76
2394992	RC10	Not Given	26.90	27.00	C	Grey SILTSTONE	WC = 5.4%	1	A	U	YES	-	100.7	58.0	43.0	2.8	74.2	0.50	0.60
2394993	RC10	Not Given	27.93	28.07	C	Grey SILTSTONE	WC = 3.0%	1	D	U	YES	66.2	100.6	100.0	96.0	2.8	98.3	0.29	0.39
2394994	RC10	Not Given	29.50	29.66	C	Grey SILTSTONE	WC = 3.5%	1	A	U	YES	-	100.8	51.0	44.0	4.6	75.2	0.81	0.98
2394996	RC11	Not Given	1.90	2.00	C	Brown silty CLAY	WC = 19.4%	1	A	U	YES	-	101.3	49.0	41.0	1.2	72.7	0.22	0.26
2394998	RC11	Not Given	2.18	2.27	C	Grey SILTSTONE	WC = 8.0%	1	A	U	YES	-	101.4	48.0	46.0	8.9	77.1	1.49	1.81
2394999	RC11	Not Given	3.10	3.20	C	Light brown to grey SHALE	WC = 3.8%	1	A	U	YES	-	102.6	59.0	31.0	0.2	63.6	0.05	0.06
2395001	RC11	Not Given	4.15	4.26	C	Light grey SILTSTONE	WC = 3.4%	1	I	U	YES	57.6	101.4	61.0	18.0	0.4	48.2	0.17	0.17
2395002	RC11	Not Given	4.85	4.94	C	Grey SILTSTONE	WC = 3.9%	1	A	U	YES	-	100.9	61.0	47.0	16.8	77.7	2.78	3.39
2395004	RC11	Not Given	6.25	6.32	C	Grey SILTSTONE	WC = 2.2%	1	I	U	YES	50.9	66.6	56.0	52.0	2.2	66.4	0.49	0.55

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
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4041

Client: Curtins

Client Address: 2 The Wharf, Bridge Street,
Birmingham, B1 2JS

Contact: Rob Swinnerton

Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF POINT LOAD STRENGTH**

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 11/08 - 15/08/2022

Date Received: 16/08/2022

Date Tested: 08/09/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2395006	RC11	Not Given	7.70	7.80	C	Grey SILTSTONE	WC = 3.2%	1	A	U	YES	-	100.1	54.0	31.0	6.1	62.9	1.53	1.70
2395008	RC11	Not Given	9.00	9.13	C	Grey SILTSTONE	WC = 2.6%	1	A	U	YES	-	100.0	55.0	37.0	9.2	68.6	1.95	2.25
2395010	RC11	Not Given	10.73	10.89	C	Grey SILTSTONE	WC = 3.4%	1	D	U	YES	67.2	100.7	100.0	92.0	7.2	96.2	0.77	1.04
2395011	RC11	Not Given	12.23	12.40	C	Grey SILTSTONE	WC = 4.3%	1	I	U	YES	55.7	101.6	58.0	54.0	1.0	83.6	0.14	0.17
2395012	RC11	Not Given	12.72	12.91	C	Grey SILTSTONE	WC = 2.6%	1	A	U	YES	-	100.4	39.0	35.0	4.4	66.9	0.98	1.12
2395013	RC11	Not Given	14.49	14.63	C	Grey SILTSTONE	WC = 3.0%	1	A	U	YES	-	99.5	67.0	55.0	5.9	83.5	0.85	1.07
2395015	RC11	Not Given	16.50	16.70	C	Brownish grey SILTSTONE	WC = 2.2%	1	A	U	YES	-	99.9	72.0	55.0	9.7	83.6	1.38	1.74
2395016	RC11	Not Given	17.50	17.69	C	Brown silty CLAY	WC = 18.0%	1	I	U	YES	-	100.1	47.0	39.0	1.2	70.5	0.23	0.27
2395017	RC11	Not Given	18.67	18.84	C	Grey SILTSTONE	WC = 1.8%	1	I	U	YES	65.2	100.9	77.0	68.0	19.7	93.4	2.26	2.99
2395019	RC11	Not Given	22.36	22.45	C	Grey SILTSTONE	WC = 1.7%	1	A	U	YES	-	100.2	56.0	44.0	7.7	74.9	1.36	1.63

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
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Contact: Rob Swinnerton

Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT**DETERMINATION OF POINT LOAD STRENGTH**

Tested in Accordance with: ISRM: 2007, pages 125-132

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Environmental Science

Client Reference: B079532.304

Job Number: 22-78992

Date Sampled: 15/08/2022

Date Received: 16/08/2022

Date Tested: 08/09/2022

Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks # (including water content if measured)	Specimen Reference	Test Type see ISRM		Failure Valid (Y/N)	Dimensions				Force P kN	Equivalent diameter, De mm	Point Load Strength Index	
		Reference	Depth Top m	Depth Base m	Type				Type (D, A, I, B)	Direction (L, P or U)		Lne mm	W mm	Dps mm	Dps' mm			Is MPa	Is(50) MPa
2395020	RC11	Not Given	24.29	24.50	C	Grey SILTSTONE	WC = 1.7%	1	A	U	YES	-	99.4	61.0	46.0	20.3	76.3	3.48	4.21
2395022	RC11	Not Given	26.84	27.00	C	Grey SILTSTONE	WC = 2.2%	1	A	U	YES	-	98.3	70.0	46.0	9.4	75.9	1.62	1.96
2395023	RC11	Not Given	27.60	27.80	C	Grey SILTSTONE	WC = 2.3%	1	A	U	YES	-	98.2	44.0	26.0	8.5	57.0	2.60	2.76
2395024	RC11	Not Given	29.20	29.35	C	Grey SILTSTONE	WC = 3.0%	1	A	U	YES	-	97.1	39.0	32.0	4.4	62.9	1.11	1.23

Note: # non accredited; Test Type: D - Diametral, A - Axial, I - Irregular Lump, B - Block; Direction: L - parallel to planes of weakness, P - perpendicular to planes of weakness, U - unknown or random;
Dimensions: Dps - Distance between platens (platen separation), Dps' - at failure (see ISRM note 6), Lne - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P;
Detailed legend for test and dimensions, based on ISRM, is shown above; Size factor, F = (De/50)0.45 for all tests

Comments:

Signed:

Monika Siewior

Monika Siewior
Reporting Specialist
for and on behalf of i2 Analytical Ltd

Opinions and interpretations expressed herein are outside of the scope of the UKAS Accreditation. This report may not be reproduced other than in full without the prior written approval of the issuing laboratory. The results included within the report relate only to the sample(s) submitted for testing.



4041

Client: Curtins
 Client Address: 2 The Wharf, Bridge Street,
 Birmingham, B1 2JS

Contact: Rob Swinnerton
 Site Address: Trinity - Stage 2 GI

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

SUMMARY REPORT

DETERMINATION OF UNIAXIAL COMPRESSIVE STRENGTH OF ROCK MATERIALS

Tested in Accordance with: ISRM, 2007, p153, part 1

i2 Analytical Ltd
 Unit 8 Harrowden Road
 Brackmills Industrial Estate
 Northampton NN4 7EB



Environmental Science

Client Reference: B079532.304
 Job Number: 22-78992
 Date Sampled: 03/08 - 15/08/2022
 Date Received: 16/08/2022
 Date Tested: 07/09 - 08/09/2022
 Sampled By: Not Given

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Specimen Dimensions (2)				Bulk density (2) Mg/m3	Water Content (1) %	Uniaxial Compression (3)			
		Reference	Depth Top	Depth Base	Type			Diameter	Length	H/D	Orientation of sample			Condition	Stress Rate	Mode of failure	UCS
			m	m											Mpa/s		
2394905	RC07	Not Given	18.20	18.50	C	Grey SILTSTONE		100.7	240.0	2.4	Vertical	2.73	3.6	as received	0.1255	MS + AC	57.3
2394979	RC10	Not Given	12.10	12.40	C	Grey SILTSTONE		100.5	260.9	2.6	Vertical	2.59	1.8	as received	0.0882	MS + AC	32.9
2394985	RC10	Not Given	18.76	19.06	C	Grey SILTSTONE		100.8	261.3	2.6	Vertical	2.60	2.1	as received	0.0627	MS + AC	18.5
2395018	RC11	Not Given	21.14	21.50	C	Grey SILTSTONE		98.7	256.0	2.6	Vertical	2.62	1.8	as received	0.0914	MS + AC	32.9
2395021	RC11	Not Given	24.50	24.81	C	Grey SILTSTONE		98.7	258.5	2.6	Vertical	2.59	2.2	as received	0.0915	MS + AC	35.6

Note: 1 - ISRM p87 test 1, water content at 105 ± 3 °C, specimen as tested for UCS, 2 - ISRM p86 clause (vii), Caliper method used for determination of bulk volume and derivation of bulk density, 3 - ISRM p153 part 1, determination of Uniaxial Compressive Strength (UCS) of Rock Materials, above notes apply unless annotated otherwise in the remarks. Compaction machine: VJ Tech AUTOCON - VJT 51-3011; Mode of failure legend: S - Single shear, MS - multiple shear, AC - Axial cleavage, F - Fragmented

Comments:

Signed:

Monika Siewior

Monika Siewior
 Reporting Specialist
 for and on behalf of i2 Analytical Ltd

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079532-CUR-XX-XX-T-GE-00005

Trinity Academy, Barnsley

Supplemental Ground Investigation



Appendix A4 – Groundwater Monitoring Results

MONITORING LOG SHEET

Project:	Trinity Stage 2 GI	Date:	01/09/2022
Job Number:	B079532.304	Visit:	1
Client:	Bowmer & Kirkland	Weather:	Overcast
Barometric State:	-	Ground Conditions:	Wet

Borehole Reference	Barometric Pressure mb	Flow l/hr		Methane %		Carbon Dioxide %		Oxygen %	Hydrogen Sulphide ppm	Carbon Monoxide ppm	Water Level m bgl	Borehole Base m bgl	Note
		Max	SS	Max	SS	Max	SS						
RC07S											Dry	5.10	
RC07D											20.40	26.00	
RC09S											Dry	6.00	
RC09D											18.60	19.90	
RC11S											2.65	3.65	
RC11D											Dry	15.00	

Notes

Ground gas monitoring is outside the scope of these monitoring visits and has been assessed previously.

Logged by

RS

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

MONITORING LOG SHEET

Project:	Trinity Stage 2 GI	Date:	12/09/2022
Job Number:	B079532.304	Visit:	2
Client:	Bowmer & Kirkland	Weather:	Raining
Barometric State:	-	Ground Conditions:	

[illegible]

Notes

Logged by _____

Ground gas monitoring is outside the scope of these monitoring visits and has been assessed previously. RH

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

MONITORING LOG SHEET

Project:	Trinity Stage 2 GI	Date:	26/09/2022
Job Number:	B079532.304	Visit:	3
Client:	Bowmer & Kirkland	Weather:	Overcast
Barometric State:	-	Ground Conditions:	Damp

[illegible]

Notes

Ground gas monitoring is outside the scope of these monitoring visits and has been assessed previously.

Logged by

RS

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.
All other gases recorded at 'steady state' unless otherwise stated

MONITORING LOG SHEET

Project:	Trinity Stage 2 GI	Date:	11/10/2022
Job Number:	B079532.304	Visit:	4
Client:	Bowmer & Kirkland	Weather:	Overcast
Barometric State:	-	Ground Conditions:	Damp

[illegible]

Notes

Logged by _____

Ground gas monitoring is outside the scope of these monitoring visits and has been assessed previously. RS

1% gas volume = 10,000 ppm

Flow rate, methane and carbon dioxide reported as 'maximum' (max) and 'steady state' (SS) readings.

All other gases recorded at 'steady state' unless otherwise stated

Appendix A5 – Risk Assessment Methodology

The site-specific risk assessment, presented in this report, follows the principle of establishing whether there is a viable linkage between a contaminant source to a potential receptor, via an exposure pathway.

The risk assessment corresponds with the total site area and incorporates both descriptive (qualitative) and, where available, numerical (quantitative) lines of evidence.

Risk assessment is the process of collating known information on a hazard or set of hazards to estimate actual or potential risk to receptors. The receptor may be humans, a water resource, a sensitive local ecosystem, or future construction materials. Receptors can be connected to the source by one or several exposure pathways such as direct contact for example. Risks are generally managed by isolating the receptor or intercepting the exposure pathway or by isolating or removing the hazard.

Without the three essential components of a source, pathway, and receptor there can be no risk. Therefore, the presence of contaminant source on a site does not necessarily mean there is a risk.

The risk assessment considers the likelihood of an event taking place (accounting for the presence of the source and receptor and the viability of the exposure pathway) in conjunction with the severity of the potential consequence (accounting for the potential severity of the hazard and the sensitivity of the receptor).

In the risk assessment the consequence of the hazard has been classified as severe, medium, mild, or minor and the probability (likelihood) of the circumstances occurring classified as high likelihood or likely or low likelihood or unlikely.

The consequences and probabilities are subsequently cross correlated to give a qualitative estimation of the risk using Department of the Environment risk classifications as detailed in the table below and as referenced in CIRIA C552.

		Consequence			
		Severe	Medium	Mild	Minor
Probability (Likelihood)	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

In accordance with DoE guidance, the following categorisation of **consequence** has been developed.

Classification	Definition	Examples
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 of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to an ecosystem or organisation forming part of such ecosystem.	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health. Pollution of sensitive water resources. A significant change in an ecosystem or organism forming part of such ecosystem.	Concentration of a contaminant from site exceeds the generic or site-specific assessment criteria. Leaching of contaminants from a site to a Principal or Secondary A aquifer. Death of a species within a designated nature reserve. Lesser toxic and asphyxiate effects
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures, and services. Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater (Inc. Secondary B aquifers). Damage to building rendering it unsafe to occupy (e.g., foundation damage resulting in instability).
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.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

In accordance with DoE guidance, the following categorisation of **probability** has been developed.

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 pollution 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 such event would take place and is 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.

In accordance with DoE guidance, the following categorisation of **risk** has been developed.

Classification	Definition
Very High Risk	There is a <i>high probability</i> that <i>severe harm</i> could arise to a designated receptor from an identified hazard at the site without appropriate further action.
High Risk	<i>Harm is likely to arise</i> to a designated receptor from an identified hazard at the site without appropriate further action.
Moderate Risk	<i>It is possible</i> that without appropriate further action <i>harm could arise</i> to a designated receptor. It is relatively <i>unlikely</i> that any such harm would be <i>severe</i> , and if any harm were to occur it is <i>more likely</i> that such harm would be <i>relatively mild</i> .
Low Risk	<i>It is possible</i> that <i>harm could arise</i> to a designated receptor from an identified hazard. It is <i>likely</i> that, at worst, if any harm was realised any effects would be <i>mild</i> .
Negligible Risk	The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

The term 'risk' in this instance refers to the risk that the source, pathway, receptor linkage for a given source of contamination is complete. It does not refer to immediate risk to individuals or features present on the site from potential contaminants and is intended to be used as a tool to assess the necessity of further investigation.

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